



2007  
AOA Historic Artifact  
Identification Workshop  
Packet

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**AOA Historic Artifact ID Workshop**

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BASIC BOTTLE IDENTIFICATION

Jim Rock

This guide is designed to assist in identification and description of historic bottles and is not meant to be all inclusive. The contents focus upon, but are not totally limited to, the time period from 1850 to the middle of the twentieth century. Basic bottle identification is an introduction into the world of historic bottles and attempts to standardize field recording and assist in documenting information that can help us understand the past.

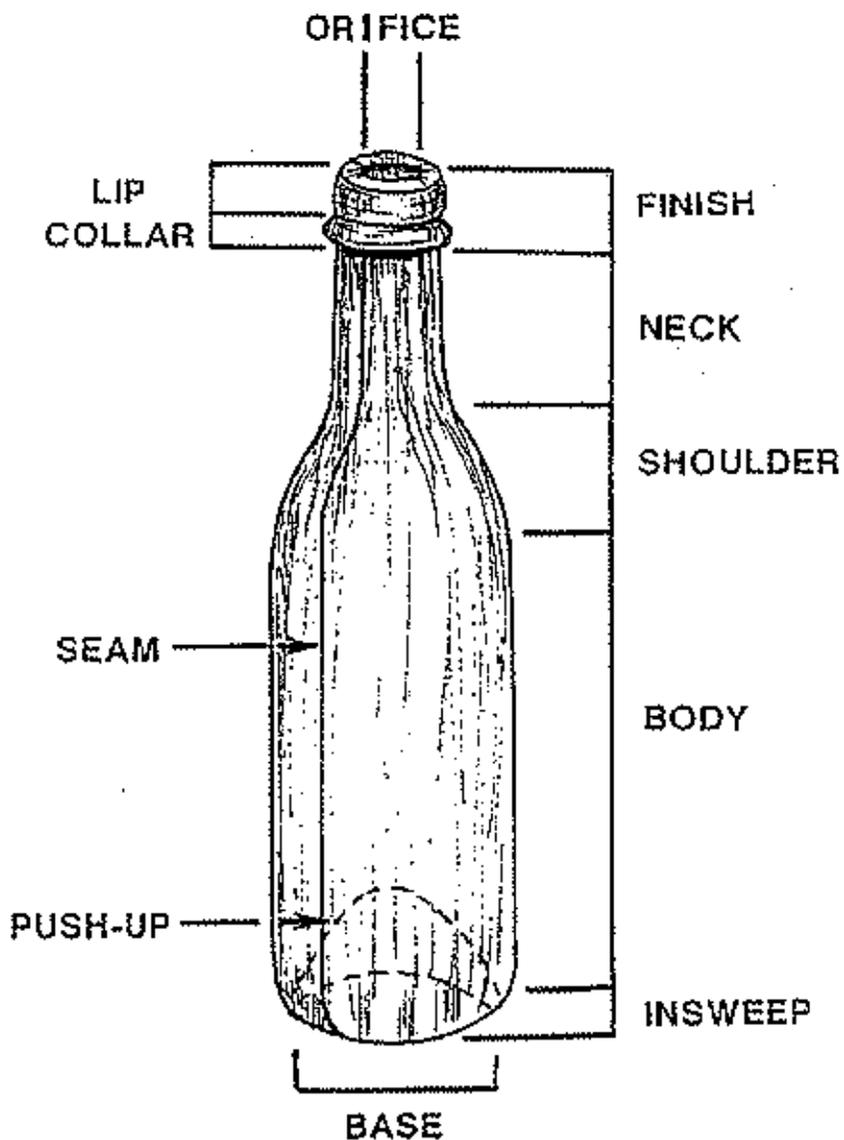
My thanks to the many people who have helped guide me through the bottle battlefield. Special thanks to Richard Fike, Mike Hendryx and John Hitchcock whose advise and comments have greatly improved this pamphlet.

The illustrations were done by Barbara Davis. The errors and omissions are of course mine.

Jim Rock

In describing historic bottles, standardization of terms are necessary to understand what the observer is referring to. The following terms are in common use:

BOTTLE ATTRIBUTES



**Orifice:** A bottle opening's mouth, aperture or bore.

**Lip:** A margin of glass surrounding the bottle's opening. The lip is the edge of the orifice.

**Collar:** A band, bead or ring of glass applied to and encircling the bottle neck. The collar may be just below the bottle lip or some distance from it.

**Neck:** The constricted part of a bottle which is situated between the top of the shoulder and the collar, if any exists. If no collar is present, the neck extends to the lip.

**Finish:** Any part of a bottle, including the neck, that was not made in the mold. Typically, this term refers to the lip and collar of a bottle, but may include any other addition or modification.

**Shoulder:** A part of a bottle between the point of change in vertical tangency of the body and the base of the neck.

**Body:** The main part of a bottle between the edge of the base and the point where the sides begin to curve in toward the neck.

**Base:** That part which the bottle rests on when sitting upright.

**Insweep:** The lower part of the bottle from where the maximum diameter begins to curve inward to meet the base.

**Push-up or Kick-up:** A push-up is a slightly concave part of the base. Kick-up is the term often used for a pronounced push-up. A kick-up is common in wine bottles while a push-up refers to any concave bottom of a bottle.

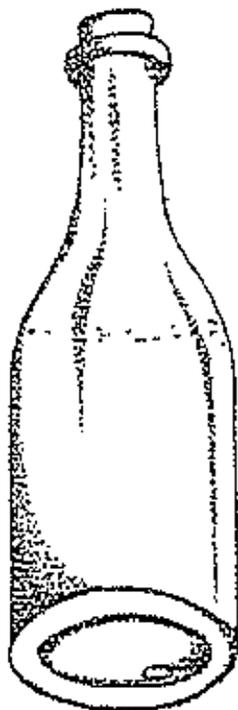
**Seam:** A line left on a bottle that resulted from where the sections of a mold fit together.

**References:** Berge 1980:38-40; James 1989; Personal Communication; Schulz 1980; Personal Communication; Switzer 1974:7; White 1978:59, 64.

## MOLDS

### Dip Molds

Dip molds or single-piece molds were perhaps the first molds used in bottle manufacture. They were common between 1790 and 1810. Bottles formed in a dip mold often have a seam mark around the shoulder caused by "blow-over" of the glass during forming. This blow-over is at the widest part of the bottle; the shoulder and neck are drawn by hand. The necks may show evidence of the glass having been stretched and twisted while this part of the bottle was formed. This type of bottle may have a pontil mark on its base (refer to the section on bases). In wine bottles, these stretch marks may be associated with sheared lips or applied finishes. Black glass bottles with sloping collar and double-collar finishes were also made by this process. Bottles made in dip molds always narrow a little from shoulder to base so that the bottle can be withdrawn from the mold. This technique allowed embossing on the base, or on specially applied shoulder seals (Berge 1980:61; Jones and Sullivan 1985:25-26; Lorrain 1968:38; Munsey 1970:38; Schulz 1980: Personal Communication; Toulouse 1969a:530).



### Turn Mold

The turn mold was another type of dip mold, but differed in that the process turned a bottle within its mold as it was formed. The result is similar to the dip mold made bottle, but may have impressions, grooves or scratches running around its circumference which gave the bottle a high polish. Lettering or design were absent on these bottles. This type of bottle became popular in America in the 1870's and was manufactured at least until World War I (Jones and Sullivan 1985:31; Toulouse 1969a:531-532).

### Iron Hinged Bottom Mold

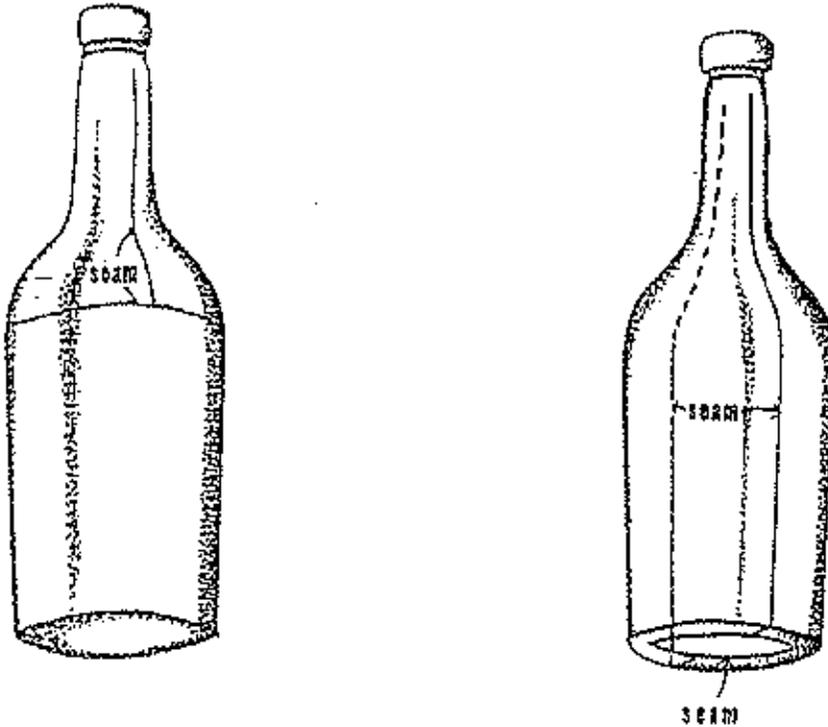
The iron hinged bottom mold typically produced a bottle with a seam across its bottom and up its sides. If a bottle was not round, the seams were found on its corners. Typically, hinge mold bottles will have hand applied lips and the mold seam will appear to stop just below this finish (Berge 1980:64; Jones 1971b:9; Jones and Sullivan 1985:26-27; Kendrick 1969:20; Munsey 1970:39; Toulouse 1969a:535). This method of molding bottles was most popular between 1750 and 1880 and became the major form for medicine bottles by the 1860's.



Mold-made bottles featuring plated molds, called "slug plates" were manufactured extensively between 1850 and the early 1920's. The first well-known plated mold was the three-piece Ricketts' mold patented in December 1821 which had a removable plate around the outer circumference of the base. This so-called slug plate could be changed to provide personalized embossed logos on a standard bottle shape for a buyer. The plate left a rounded or rectangular raised line around the embossing (this feature might be decorative). It also left two faint horizontal lines stretching from one vertical body mold line to another. Raised lettering of this type was very typical of bottles made in the 1880's. These bottles were used extensively by druggists, soda drink manufacturers and those selling milk (see drug store bottle illustration). Slug plates were also used on many machine-made bottles (Jones 1971b:10; Jones and Sullivan 1985:28; Kendrick 1967:22; Munsey 1970:40; Toulouse 1969b:584; Ward, et. al. 1977:235).

### Three-Part Mold

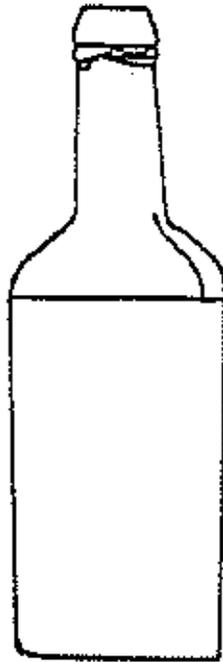
Bottles made using this mold form were most popular between 1870 and 1910. Three-part mold-made bottles came in several styles. The most common type is where the base and body were a single piece with the hinge at the widest point of the shoulder. Bottles made using this type of mold have seams that circle the body at the shoulder and extend onto the neck. By the 1880's, the lips attached to these bottles were applied by hand or by using a lipping tool. Some types of molds left three or more vertical seams that ran up the bottle from the base which indicated the mold was vertically hinged. Three-part mold glass manufacture was most popular in art glass (Jones 1971b:9; Kendrick 1967:22; Munsey 1970:39; Newman 1970:72; Toulouse 1969a:573-580).



By 1875, improvement to the iron mold caused some seams to extend to the edge of the lip. The closed mouth mold was invented in 1880 and formed the base, body, shoulder and neck to about 1/8 inch from the lip of the bottle (Kendrick 1969:22; Putman 1965: Preface).

Ricketts or Ricketts-Type Mold (three piece mold)

The Ricketts mold is a three piece mold which used a dip mold for the body and shoulder--or shoulder and neck--halves. (There can be a base section that forms a fourth component.) By the end of the 19th century, the Ricketts mold for liquor bottles had nearly disappeared (Jones and Sullivan 1985:29-10).



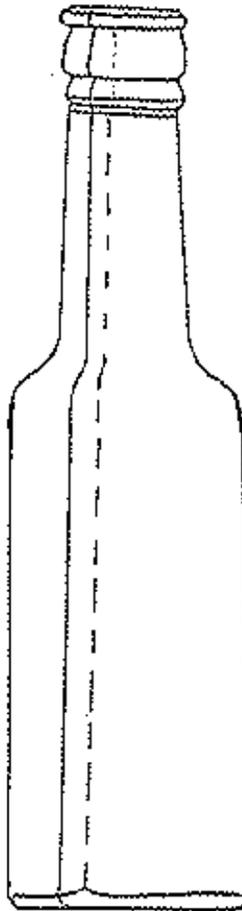
Press Molding

Press molding, a process carried out entirely by machine, became common in the 1860's and 1870's and was restricted to bottles that were opened at the top. These bottles had relatively wide mouths. The inside of the vessel was shaped by a plunger (Jones and Sullivan 1985:33-35).



### Machine-Made Bottles

Michael J. Owens invented an automatic machine for blowing glass bottles in 1903 and patented this process in 1904. Bottles produced by this method have continuous mold lines running up the sides and onto the top of the lip. By 1920, screw top bottles with outside threads were common. These bottles had a fire polished finish which nearly eliminated the seam mark. This method of bottle manufacture is still the most common manufacturing technique used today (Berge 1980:64; Jones and Sullivan 1985:37; Lorrain 1968:40; Kendrick 1967:24; Kendrick 1968:160; Riley 1958:105, 254).



### BOTTLE BASE MARKS

A pontil is a rod which was attached to the base of a molten bottle allowing the bottle to be finished. When finishing was completed, the pontil was removed, leaving a scar where it had been attached. The pontil marks or scars are present on all bottles made before 1840. The majority of bottles made before 1870, however, will also have these scars. Most bottles made with a pontil were free blown or dip mold manufactured. Recent studies in Sacramento have recovered some bottles that were made in two-piece molds that have pontil scars. Free blown bottles made today may also have pontil scars. Various types of pontils, glass and metal for example, leave different pontil marks; but for our purposes, recognition of the pontil scar or mark is sufficient (Jones 1971a:71; Jones 1971b:8; Jones and Sullivan 1985:45; Kendrick 1967:20; Kendrick 1968:123; Munsey 1970:47-50; Newman 1970:72; Schulz 1980: Personal Communication; Toulouse 1968a:140-141).

The snap case began to replace the pontil in bottle manufacturing after the 1840's and, by the 1860's, was in common use. The snap case is a rod with four curved and padded arms on the end that clamp around the bottle. Snap case marks may be identified by four slight impressions on the body of a bottle, although many times it leaves no impressions. Because of this, one can assume that a hand or mold-made bottle that has no pontil mark was probably held by a snap case (or similar tool) while the finish was applied (Jones and Sullivan 1985:45; Kendrick 1967:20; Schulz, et. al. 1980:2-3; Schulz 1981: Personal Communication).

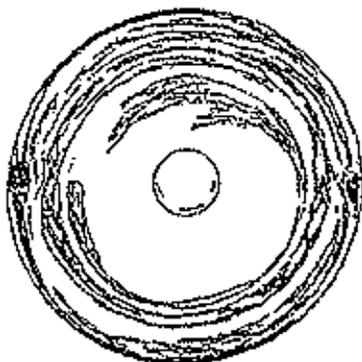
### Cut-Off Scars

By 1904, machine-made bottles began to dominate bottle production. These bottles have a base feature called "cut-off" (suction machine cutoff) scars. These are little seams, often having "feathered edges" that form a circle on the base of the bottle. This circle may be faint or pronounced and varies in diameter. Most recent bottles will show these scars, though stippled or ridged designs are often used to obscure them. The most distinctive of these scars is made by the Owens bottling machine which leaves an off-center circular mark that has "feathery" edges. This mark is created when shears cut off the gob of glass in the suction machine.



Valve Marks

Machine-made "valve" marks may be found on the base of 1930's and 1940's wide mouth food jars and on many milk bottles. The valve mark is a result of a plunger that pushed the bottle from the mold. It consists of a round depression generally off-center, between 1/2 to 7/8 of an inch in diameter (Jones and Sullivan 1985:35-39; Munsey 1970:40-41; Toulouse 1969b:582-583).



## LIP FORMS

### Sheared Lips

Sheared lips date between 1810 and 1840. This type of lip is formed by cutting the glass free of the blow pipe, leaving the lip looking like a stove pipe. In Sacramento, a number of wine bottles were found that had sheared lips with a band of glass applied around the bottle neck below the lip, forming a collar (Kendrick 1964:33; Newman 1970:73, 74; Schulz 1981: Personal Communication; Ward, et. al. 1977:239).



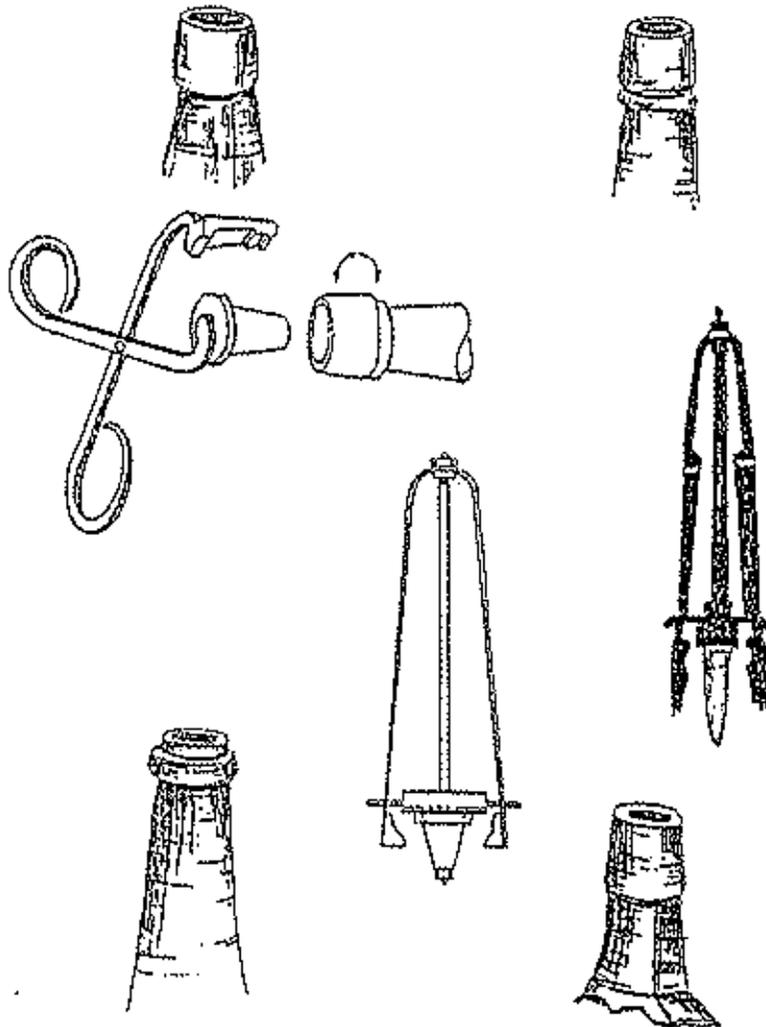
### Applied Lips

Applied, or laid on ring lips, were most common in bottles manufactured between 1840 and 1920. Applied lips form both the lip and collar of the bottle. The first type of applied lip was a ring of glass applied by hand. These lips often had crude or rough appearances. A development in applying lips was to reheat them to create a smooth (polished) surface. Hand applied lips are most frequent between 1840 and 1860, and reheated lips are common between 1880 and the early 1900's. A good example of a fired lip is the Bordeaux-style wine bottle. Many wine bottles used this type of lip well into this century (Newman 1970:74; Schulz, et. al. 1980:76; Ward, et. al. 1977:239).



### Lipping Tool

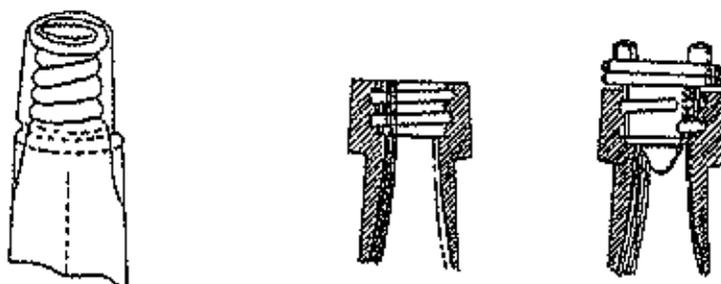
Technically, use of a lipping tool is just an improvement in making applied lips for bottles. In 1856, Amasa Stone patented the first lipping tool in the United States, a tool which made a uniform finish on the bottle's lip. In many cases, this specially-shaped tong erased the seam marks on the neck of the bottle, leaving rings and scratches around the inside and outside of the neck. A pronounced groove may be present on the inside at the bottle neck. Smooth-lipped bottles made with lipping tools may date as early as the 1820's in England. In France, lipping tools were common between 1860 and 1870. Mouth-blown bottles generally stopped being manufactured in the 1920's, but patents for the lipping tool were still being issued as late as 1910 (Ferraro 1964:79; Jones 1971b:9; Jones and Sullivan 1985:42; Kendrick 1964:33; Kendrick 1968:144; Lorrain 1968:40; McKearin and Wilson 1978:217; Munsay 1970:32, 41; Newman 1970:73-74; Toulouse 1969a:533-534).



## CLOSURES

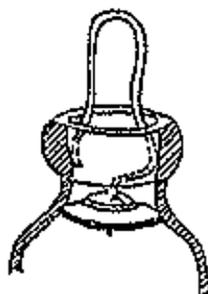
### Inside Screws

By 1855, American bottle manufacturers had a tool that made threads inside a bottle's neck. Called "inside screw" bottles, this closure required a threaded stopper and was used most commonly in whiskey bottle manufacture. It was popular from the 1870's to around 1900. About 1895 brandy bottles were being sold in Nevada with hard rubber inside screw tops for \$16.50 per gross. Samuel A. Whitney's 1861 patent (No. 31046) was designed for a glass stopper. The product within the bottle was to be mineral water, wine or malt liquors (Holabird and Haddock 1981:74; Kendrick 1964:35; Munsey 1970:32; McKearin and Wilson 1978:220).



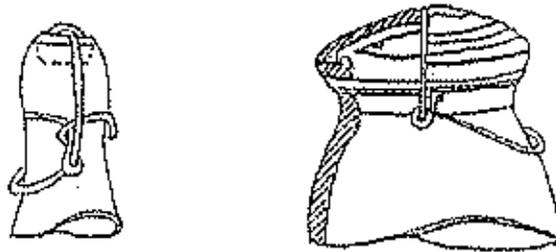
### Hutchinson Stopper

The Hutchinson stopper was extremely popular between 1879 and the 1920's. "Hutchinson Patented Spring Bottle Stopper" was patented by W. H. Hutchinson & Son of Chicago on April 8, 1879. They discontinued its production in 1912. The closure had an internal rubber gasket and a wire loop. To open this type of bottle, you drove the closure into the bottle which often gave a popping sound, hence the term "pop" bottle. Several smaller companies continued using this stopper into the 1920's (Berge 1980:47; Chance and Chance 1976:141; Jones and Sullivan 1985:162; Lief 1965:14; Lorrain 1968:42, 44; Munsey 1970:104-110, 194; Riley 1958:97, 261; Ward, et. al. 1977:239).



### Lightning Stopper

The "Lightning Stopper" was invented by Charles de Quilfieldt in 1875 and patented in the U.S. by Henry Putnam in 1882. This closure was most commonly used between 1882 and 1920 for canning jars and beer bottles. The stopper has been recently reintroduced into the U.S. market on beer bottles from Holland (Kendrick 1968:142, Jones and Sullivan 1985:162-163, 167; Lorrain 1968:42; Nunsey 1970:104; Toulouse 1979:465-466; White 1978:64).



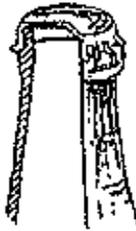
### Baltimore Loop Seal

William Painter of Baltimore, Maryland, invented the Baltimore Loop Seal in 1885. It consisted of a hard rubber disc with a wire loop on top and fit snugly into a groove just inside the orifice of the bottle. The rubber disc was replaced in 1900 with aluminum. The loop seal was primarily used for closing beer bottles and the cap was not reusable (Fike 1989: Personal Communication).



### Crown Cap

In 1889, William Painter of Baltimore invented the Crown Cap and patented it on February 2, 1892. It is still widely used today. This closure was lined with cork to form its seal. Since 1955, plastic liners as well as cork have been used and, in the 1970's, a twist-off crown was introduced (James 1989; Personal Communication; Jones 1971b:11; Kendrick 1968:142; Lief 1965:14, 40; Lorrain 1968:42, 44; Riley 1958:101, 258, 264; Ward, et. al. 1978:239).



### Kork-N-Seal Cap

When this cap was new in 1911, it was described as having the merits of the crown cap and the lightning stopper. It was designed for bottles, mostly expensive alcohol containers whose contents were not entirely consumed upon first opening.



### Continuous Thread (C.T.)

C.T. cap bottles became popular after World War I. This closure was in use by 1919 and a "quick-thread" type of closure was standardized in 1924 (Berge 1980:43; Lief 1965:26-29; White 1978:59, 62).



BOTTLE SHAPES



FRENCH SQUARE



PLAIN OVAL



VIAL



OVAL CASTOR OIL



CLUB SAUCE



OLIVE OIL



ECLIPSE OLIVE OIL



AMERICAN SQUARE PICKLE



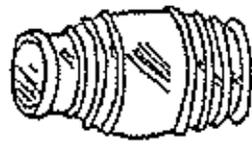
OCTAGONAL PEPPERSAUCE/SPICE



GOTHIC PEPPERSAUCE



SQUARE RING PEPPERSAUCE



FRENCH BARREL MUSTARD



ROUND HORSERADISH



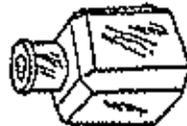
FLORIDA WATER



OVAL POLISH



SNUFF JAR



CARMINE INK



CONICAL INK



ROUND INK



GLOO INK

**BOTTLE SHAPES**



**BEER**



**CHAMPAGNE**



**CASE**



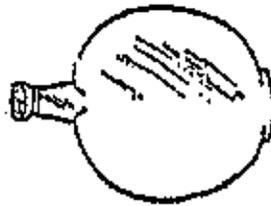
**JOJO FLASK**



**SHOOFLY FLASK**



**UNION OVAL FLASK**



**PICNIC FLASK**



**SODA WATER**



**PACKING**



**ROUND PRESCRIPTION**



**FLUTED PRESCRIPTION**



**PONCEAU BOTTLE**



**PANEL**



**BALL NECK PANEL**



**BALTIMORE OVAL**



**UNION OVAL**



**PHILADELPHIA OVAL**



**BLAKE**

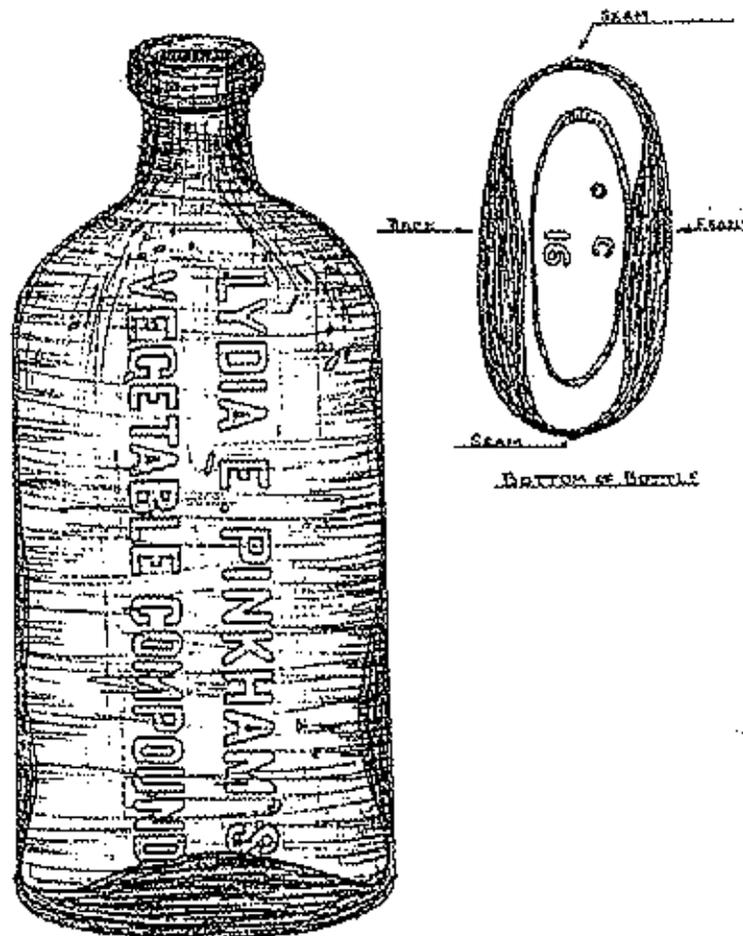


**OBLONG TOOTH POWDER**

## A FEW SPECIFIC BOTTLE STYLES

### Patent Medicine, Bitters and Drugstore

Patent medicine, bitters and drugstore bottles are similar bottle types. The patent medicine bottle was introduced into the American market around 1810. These bottles were copies of late 1700's English bottles which contained Turlington's Balsam of Life. By 1825, octagonal medicine bottles were produced only to be replaced by bottles that were oval with lips that were applied with a lipping tool. Bottles with inset panels and embossed names were in use for patent medicines by the 1840's. The personalized embossed customer's name plate was most common between 1860 and 1900. Paper labels could also be attached to these bottles.



Lydia E. Pinkham's embossed patent medicine bottle is commonly found in historic sites. This product was first brought on the market in 1873 and sold all over the world. Advertised and sold as a general tonic "good for both women and men", the primary content was alcohol. After the 1906 Pure Food and Drug Act, the alcoholic content was reduced to 15 percent.

Bitters bottles saw their "heyday" between 1860 and 1900. Bitters and patent medicine bottles had a cork closure.



Dr. Jacob Hostetter's celebrated stomach bitters is perhaps the best known of all bitters bottles. This tonic was first produced in 1853. During the Civil War, Hostetter's Bitters were used as an invigorant before soldiers went into battle. The product contained 47 percent alcohol (94 proof) and was on the market well into the twentieth century.

Reuseable drugstore bottles were made with tight-fitting glass stoppers. Schulz (1980) suspects that most druggists' bottles used cork rather than glass stoppers and that the glass stoppers were used for perfume as well as drugs and chemical bottles. In order to provide a tight stopper fit, the inside of the bottle neck was often ground.



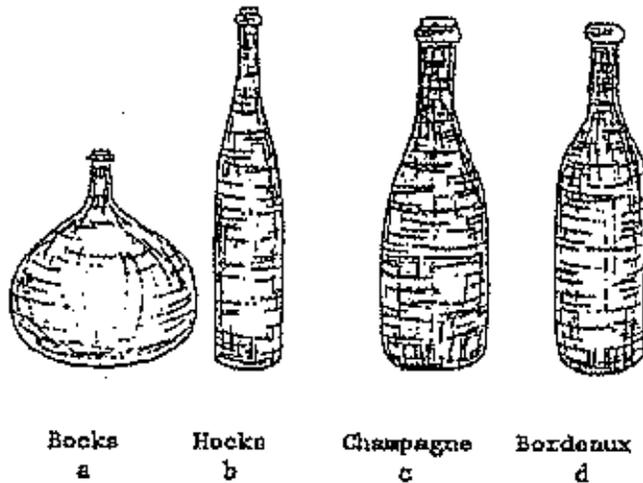
Very little is known about Robert O. Dewitt, a Yreka druggist. There is a Robert Oscar Dewitt listed in the 1867 Great Register of Siskiyou County, but the bottle bearing that name was manufactured between 1900 and 1935. It is not known if the 1867 registered Dewitt was indeed the druggist.

By the 1880's, the size and shape were standardized for most of these bottles. As is the case with patent medicine and bitters bottles, drugstore bottles of this type are still being manufactured (Fike 1987; Fike 1989: Personal Communication; Jones 1971b:10; Kendrick 1964:15; Lorrain 1968:40-44; Munsey 1970:65-69, 112, 174-181; Putnam 1965: Preface; Schulz 1981: Personal Communication; Ward, et. al. 1977:236).

### Wine Bottles

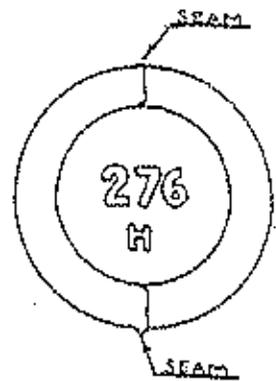
There are four primary styles of wine bottles: bocks, hocks, champagne and Bordeaux. Bocks and hocks held Rhine wine, champagne was for champagne, and Bordeaux for wine from the Department of Gironde in France. The bocks bottles (a) are squat, rather bulbous oval bottles that hold about 24 ounces of wine. They are made of reddish blown glass. The hock (b) or Rhine wine bottle tapers gradually for about three-quarters of its length. It has no distinct shoulder and its glass often has a reddish cast. The hock bottles hold about 26 ounces of wine and usually have a shallow push-up and hand-applied lip rings.

The champagne (c) bottle is larger than the Rhine bottle through the base and body and is heavier. Its shoulder tapers gradually into the neck. Champagne style bottles are usually made of dark olive green glass and hold about 13 or 26 ounces. The push-up is high in these bottles and most often they have a lipping tool applied finish. The Bordeaux style bottle (d) is of thinner glass than the champagne bottle and, consequently, is a lighter shade of olive green. This bottle is straight sided with high shoulders that are well defined. These bottles hold about 23 ounces of wine. The finish usually has a hand applied ring and the push-up is high. Champagne and Bordeaux bottles were the wine bottles in common use in the 1850-1890 time period (Jonas 1971a:66; Montagne 1961:159; Schoonmaker 1969:42; Schulz, et. al. 1980:75-76; Toulouse 1968b:61).



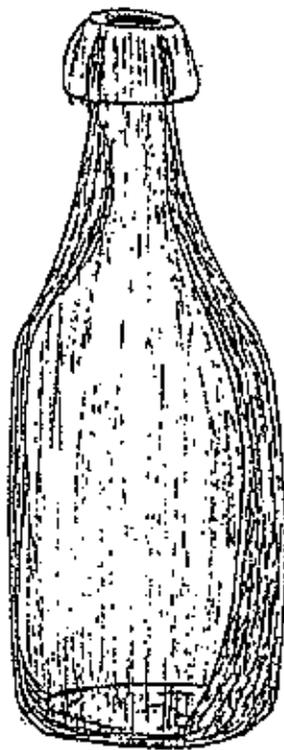
Beer Bottles

Extensive bottling of beer depended upon pasteurization, a process which was first used by breweries in 1873. Beer bottles were originally about 10 inches high, had sloping shoulders and a tapered neck. They were often embossed. The quart bottles were closed with cork stoppers that were held in place by wire. Originally, these wire holders were often a type of lightning stopper or cork closure which have since been replaced by crown caps. This type of beer bottle was used from the 1870's to the 1920's (James 1976:94; Munsey 1970:116-117; Woodward 1958:131).



Soda Water

Soda water bottles were made as early as 1825-1828 and were often called "blob top" bottles (a). Their popularity increased in the 1830's when flavors were added, but it was not until the 1890's that companies such as Coca-Cola began to bottle their soda water. At this time, the bottles were a short-necked Hutchinson type with the appropriate Hutchinson stopper. The Pure Food and Drug Act of 1906 indicated that this closure was unsanitary since the cap stayed inside the bottle even when it was washed for refilling. The bottle's popularity declined until 1912 when the Hutchinson stopper was discontinued (b). Some of these bottles remained in use until the 1920's. By 1915, Coca-Cola had standardized its bottle shape and, like the rest of the industry, adopted the crown cork cap closure. The left-hand illustration depicts a circa 1880 soda bottle. The Mt. Shasta soda bottle is post-1890 (McKearin and Wilson 1978:160; Munsey 1970:101-106; Munsey 1972:17-18, 62).



a  
Ca. 1880 Blob top  
Soda



b  
1890-1920  
Hutchinson Stopper  
Soda

### Milk Bottles

Milk bottles were invented in 1884 by Dr. Harvey D. Thatcher. The bottle had an embossed base and was closed with a lightning type fastener which was replaced with a glass closure in 1886. Lightning type milk bottle fasteners persisted until 1900. In 1889, Thatcher introduced the paper cap top and the bottles were then referred to as "common sense milk jars." Paper cap top bottles were commonly manufactured from about 1890 or 1900 into the 1940's. A type of square milk bottle was brought out around 1900, but did not last long. In 1936, Dr. Julian H. Toulouse invented a round squat bottle which was popular until 1940 when a square squat bottle was developed. The public accepted this shape. Milk bottles were embossed early in their history, but in the mid-1930's applied color labeling replaced embossing. The milk bottle was gradually phased out in the 1950's and early 1960's in favor of the disposable paper carton. Smaller dairies were the last producers to switch from glass to paper containers (James 1981: Personal Communication; Munsey 1970:191-194).

### GLASS COLOR AND LABELS

Black glass (actually a deep olive green) is generally associated with liquor, beer, wine and medicine bottles. This color of glass is most common in sites occupied between 1840 and 1880 (James 1976:94; Jones and Sullivan 1985:12,14; Kendrick 1967:20-21).

Clear glass, manufactured in the United States between 1880 and 1916, was made by adding manganese dioxide as a decolorizer. When exposed to the sun, glass with this additive turns amethyst. This color change process is also known as "solarization." The purple color varies with the amount of manganese used and the degree of exposure to sunlight. Manganese supply from Germany was interrupted by World War I, and American glass makers changed to selenium, which often turns amber with age. The use of 97 percent silica around 1920 was created in an attempt to develop a cheap crystal. This glass was found to be satisfactory and has become the clear bottle glass in use today (Hunt 1959:10; James 1981: Personal Communication; Jones 1971:11; Kendrick 1964:43; Kendrick 1967:22; Kendrick 1968:185; Munsey 1970:55; Newman 1970:74).

Applied color labels and painted-on labels were developed around 1920. They were first applied commercially to American glass in 1934 (Jones and Sullivan 1985:13,16; Munsey 1970:52; Riley 1958:145; Ward, et. al. 1977:235).

A Federal law required liquor bottles made after 1933 and before 1965 to be embossed with "Federal Law Prohibits Sale or Reuse of this Bottle." This label has been abbreviated through time (Berge 1980:78; Schulz 1981: Personal Communication).

Notes to the recorder of historic bottles:

Identification of historic material can easily be carried to the extreme. This guideline is designed to assist field people in the identification of diagnostic bottles that are useful in dating a site. Every bottle or bottle fragment does not need to be described, but it is necessary to look at the artifact array and make general comments about the composition of the materials present. If several identical artifacts are present, say so, but do not describe them repetitively. Typical examples may be sketched and/or photographed to support the statements given in the site record.

When making assumptions about site dates using bottles or bottle fragments, remember that the dates may represent patent or invention dates, not the bottle distribution date. Bottles were also informally recycled, thus extending their use life longer than they were represented in the commercial system.

Bottle parts, mold marks, base marks, lip forms and closure types need to be recorded in the field. Remember, it is of extreme importance that all lettering, numbering, or symbols be recorded. These attributes are highly diagnostic and critical in assessing the significance of the find.

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472 - BOTTLES/GLASS

472.1 - IMACS Classification: See IMACS Users Guide for complete bottle and glass classification.

472.2 - Bottle Terminology:

The following definitions for bottle terminology are taken from Berge (1980:37-38). The definitions presented below are represented by the illustration on the following page.

The average bottle consists of six basic sections – finish, neck, shoulder, body, insweep or heel, and base. The 'finish' is the top section of the bottle attached to the neck from which the bottle contents are obtained and to which a closure is applied to secure the bottle's contents from spoilage or spilling. The upper part of the finish to which a cap would seal itself is the 'sealing surface'. The diameter of the aperture opening is the 'bore'. Sometimes a ring of glass is placed around the neck at the base of the finish in order to secure the closure, usually on threaded closures, which are called a 'collar'. The collar, when present, is the basal portion of the finish. The 'neck' is generally an extension of the finish that connects the finish to the shoulder. The neck is usually the same general size and cylindrical shape as the finish. The part of the neck that connects the neck to the shoulder is termed the 'root of the neck'. The 'shoulder' is an extension between the neck and body which connects these sections to form the single unit. Often the body is wider than the neck, and the shoulder serves as a means of reducing the body diameter to the size of the neck and finish. The lower section of the body which attaches to the base is called an 'insweep'. The 'base' is under the section of the bottle on which the bottle rests when not in use. All the weight of the bottle may not rest on the entire surface of the base, if the base is not flat. Curved bases help to withstand internal pressure on the bottle, especially fermented or carbonated contents. If the base is convex, as in some soda pop bottle types, it is called a 'round bottom'. If the base is slightly concave, it is referred to as a 'push-up' (Glass Manufacturers' Federation n.d.:1). On wine bottles, the push-up is much deeper and is termed a 'kick-up'.

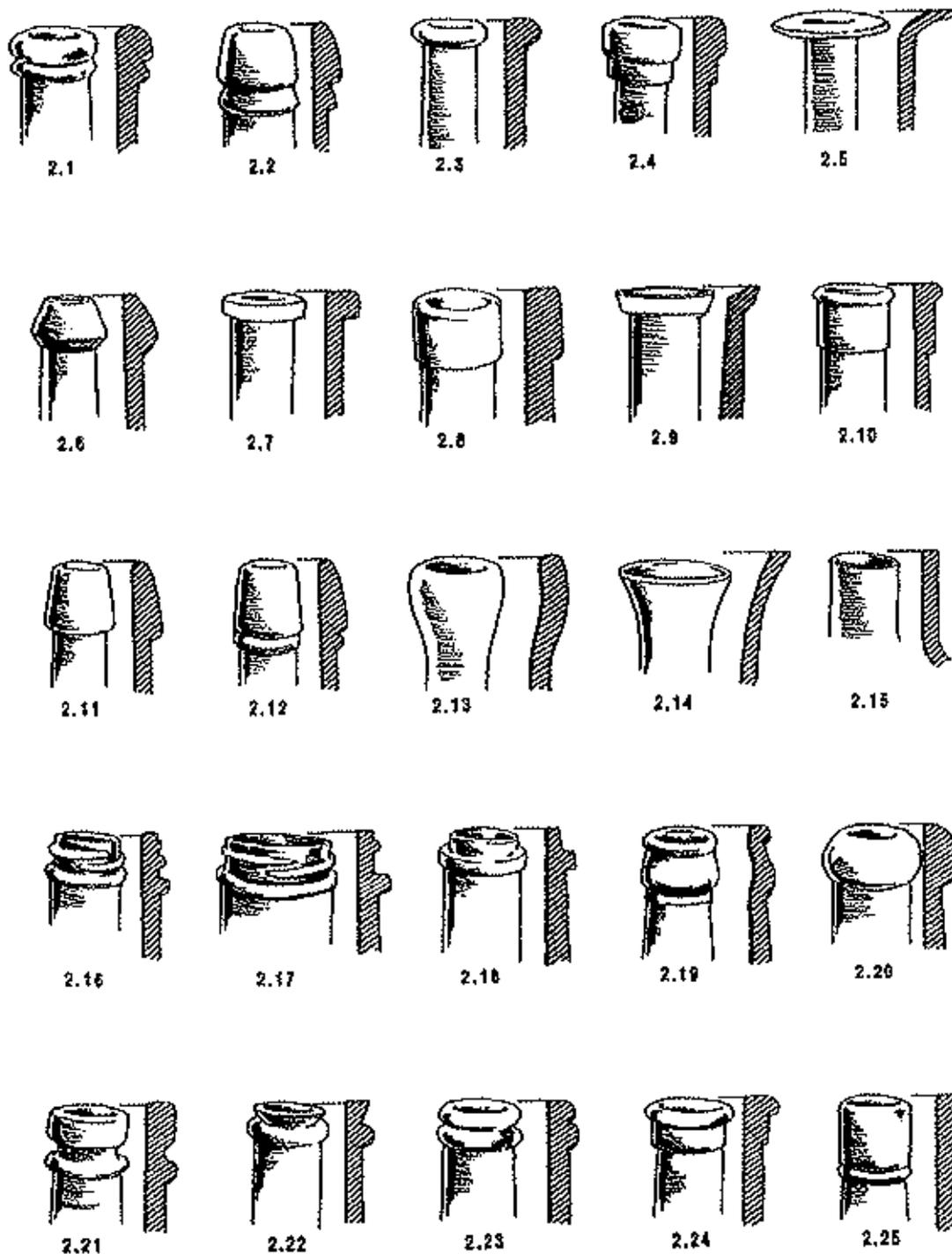
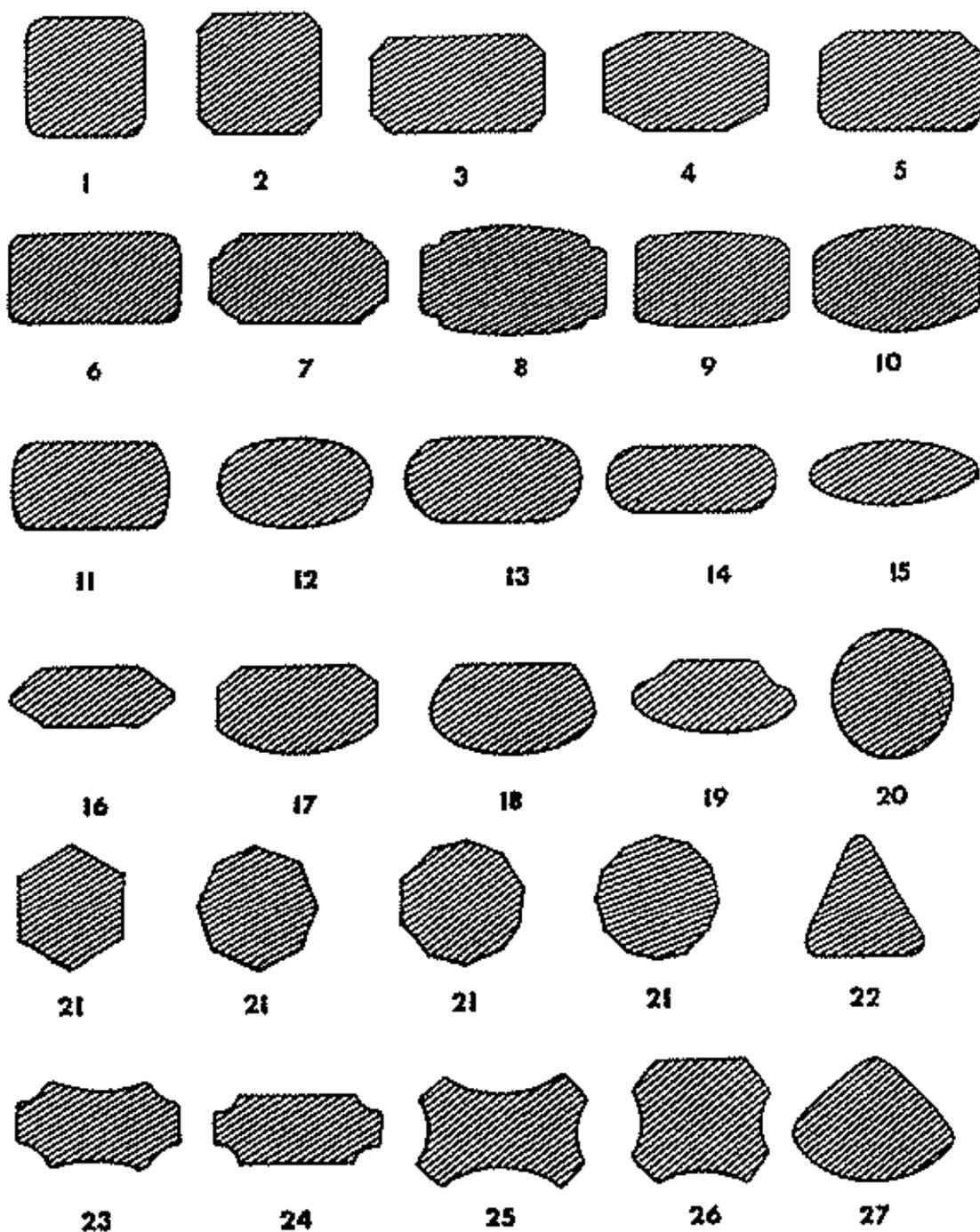


Fig. 2—NECK FINISHES: 2.1 Double Ring; 2.2 Double Oil or Mineral; 2.3 Bead; 2.4 Stove Pipe; 2.5 Wide Prescription; 2.6 Sheared Ring (occasionally ground); 2.7 Flat or Patent; 2.8 English Ring, Deep Lip or Packer; 2.9 Prescription; 2.10 Reinforced Extract; 2.11 Ring or Oil; 2.12 Wine or Brandy; 2.13 Globular Flare; 2.14 Flare or Trumpet; 2.15 Sheared or Blow Over (usually ground); 2.16 Small Mouth External Thread; 2.17 Wide Mouth External Thread;

2.18 Champagne; 2.19 Crown; 2.20 Blob; 2.21 Grooved Ring; 2.22 Flared Ring; 2.23 Stacked Ring; 2.24 Collared Ring; 2.25 Straight Brandy or Wine. *Shapes and names are compiled from information from Cumberland Glass Co. Catalog, 1911; Dominion Glass Co. Catalog, n.d.; Illinois Glass Co. Catalog, 1911 (Patterson 1965); Whiteall Tatum Glass Co. Catalog, 1880 and 1902 (James 1967); Whittory Glass Co. Catalog, 1904 (Lohman 1972).*



**BASE PROFILES:** 1 HOPKINS SQUARE; 2 FRENCH SQUARE; 3 BLAKE (VARIANT 1); 4 BLAKE (VARIANT 2); 5 BEVELED IDEAL; 6 EXCLSIOR, WINDSOR OVAL OR ROUND CORNERED BLAKE; 7 OBLONG PRESCRIPTION; 8 UNION OVAL; 9 CROWN OVAL; 10 SALAMANDER OVAL; 11 MONARCH OR ERIE OVAL; 12 PLAIN OVAL; 13 BLIKIR, OR HANDY; 14 SLENDER HANDY; 15 OVAL; 16 IRREGULAR POLYGON; 17 HUB OR GOLDEN GATE OVAL; 18 BUFFALO OR PHILADELPHIA OVAL; 19 CLAMSHELL; 20 ROUND; 21 POLYGON; 22 TRIANGLE; 23 FLUTED OBLONG (VARIANT 1); 24 FLUTED OBLONG (VARIANT 2); 25 CONCAVE; 26 FLUTED SQUARE; 27 SPHERICAL TRIANGLE  
*(Berge, 1980; Dominion Glass Co. Catalog, n.d.; James, 1967 (1902, Whitall Tatum Glass Co. Catalog Reprint); Putnam, 1965 (1911, Illinois Glass Co. Catalog Reprint.); 1907, Peter Van Schaack & Sons Drug Catalog).*

472.3 Bottle Chronologies and Manufacturers Techniques:1) Bottle Chronology: (from Berge 1980)

1700-1800: Typical bottles were the tall and squat bottles with kick-up bases, squat types with long necks, and late types with high kick-ups. Another common bottle type was the Dunmore.

1780-1840: The most common feature of bottles before 1820 is the crude blow-over finish formed by simply cutting the container free from the blow pipe--also called a 'sheared lip' (Kendrick 1966:28). Other popular bottles included the Ludlow, Chestnut flasks, and the swirled bottle.

1840-1860: With the glass industry in full bloom diversification began to take place and new inventions were produced to satisfy the demands of consumers.

The bottles of this period and earlier were formed by open molds in which only the body was formed. The neck and finish had to be shaped by hand. This type of mold leaves a seam on the bottle body which terminates on the shoulder or the low neck (Kendrick 1966:47). It was the practice of glassmakers to form finishes by applying a strip of glass around the sheared end of the neck. The manufacture of free-blown bottles died out around 1860, so that the seamless bottles of irregular shapes are seldom encountered after this date.

A common feature up to 1860 on ordinary utility items was pontil marks. This mark, found on the base of bottles, consisted of an area somewhat circular, rough and sharp where a glass rod had once been attached to maintain control during the hand-making of the finish.

Between 1850 and 1860, the pontil was gradually replaced by the soap-case. The rod was not physically attached to the bottle base, but rather a tong that snapped tight to the bottle heel was used; when removed it left no marks on the base. This left the base free for lettering or decoration (Kendrick 1966:29).

There was little concern over the color of glass until food began to be bottled. Then came the desire to see what was in the bottle, so glass had to be made lighter. Dark olive-green or black glass, common up to 1860, began to be replaced by clearer and lighter colored types of glass.

1860-1880: The bottles of this period were still produced by somewhat crude manufacturing techniques, but a change was beginning to take place. Colors were still somewhat unimportant, though they were more refined and lighter. Also, clear glass containers grew in importance around 1880. There may have been a refinement in finish

preparation, because mold seams of this period end just below the finish, an obvious indication that the finish was made separate from the body (Kendrick 1966:47).

An important characteristic of some bottles that first appeared in 1869 was that of embossing them with the names of contents, manufacturers, distributors, slogans, and messages. This practice nearly died out with the advent of automatic bottle machines (1903); paper labels were used extensively on bottles made from such machines (Kendrick 1966:71).

Beer bottles were found in the West only after 1873. As stated by Woodward (1959:126-127), pasteurization of beer is a prime requisite for the proper bottling of beer and since Pasteur's process did not come into active use in the brewing business until 1873, we can safely assume that no bottled beer was shipped to Ft. Union or any other place in the United States prior to that year.

1880-1900:

The common mold of this period was the closed mold in which the entire bottle, except the upper section of the finish or lip, was mold-made. On these bottles, the seam ends at about the middle of the neck. The contours of the finish became more controlled and standardized, resulting in more uniformity of closures (Kendrick 1966:47-48).

In 1892, a semi-automatic process called 'press and blow' was invented, which was adaptable only to the production of wide-mouthed containers. In this method, the glass was pressed into the mold to form its mouth and lip first. Then a metal plunger was forced through the mouth and the air pressure was applied to blow the body of the vessel. This process was used for the production of fruit jars and also our early milk bottles. It was not adaptable to narrow-necked bottles because of the 'bottleneck'. The necks were too small to allow the use of the metal plunger. So our conventional screw-topped bottle did not become common until after 1924, when the glass industry standardized the thread (Kendrick 1966:51).

By 1896, the first of the new semi-automatic machines was in successful operation at the Atlas Glass Works, and in 1898 Ball Brothers installed a similar machine for the making of fruit jars (James 1956:19).

1900-1940:

D. James (1956:17-18) divides this time period into three phases: 1) 1898 to 1906 - semi-automatic machinery for the making of wide-mouth ware exclusively; 2) 1905 to 1917 the Owens automatic machine for the making of all kinds of bottles, wide and narrow mouth, and semi-automatic machinery for the narrow mouth ware; and 3) 1917 onward - semi-automatic machinery made automatic by the feed and flow devices.

At the beginning of the 20th Century, a new phase of bottle manufacture commenced.

Through the cooperation and financial backing of the Toledo Glass Works, the Owens machine was perfected in 1903. At first, the Owens machine made only heavy bottles, which were wanted in great number. In 1909, improvements allowed it to make small prescription bottles. By 1917, other completely automatic bottle making machines had been invented, and bottles were formed automatically throughout the civilized world.

Characteristically, bottles formed by the Owens machine will have heavy bottoms, thick even walls, and the seams of the neck molds will not line up with the seams of their bodies.

A distinguishing mark left by the Owens machine is a shallow wrinkle in the glass which forms a circle in the base of the bottles. The ring probably is off center and may complete its circle by extending up the sidewalls of the bottle.

This "Owens ring" formed when the glass, which was sucked up into the lip mold, was cut off from the rest of the glass in the pot (Kendrick 1966:81).

Before 1917, the only fully automatic bottle machine was the Owens, but after this, the importance of the Owens machine decreased. After 1917, the semi-automatic machines greatly decreased in the United States. Between 1916-1924 the Hartford-Empire Company was developing the gob feeder machine (James 1956:21-23). Kendrick (1966:83) describes this device as follows:

In 1917 an important invention of mechanized bottle production (not used by the Owens machine) was a way of forming a measured amount of molten glass from which a bottle could be blown. It is called a "gob feeder". In this process, a gob of glass is drawn from the tank and cut off by shears. Bottles which have been formed from such a gob, may show a design in the center of its base like a "V" with straight lines radiating out at right angles from the "V".

Bottles produced by the automatic machine have a mold seam that extends to the bore of the finish. By 1920, bottles were refined in that bubbles were eliminated and the thickness of the glass made more uniform.

Manganese was used in bottle glass up to about 1917 in order to give the glass a clearer effect. After this date, ultra-violet rays of the sun would not turn glass "purple", a change caused by the manganese content of the glass. Just when manganese began to be mixed with the glass is not definitely known, but it may date back as far as 1810 (Ferraro and Ferraro 1964:79). Newman (1970:74) suggests a beginning date of 1880 and a terminal date of 1925.

Pertaining to amber glass, Kendrick (1966:59-61) states:

With the advent of World War I, our main source of manganese (German suppliers) was cut off. In the U.S. bottle industry, selenium became the predominant chemical used to bleach out the unwanted iron-produced aqua color from the glass. A change-of-color event takes place in this glass which has a high selenium content. With exposure to sunlight its clear appearance changes to an amber hue, or, as I would describe it, the color of ripened wheat. It never gets any darker than a good grade of honey, and there is no need to confuse it with a brown bottle.

A characteristic embossing that takes place after 1933 is described by Ferraro and Ferraro (1966:56-60):

At the time of repeal of prohibition in 1933, the evils characteristic of the pre-prohibition era were well remembered and fresh in the minds of legislators, such antics as a saloon putting cheap whiskey in a bottle with a superior brand name or even bootleggers and moonshiners paying janitors of apartment buildings for empty liquor bottles. As a result, almost every conceivable safeguard or device which would avoid recurrence of those practices was included in Federal legislation. One of the basic changes which was brought about by repeal of prohibition was the type of packages which could be used at the consumer level. The new legislation restricted the sale of distilled alcoholic beverages at the retail level to glass containers of one gallon capacity or less. To avoid or prevent tax evasion, misbranding and adulteration, the law provided that liquor containers must bear the phrase "Federal Law Prohibits Sale or Reuse of This Bottle". The new legislation prohibited absolutely the reuse of liquor ware in any manner. Implemented in 1933, the law was in effect until 1964.

#### 1940-Present

Most of the glass in common use today is one of three types:

##### (1) Lime glass:

Contains a large proportion of lime and soda or other alkalis. Between 80 and 90 percent of all glass used in the home is of this durable, inexpensive variety. Drinking glasses, milk bottles, jars and containers, and window panes are just a few examples of its varied applications.

##### (2) Lead glass:

Contains a substantial amount of lead oxide and potash or other alkalis. Most often used for more expensive, quality tableware and decorative pieces.

## (3) Borosilicate glass:

Is heat-resistant glass used for cookware and baking dishes, in which a small percentage of boric oxide helps prevent expansion and cracking under temperature change (Glass Institute of America nd:3).

Some modern glass companies are readily identifiable by characteristic manufacturing attributes produced by the type of machine used or by specific patented shapes. Sometimes only the company that used the bottle can be established, since the manufacturer placed the product's name on the bottle and not his own. During the twentieth century, it has been a common practice to place the company's trademark on the bottle--usually on the base. For example, the Owens-Illinois Company was formed by the merger of the Owens Bottle Company and the Illinois Glass Company in 1929. The trademark of the Illinois Glass Company was an "I" in a diamond, with the long dimension of the diamond horizontal. The Owens Bottle Company had an "O" inside a square. After the merger, the trademark consisted of a combination of these two marks. This same trademark was used in 1941 when the term "Duralglas" was added. In 1954, the present trademark (an "I" within an "O") of the Owens-Illinois Company was adopted (Holscher 1967).

Underneath the trademark, another number identifies the mold in which the bottle was made. Holscher (1967) explains the mold numbers as follows:

These numbers would go up to the number of mold cavities made which might be, say from 1 to 22. They would be plain numbers if there was one mold cavity in each mold casting. However, many of our bottles are made in mold castings which contain two or three cavities. A plain number could also indicate the front cavity of a two or three cavity mold. A dot after the number indicates that the bottle is made in the rear cavity of a two or three cavity mold. If two dots follow the number, this would indicate quite recent production in which the bottle is made in the middle cavity of a three cavity mold.

Other companies have similar marking systems. For example, the Glass Container Corporation has the overlapped "G" and "C", the company trademark, on the base. Just below it to the left is the plant number, while to the right is the year of manufacture. Still lower to the left is the mold pair number, and at the bottom of the base is the mold or job number. Each glass company has its own layout, but that above may be representative.

1) Bottle and Glass Chronology (Including Introduction Dates): (from Berge 1980)

- 1785 - 1840-----Large production of lamp chimneys.  
 ca. 1800-----The mineral water bottle with a pointed bottom to lay on side for wet cork.  
 1800 to 1870-----The American Historical Flask Period.  
 ca. 1810-----Preserving (commercial) in glass in France, England, America.  
 ca. 1811-----Syrups for flavoring drinks.  
 1820 -----Invention of the metal mold in England.  
 1821 -----English patent on split iron mold, to shape whole bottle (externally).  
 1841 -----Nursing bottle patent.  
 1850s -  
 late 1870s-----High frequency of mold made bottles with applied finishes but sparse  
 -----frequencies of makers marks and lettered panels.  
 1850-1880-----Glass balls for trap shooting.  
 1857 -----The "snap" case - making "pontil" mark unnecessary on  
 -----hand-made glass bottles.  
 1858 The Mason fruit or canning jar.  
 Late 1870s  
 - 1903 -----High frequency of mold made bottles with applied  
 -----finishes, makers marks and lettered panels.  
 1860s -----Kerosene lamps appear.  
 1861 First lead glass medicine bottles. Shortly after this "French squares"  
 --- tall, four-sided bottles with beveled edges  
 --- were put on the market.  
 1860-1915-----Hey day of bitters (patent medicine) craze.  
 1871 -----Pressed glass fire extinguisher patented.  
 1879 -----Hutchinson stopper patented.  
 1879 -----Edison's first light bulb - hand blown.  
 ca. 1884 Introduction of milk bottles; very slow in acceptance; complete adoption after  
 World War I.  
 1885 - 1910-----A very wide range of closure concepts.  
 ca. 1885-----Introduction of semi-automatic manufactured bottles.  
 ca. 1891-----Safety glass with imbedded wire mesh produced.  
 1896 - 1900-----Bottled Coca-Cola.  
 1900 to 1920-----Introduction and wide use of metal screw closures.  
 1903 -----The patent of Owens automatic bottle machine.  
 1912 -----Crown cap universal for carbonated beverages (patented in 1892).  
 Post 1912-----Particle cork liners in crown caps.  
 Post 1917-----Little manganese used in making glass (gives purple tint).

- 1919 -----Machine-made bottles still heavier than hand-made bottles.  
 Post 1920-----Introduction of radio tubes.  
 1920 -----Complete transition to "crown" for beverages.  
 1920 - 1930-----Era of wide range of commercial closures, replacing cork stoppers.  
 1920 - 1933 -----Prohibition. Manufacture of alcoholic beverage bottles practically negligible.  
                   Use of older vessels and reuse by "bootleggers" is popular.  
 1922 to 1926-----Introduction of the plastic closure (bakelite).  
 1924 -----8 oz. and 10 oz. bottles for soft drinks.  
 1926 -----Beginning of the baby food era (by 1939 largely in glass).  
 1930 - 1935-----Standardization of wide range of bottle finishes and closures.  
 1933 - 1964-----"Federal Law Prohibits..." embossed on liquor bottles.  
 1934 -----Wide use of 12 oz. bottles for soft drinks.  
 1938 -----Non-returnable beer bottles.  
 Post 1940-----"No Deposit - No Return" embossed on soda pop bottles.  
 1945 -----Bubblers in use in tank for homogeneity; the square milk bottle.  
 1948 Larger capacity soft drink bottles; non-returnable soft drink bottles.  
 1953 -----Synthetic sweeteners of soft drinks.  
 1954 to 1958-----Introduction of plastic coated bottles for aerosols.  
 1959 to 1961-----The advent of rigid polyethylene containers.  
 1963 -----Wide use of low-calorie soft drinks.

(Above chronology is adapted from Berge 1980; Buckles 1978; and Lorrain 1968).

## 2) Bottle Chronology: (taken in part from Rock 1980)

Free Blown  
 to circa 1880

### Bottle Molds:

- 1790-1810-----Dip Molds  
 1870s-1920s-----Turn Molds  
 1810-1880-----Iron-hinged bottom mold (2-piece mold)  
 1870-1910-----Three-part mold  
 1880-1910-----Closed mouth mold  
 1904-present-----Automatic bottle machine

Base Marks:

pre-1840-ca. 1870-----Pontil or snap marks  
 1904-present-----Cut-off scars  
 1930s-1940s-----Valve marks (milk bottles)

Lip Forms:

1810-1840-----Sheared lips  
 1840-1920-----Applied lips  
 1840-1860-----hand applied lips  
 1880-early 1900s-----fired lips

Lipping Foot Marks:

1870-1920-----Smooth-lipped

Closures:

1870s-1900-----Inside screw (whiskey bottles)  
 1879-1915-----Hutchinson stopper  
 1882-1920-----Lightning stopper  
 1892-present-----Crown Cap  
 1892-present-----with cork liner  
 1955-present-----with plastic liner  
 1924-present-----Roll on cap

3) Definitions of Mold Seams and Accessories: (from Berge 1980:61-66)

The types of bottle mold seams described herein are illustrated below. Illustration is taken from Berge (1980:63).

Changes that took place in the growing bottle industry during the nineteenth century resulted in many subtle characteristics found on the container. By 1800 the most widely used method of making bottles and other glassware was by blowing; glass produced by this method is termed hand-blown, free-blown, or off-hand-blown (Lorrain 1968:35).

Lorrain (1968:35) states:

Surfaces of hand-blown pieces are smooth and shiny and are without impressed designs or letters. Design may be art, engraved, or etched into off-hand-blown pieces after they are cooled but these are not an intrinsic part of the glass. Decorative globs or threads of molten glass may be added to the object before it is cooled but they will also have smooth, shiny surfaces.

Other characteristics of this technique of glass manufacture are the presence of a pontil mark, asymmetry and lack of mold marks.

Munsey (1970:38-50) provides specific details for recognizing techniques used by manufacturers as various molds changed through time. His methods of identifying the molds used on specific bottles and the time range in which these technological techniques were in operation are in part provided below (see Munsey for additional information and illustrations):

1. Non-Shoulder Molds - This type of mold forms the body only and may or may not have mold seams at the shoulder.

**Dip Molds.** The body and base are formed in this one-piece mold. The bottom is slightly smaller than the shoulder, where there may be a mold seam. This type of mold produces a uniform body shape up to the shoulder, and the finish may be handmade.

A. Hinged molds (late 1700s and 1800s). This type of mold does not have to be tapered, since the mold apparatus opens at the shoulder. The side seams disappear at the shoulder and the body could be embossed.

B. Bottom-hinged mold (ca. 1810 to ca. 1880). The mold seams on bottles manufactured by this method have seams up the sides and across the base. The seams across the bottom come in two varieties: (1) straight across the bottom; and (2) curves around a slight push-up in the center. The bottom seams may be obliterated to some degree by a pontil scar, except when a snap-case was used, in which case the mold seam would be intact.

Three-part mold with dip mold body (1870 - 1910). This mold produces seams around the shoulder and up to the finish area. It allows versatility in designing the shoulder, such as embossing which, however, was not usually done. It did not provide for embossing on the lower half of the bottle.

C. Three-part leaf mold (handblown period of the 19th century). This type of mold produces three mold seams equally spaced up the sides of the bottle.

D. Post-bottom mold. From this type of mold, seams are produced down the sides and to a circle around the bottom.

E. Cup-bottom mold. The seams from this type of mold run down the sides to the heel and around the outside of the base.

F. Blow-back mold (Patent Nov. 30, 1858). This type of mold leaves a rough and ragged edge around the top of the finish. This rough area is ground down so that closure can seal on the sealing surface. This mold was used in early fruit jars, on which screw threads were molded with the rest of the bottle in one piece.

G. Semi-automatic bottle machine. Mold seams extend the length of vessel (unless obliterated by turn-molding) to within 1/4 inch of the top of the lip. No seams are visible on top. See illustration.

H. Automatic Bottle machine (1904 on). The advent of the automatic bottle machine produced bottles with new mold seams. These molds produce seams up over or around the top of the sealing surface. However, beverage bottles are fire polished to eliminate the seams so they will not cut the mouths of the drinker of the contents.

In addition to the above molds and others, there were processes, accessories or tools that produced distinguishing features on bottles. One such process produced in a full-height mold is called a turn-mold bottle, used between 1880 and 1910. In this process mold seams are obscured by turning the bottle in the mold. Bottles treated this way are highly polished, cannot be embossed, and show horizontal lines or grooves produced as the bottle is turned in the mold. These turn-mold attributes are found more commonly on wine bottles.

During the last half of the nineteenth century a plate mold was used to emboss lettering or designs on the body of bottles. In this process a plate with the particular desired motif was inserted into the mold. The plate mold, or slug plate, as it was known, helped in the standardization of many bottle shapes such as milk bottles.

The Owens automatic bottle machine from about 1904 on produced irregular circular marks, known as cutoff scars (not seams) on the base.

Between about 1930 and 1940 some bottle machines produced what is called a machine-made valve mark. This mark is a circle less than an inch in diameter, similar to a seam. It is found more commonly on wider mouth bottles and glass milk containers.

Lipping tools first developed in England ca. 1830 and used in America ca. 1850 often erased seams on the finish. In this process, which shaped the top of the bottle, a rod was inserted into the bore while the associated clamp on the outside developed the finish as it was rotated. Seams were obliterated by the rotation of the lipping tool; but if the tool was pressed only, seams were produced to the top of the bottle.

Early in the nineteenth century and on, the finish was made by cutting the bottle from the glassblower's rod and reheating the lip or sealing surface to smooth it. In cases where mold seams came to the top of the finish, the seams were obliterated by the reheating. This process produced a flared or fired lip.

A wavy, dimpled, or hammered appearance on a bottle surface is more commonly known as whittle marks because they are thought to have been produced by wooden molds. These marks were actually made by blowing hot glass into a cold mold.

Hand-blown bottles were finished by a method known as emponitling. When the hand-blown bottle was at its desired shape and cut from the blowpipe, the finish had to be shaped and fire-smoothed. This was done by attaching a glass rod to the base to turn the bottle while the finish was formed. After the finish was completed the rod was broken off, leaving a mark known as a pontil scar or "punity".

The snap-case was a mechanical device that gripped the base of the bottle body. Occasionally it left a mark on the side of the bottle where it squeezed the hot glass a little too hard.

Machine blowing eventually eliminated the need for emponitling, and the automatic bottle machine did away with the snap cases.

#### Summary of bottle seams from Toulouse (1969:587).

1. When there are no seams whatever:
  - a. the piece may be free blown without molds, or
  - b. it may have been blown in a shoulder height dip mold with hand shaped shoulder
2. A seam disappearing at the shoulder means a bottle blown in a shoulder height hinged mold.
3. Seams disappearing in the neck area may be blown in any mold, but the seam rubbed out with a hand held finishing tool.
4. If a seam crosses the bottom the mold was a two piece, hinged bottom type.
5. A horizontal seam around the widest point, with two side seams going upward means a three part mold based on a dip mold bottom.
6. Three or more side seams from heel to finish means a three part (or more) mold for decorative designs.
7. Circular seam symmetrical with bottom, joining two or more side seams means a post bottom mold.
8. Irregular, feathery, non-symmetrical bottom seams usually mean a machine made bottle from suction machine equipment.
9. Small diameter, indented into surface rather than extending, non-symmetrical, on the bottom, usually is the valve mark of a (see next page)

press-and-blow machine.

10. Circular seam in heel-side wall tangent area means a cup bottom mold.
11. Seams to top of finish, which is then ground to level, usually indicate hand blown in blow-back mold, or snapped off by blow-over method.
12. Circular or oblong seams in side wall, not connected with other seams are made by plated molds.
13. Horizontal seams below finish area mean separate neck rings but do not prove machine manufacture.
14. One or more seams circling top of finish show machine manufacture.
15. "Ghost seams" seams come from the use of a separate blank mold - hence indicate machine manufacture.

472.4 Glass Color: (from Berge 1980:82-86)

Glass can be produced in practically all colors by adding specific ingredients to the basic glass mixture. Munsey (1970:37) suggests that the color of glass was obtained by adding the following compounds:

copper, selenium, gold	reds
nickel or manganese	purple (amethyst)
chromium or copper	greens
cobalt or copper	blues
carbon or nickel	browns
iron	greens, yellows
selenium	yellows, pinks
tin or zinc	opal or milkglass
iron slug	"black glass"

In order to obtain clear glass, the raw materials should be free of impurities in the sand. Very dark greenish-amber glass ("black glass") was popular until the middle of the nineteenth century. Before the turn of the century, bottles were predominantly green and aqua. Munsey (1970:37) further states:

A number of variables can affect the actual color produced including the amount of the compounds used, the degree to which the basic glass mixture is impure, the temperature and the time-temperature relationship, and the reheating necessary to complete a piece of glass.

In the late nineteenth hundreds much of the glass sand, which came from Belgium as ballast for ships, was pale green. This may account for many bottles being this color (i.e., pale green or aqua), though it was not desirable for many products. This glass was decolorized by the addition of manganese, which causes glass to turn purple to amethyst when exposed to the ultra violet rays of the sun (Jones 1965a:40).

Chronological Implications of Glass Coloring: (from Rich Fike, personal communication January 1984)

Black glass -----	alcoholic beverages, e.g., stout, ale, wine, etc., and mineral water.	ca. 1870
Milk glass -----	medicine, cosmetic, toiletry, food and specialty items.	1890-1960
Aqua glass -----	has general and very versatile application, used commonly in nearly all functional categories.	ca.1800 - ca.1910
Green glass -----	has general, versatile use including wine and mineral water vessels.	ca. 1860-present

Amber or brown glass	-----has general application, including alcoholic beverages, e.g., beer, whiskey.	ca. 1860-present
Blue or cobalt glass	-----medicines, cosmetics, and specialty use.	ca. 1890 - 1960
Red glass	-----rare, specialty items.	
Clear glass	-----general application.	ca. 1875-present

#### 472.5 Beverage Bottle Descriptions:

(B) Alcoholic - Whiskey: "A variety of shapes, including large 'case' bottles which were square in shape, figural bottles, 'coffin flasks' for carrying in the pocket (shaped like a coffin), 'picnic' flasks, or half-pints (which are self-explanatory as to use), small flat and ovoid (quite often embossed) pints or half-pints and the round 'fifth' size were, and are, commonly used for bottling whiskey. The common colors of whiskey bottles are aqua, clear, amber and pale green" (Buckles *et al.* 1978:423).

(D) Alcoholic - Champagne/Wine: "These have changed little over the years. They are tall, cylindrical, may or may not have a 'kick-up', and can come in a variety of colors, but distinctive dark greens or ambers are the most common. Another distinguishing mark is the 'turn-mold'. This means that the mold was greased and rotated to remove the mold marks and a shiny patina was left. This was possible as wine bottles were not embossed, but identified with labels" (Buckles *et al.* 197:422).

(E) Alcoholic - Beer: "In glass, a standard beer bottle shape was adopted by the 1870s. The first bottles of this type were free of embossment, in quart size, and were approximately ten inches high. They featured a cylindrical body about six inches around, with slightly sloping shoulders and a tapered neck and lip about four inches in circumference. These bottles utilized a cork closure that was held in by a wire over the cork and twisted around beneath a ring of glass on the neck. Beginning in about 1870, the eastern and mid-western areas of the country used beer bottles with embossments. Many of these bottles were embossed by the plate mold process. By 1890 the western half of the country, too had an abundance of embossed beer bottles. Everywhere beer bottles were being manufactured mostly in pint and quart sizes" (Munsey 1970:116).

(F) Alcoholic - Ale/Stout: "Two ancient malt beverages, ale and stout, were popular on the frontier long before the appearance of lager. Of higher alcoholic content than beer, these two beverages have a heady character that permitted relatively safe shipment over considerable distances before the time of pasteurization. This factor accounted for their appearance in New Mexico and other remote regions of the West in the 1850s, if not earlier. Ale is a strong, fermented, aromatic malt beverage. It is darker, heavier,

and more bitter than beer. Stout, a very dark ale, has a strong malt flavor and a sweet taste. A multitude of ale and stout bottles were recovered at Fort Union and Fort Laramie, many with remnants of paper labels or cork stoppers. Some of these bottles clearly predate beer bottles found at the same posts, and all indicate that Americans in the West brought with them a taste for these malt beverages" (Wilson 1981:7).

(G) Soda/Mineral Water: The varieties of these bottles consist of the three basic types stressed thus far, i.e., blob-top, Hutchinson-type, and crown-cork bottles. However, there are several variations, involving pointed, or torpedo-shaped as it is frequently called, and the round bottom bottles were mostly imports from Europe, notably England. These vessels contained ginger ale primarily (Munsey 1970:105).

"The separation (between soda bottles and mineral water bottles) is hard to maintain because at one period mineral water and soda water were one and the same in many cases. The common sizes of mineral water bottles are pints and quarts but they are also discovered occasionally in other sizes. Since the period of greatest production for mineral water bottles was during the era of cork closures most of the ones located are crude and have hand developed necks and lips. Some, however, were made after the invention of the lightning stopper and the Hutchinson stopper and are thus located with these closures. Some of these bottles even have crown cork closures. Shapes in mineral water containers are varied and range from the Saratoga types to the very unusual Moses figural bottle." One difficulty in mineral water bottle identification relates to soda water bottles: Both beverages used the blob-top soda water-type bottle. Although many mineral water vessels were produced in the common aqua and light green colors some were manufactured in amber and green. The Saratoga types are unusual because they have beautiful deep shades of green and amber. Blue mineral water bottles are known but are unusual (Munsey 1970:101-103).

Blob-top soda bottles: "The earliest of these bottles had tops that were applied separately during their manufacture. To hold the cork under pressure, a wire was placed over the top of the bottle and secured around the neck. These early blob-top soda bottles can be found with pontil scars and iron pontil marks, but are mostly found with plain bottoms because they became most popular after the development of the snip" (Munsey 1970:104).

Hutchinson-type: "The stopper consisted of a rubber gasket (which came in five sizes to accommodate neck diameters) held between two metal plates and attached to a spring wire stem (which came in three sizes to accommodate neck lengths). A portion of the looped wire stem protruded above the mouth of the bottle while the lower end with the gasket and plates extended far enough into the bottle to allow the gasket to fall below the neck. To seal the bottle after it had been filled the rubber disk was pulled up by the wire stem. The bottle was then inverted and righted; this motion formed the seal--the pressure of the carbonation forced the rubber gasket to remain against the shoulder of the bottle." (Munsey 1970:104).

Crown-cork: "It was Painter's (William) third closure, which was patented in its final form in 1891, that eventually made all other beverage closures obsolete. He called this device the crown cork. This closure was essentially the same as those used on beverage bottles today" (Munsey 1970:105).

## 472.6 Medical/Chemical Bottle Descriptions:

(K) Pharmaceutical/Drug Store: "There are essentially two major groups of drugs: ethical and proprietary. The bottles to be discussed here will be those used for ethical (prescribed) medicines and the various other types of bottles associated with pharmacies (drugstores), excepting poison bottles which are treated separately. There are two types of prescription bottles: plain and embossed. The plain bottles usually featured sunken panels into which paper labels were glued. These are not especially interesting because in most cases the labels are missing. The popular prescription bottles are the ones with embossments. Beginning in the late 1880s the large glass-manufacturing firms had inserted the customer's personalized plate and then blew a supply of bottles. This was an inexpensive means of obtaining the necessary prescription bottles, and almost all drugstores took advantage of it. Large drugstores and chains of drugstores usually had their own exclusive molds made and did not use plate-molded bottles. A number of bottles are lumped together in the category of drugstore bottles. As a result, sizes within this category vary a great deal. Labeled and glass-stoppered bottles that were reused by pharmacists were usually several inches to ten inches in height. Show-window bottles were generally as tall as several feet; other show bottles were shorter (one or two feet). Prescription bottles of all types seldom exceeded twelve inches in height. Shapes in all types of drugstore bottles varied greatly except in the reusable labeled bottles, which were mostly cylindrical or square, and prescription bottles, which were mostly oblong. Show-window and display bottles and jars were made in numerous original shapes. Although closures on the more expensive bottles and jars were usually glass stoppers, on the expendable and less expensive prescription bottles the cork closure was common. Embossments, though common on prescription bottles, were for the most part limited to descriptive lettering and some designs. Colors, though not rare prescription and reusable labeled bottles. In other types and most prescription and reusable labeled drugstore bottles, clear glass was predominant" (Munsey 1970:174-175).

(L) Patent/Proprietary Medicine: The term patent medicine has, however, become the generic one for all medicines sold without prescriptions. In 1906 there were over fifty thousand medicines being manufactured and sold in America. By far the majority of these came in glass bottles. Sizes and shapes of these bottles were fairly consistent; standard sizes up to a quart were common, and cylindrical or rectangular were the common shapes. They were also quite consistently aqua or light green. Almost without exception, patent and proprietary medicine bottles utilized a cork closure (Munsey 1970:69).

(M) Cosmetic: (perfume, scent, and cologne bottles) "Before the common use of hinged molds, perfume and scent bottles were either free-blown or blown in a dip mold. Around the turn of the century perfume and scent bottles of great beauty were beginning to be produced in hinged molds. These bottles were often highly decorated and as a result were comparatively expensive, as were their contents.

By the mid-1800s, double scent bottles came into vogue. These interesting containers usually consisted of two separately blown bottles welded together at the base during the manufacturing process the owner to carry both perfume and scent in what for all practical purposes was one container. Cologne bottles are generally larger than perfume bottles. Because of their close relationship, perfume, scent, and cologne bottles are usually considered to be one speciality in typology, and the term 'perfume' has generally become the generic one for all three types. The major interest of perfume bottles lies in their beauty and size. Usually, much time and effort are put into the designing of perfume and related containers. Perfume bottles are generally less than six inches in height and this factor has great appeal to many collectors who associate smallness with quality. Shapes of many kinds can be found in the perfume bottle collection, including figural types. Many shapes are predominantly geometric. In the more common bottle types embossments are of interest. Both lettering and design are to be found on many perfume bottles. While the majority of twentieth-century perfume bottles have been made from clear glass there are many specimens to be located in a wide range of colors. The pre-1900 specimens are especially noted for their colors. Most twentieth-century specimens were made with matching glass stoppers; on the more expensive bottles the stoppers were specially ground to fit. Before 1900 the common cork closure was popular. Sometimes a combination glass and cork stopper was utilized; such closures usually featured a cork ring within the neck of the bottle into which a glass stopper fit" (Munsey 1970:154-155).

(O) Poison: "In the early years of the 19th Century there wasn't the legislation or pressure required to make poison bottles 'different', but there was concern which produced brightly colored, odd shaped (i.e. skull and crossbones, coffin), embossed and textural bottles. All these methods were employed to warn both the literate and illiterate populace of the contents. The favorite color seems to be blue but a great variety of other bright colors were employed" (Buckles et al. 1978:425).

#### 472.7 Household Bottle Descriptions:

(O) Fruit/Canning Jars: "These were usually cylindrical in shape with a wide mouth and made of clear or aqua glass. They are relatively easy to recognize because of their familiar forms as 'Mason Jars'" (Buckles et al. 1978:424).

(P) Milk Bottles: "These were introduced in the latter part of the 19th century and the first recorded patent was in 1880. These were usually cylindrical (although other shapes do exist), widemouthed, made of clear glass and embossed" (Buckles et al. 1978:425).

(Q) Preserves/Pickles: "Among other late 19th century containers which are easy to recognize are pickle jars. They are generally large and have four to eight sides, are wide mouthed and are often embossed with Gothic arches" (Buckles et al. 1978:425).

(R) Peppersauce/Clubsauce: "Pepper sauces were commonly in bottles smaller than the pickle bottles, in shades of aqua or green, with longer and more slender necks and openings. These were usually square or cylindrical and sometimes employed the Gothic arch embossing similar to the pickle bottles" (Buckles et al. 1978:425).

(S) Mustard: Mustard bottles are generally the same shapes as are in use today. "Often, a particular bottle shape has been associated with a particular product for so long that it is seldom used by manufacturers for anything else" (Munsey 1970:152). Wilson (1981:81) says of these bottles found at Fort Union, New Mexico and Fort Laramie, Wyoming (ca. 1849 to 1891): "Pickle, mustard and relish jars are rare. All such products were packaged in glass and were in common supply as items of commercial trade by the late nineteenth century. It can be concluded that such products were standard items stocked in bulk by the army commissary and that their purchase in small containers was unnecessary. However, too great a reliance should not be placed on this explanation..."

(T) Catsup: "Food containers included a wide variety of sizes, shapes and colors. Many are still in use and easy to recognize, such as catsup and mustard bottles" (Buckles et al. 1978:425).

#### 472.8 Domestic Bottles Descriptions:

(V) Ink: "Ink bottles were made in a variety of shapes and colors. The most common shapes are 'cone shapes' with a wide base tapering up to a narrow neck. A variation of the cone shape was called the 'umbrella shape' which had greater heights" (Buckles et al. 1978:424).

(W) Shoe Polish: Shoe polish bottles come in a variety of sizes and shapes. In general shapes can include square, rectangular, and cylindrical. Colors include green, amber, clear, and blue. In general bottle heights appear to range from 2 1/8" to 7 7/8". Embossing and paper labels are common. (Description drawn from examples in Wilson 1981:93-94).

(X) Tooth Powder: "These rather small containers were produced in attractive shapes. Tablet jars featured glass stoppers while most tooth powder bottles had screw caps or cork-encircled stoppers. These tooth powder stoppers usually had a second screw cap at the tip of the stopper; this was to allow for the use of small amounts of tooth powder. Table jars and tooth powder bottles were usually one to several inches high" (Munsey 1970:175).

(C) Other: Includes baby nursing bottles, paste/glue bottles, etc.

**472.9 Specialty Bottle Description:**

(V) Figural: "There is a popular parlor game based on the idea that all things in the world can be divided into three general categories: animal, vegetable, and mineral. A similar statement can be made in defining figural bottles, i.e., they are made in the shape of things: animal (including humans), vegetable, and mineral. Figural bottles of both ceramic and glass range from fractions of an ounce to a full gallon. Some of the smallest are the fragrance bottles and some of the largest are spirit containers. In glass specimens, all colors are represented... and each bottle is generally limited to one color. The majority of figural bottles of the earlier types utilized the common cork closure and the more recent specimens come quite often with screw cap closures" (Munsey 1970:95-96).

472.10 Other Glass/Non-Containers Descriptions:

(1) Window: "Window glass is obviously that glass used in windows. However, there are problems in the differentiation of flat side panel bottle fragments from window glass fragments. After considerable observation it was decided that window glass must be flat and between .045 to .130 inches thick. Teague and Shenk (1977:125-126) report that window glass may be datable by seriation of thicknesses and recoralation of thicknesses is suggested, if feasible" (Buckles et al. 1978:405).

(2) Chemical Related: Laboratory equipment including mining(assay), medical, beakers, flasks, test tubes, pipettes, thermometers, etc.

(3) Lamp Chimney: "Lamp chimney fragments are very common. They are identifiable as fragile curved glass which breaks into very small pieces. Lamp parts are also common and often have patent dates. Lanterns are less common than lamps and may have been related more to outdoor rather than indoor activities" (Buckles et al. 1978:429; also see Roenke 1978:1-117).

472.11 Decorative Technique Description:

(1) Plain

(2) Embossed

(3) All other decorative glass including cut, pressed, engraved, etched, applique, etc.

472.12 Trademarks:

"Trademarks, whether registered or not, brand names, and other marks and symbols of identification found on bottles are datum points in determining the history and ages of the collectors' bottles. When the owner of the mark is known, and when more exact dates can be assigned to its use, the mark becomes a means of dating the piece upon which it appears. If the mark was used for many years, we may have to rely on other considerations in order to date the piece within the mark's span of years. If the period of use of the mark was short, the age of the bottle may be pinpointed to a short period of time. In some instances, lucky for the collector but unlucky for the user of the mark, the period may be reduced to one or two years. One factory making beer bottles in the 1880s, whose ownership, name, and mark changed five times in eleven years, has helped historical archeologists date a number of sites in the western United States" (Toulouse 1971:7).

"Bottles which are made in molds commonly exhibit some intentional markings which are produced from the molds as identifications of the bottle makers (Toulouse 1972). These 'makers marks' are primarily located on the bottle bases. The marks evolved over time and the time spans of many of their stylistic variants can be identified. These distinctive makers marks are the most exact and wide-spread attributes of bottles which aid in dating bottles of the late 19th and early 20th Centuries" (Buckles et al. 1978:427).

The most useful publication for identifying makers marks is *Bottle Makers and Their Marks* (Toulouse 1971). In addition, local makers marks can usually be traced through local telephone directories and informants.

"A factor to consider when identifying bottles of the past is that the functions bottles were manufactured for may not have been their function at a site. 'Used bottle dealers' were common up until prohibition (1918), particularly in the west (Wilson 1968:24). Bottles were reused for a number of functions but most commonly for containers for beer, whiskey, wine and other liquors and 'spirits'. These 'liquid refreshments' were commonly sold to saloons or stores by the barrel (whiskey and wine) or keg (beer) and then drawn off as ordered by the customers for home consumption. The customer would have to provide his own bottle, or quite often a bucket (necessitating fairly rapid consumption before the contents went flat) (Wilson 1968:22,168)" (Buckles et al. 1978:426).

**WCRM, INC. FIELD GUIDE  
TO HISTORIC ARTIFACTS**

**compiled by  
Monique E. Kimball**

**Field Season 1993**

MANUFACTURING DATES FOR EVERYDAY OBJECTS

ITEM	DATE RANGE	SOURCE
<b>Closures</b>		
Cork - general use	ca1600-1920s	Lief 1965:4, 24-26; Jones and Sullivan 1989:149-151
Threaded cap - metal	1858-1930s	Lief 1965:9-13, 33; Botz 1980:5-6, 16
Tinplated steel cap	1930s-1993	Lief 1965:33
Knurling on cap	ca1924-1993	Lief 1965:29
Threaded canning cap - zinc	1858-ca1941	Lief 1965:12; Brantley 1975:57
Screw band - canning, zinc	ca1864-ca1941	Brantley 1975:57
Screw band - canning, metal	1864-1993	Botz 1980:7; Lief 1965; Brantley 1975:57
Glass liner - canning		
Kerr seal - band/metal seal	1916-1993	Botz 1980:13-14, 20
Rubber ring gasket - canning	1864-1993	Botz 1980:6
Hutchinson Stopper	1879-1920s	Rock 1990:14; Lief 1965:14
Bernardin	1880s-1900s	Lief 1965:15
Lightning Stopper (canning and beer)	1882-1993	Lief 1965:15-16; Rock 1990:15
Crown cap	1892-1993	Lief 1965:17-20; IMACS 1990:472.10, 12
Cork lined	1892-1909	Lief 1965:25
Composition cork lined	1909-ca1955	Lief 1965:25, 40; IMACS 1990:472.12
Composition cork/aluminum lined	1916-ca1955	Lief 1965:25, 40
Plastic lined	ca1955-1993	Lief 1965:40; IMACS 1990:472.12
Kork-N-Seal	1911-7	Rock 1990:16
Lug cap - Amerseal	1906-1950s	Lief 1965:40
Improved seal with flowed-in ring of plastisol - 3 lug/6 lug sizes	1950s-1993	Lief 1965:40-41
Continuous thread cap	ca1919-1924	Lief 1965:27-29
Standardized CT cap	1924-1993	Lief 1965:29
Sure Seal	1908-7	Lief 1965:22
Giles rubber gasket	1902-1919	Lief 1965:22; Ward et al. 1977:239
Roll-on - aluminum	1924-1993	Lief 1965:29
Threaded cap w/ring - aluminum	1924-1993	Kirkpatrick 1991:3
Threaded cap - plastic	1927-1993	Lief 1965:30; Kirkpatrick 1991:7
Colored plastic (phenolic, bakelite) caps	1930s-1993	Lief 1965:30
Threaded cap - modern plastic	1978-1993	Kaplan 1982:131
Glass stopper	1870s-1950s	Jones and Sullivan 1989:151-154; Zumwalt 1980:239
Special caps - fitted with brushes, daubers, rods	1930s-1993	Lief 1965:35
Tamperproof cap with audible click for vacuum packed food	1930s-1993	Lief 1965:35
Inner membrane on jar finish	1930s-1993	Lief 1965:35
<b>Bottle Finishes</b>		
Lipping tool	ca1870-1920s	Rock 1990:13; IMACS 1990:472.12
Cap Seat (inside bore for caps - milk bottles with paper caps, some with cork)	ca1870s-1960s	Jones and Sullivan 1989:79 (dates suggested)
Threaded - external	1858-1993	Lief 1965:9-13; Botz 1980:5-6, 16
Threaded - internal	1855-ca1905	Rock 1990:14; Wilson and Wilson 1968:151
Crown	ca1892-1993	Lief 1965:17-20
Automatic bottle machine	ca1904-1993	Rock 1990:9

ITEM	DATE RANGE	SOURCE
Amerseal (lug - quarter turn - interrupted thread)	1906-1993	Lief 1965:22-23, 40-41
Kork-N-Seal	1911-7	Rock 1990:16
Continuous thread - external	ca1919-1993	Rock 1990:16; Lief 1965:27-29
<b>General Bottle Information</b>		
Crown cap universal closure - Standardized bottles - 1st phase	1912	Kaplan 1982:106
Bottle sizes: 6-oz, 7-oz, quart	ca1912-1920s	Kaplan 1982:106
8-oz	ca1920	
9-oz, 10-oz	1924	
12-oz (Pepsi-Cola)	1929-1993	
16-oz (introduced 1930s)	ca1957-1993	
26-oz (Coca-Cola)	1955	
Sizes in 1957 - 6, 6 1/2, 7, 8, 9, 10, 12, 16, 24, 26, 28, 29, 30, 32-oz		
Standardized with Non-returnables - 2nd phase	1965	
Applied Color Label (ACL)	1934-ca.1965	Munsey 1970:52; Jones and Sullivan 1989:16, 76; Kaplan 1982:114
Resurgence of paper labels	ca1965-1993	Kaplan 1982:114
Non-returnable bottles	1965-1993	Kaplan 1982:106
Plasti-shield on glass bottles (Owens-Illinois Inc.)	1971-1993	Kaplan 1982:109
Plastic bottles - soft drink (PET - polyethylene terephthalate)	1978-1993	Kaplan 1982:109, 113
<b>Tin Cans</b>		
Hole and cap	ca1810-1900s	Rock 1988:12-13
Hole-in-cap	1810+ -ca1940	Rock 1988:12
Stamped end	1840s-ca1985	Rock 1988:20, 49
Overlapping side seam	ca1840-1900s	Rock 1988:4
Internal folded side seam	1859-1890s	Rock 1988:5
Improved w/gasket	1890s-?	
Internal rolled side seam	1888-1993	Rock 1988:6
Vent hole	ca1900-ca1985	Rock 1988:21, 49
Evaporated milk	ca1914-ca1985	Rock 1988:21, 49; Saunchegrow, Jura, and Jaynes, personal communication to MEK 1990 - letters
Sanitary	1904-1993	Rock 1988:14, 22
Threaded can	1860s-1890s	Rock 1988:17
New products - spice, tea	1890s-1920s	Rock 1988:17
Other products - varnish, etc.	?-1993	Rock 1988:83
Knurling on cap	ca1924-1993	Lief 1965:29
Key-wind top strip - overlapping side seam	1860s-1900s	Rock 1988:65
Key-wind top strip - drawn	ca1897-1993	Rock 1988:66
Key-wind side strip - meat	ca1890-1993	Rock 1988:62-63
Key-wind side strip - coffee, vacuum packed	ca1903-1960s	Rock 1988:32, 40-42
External friction	1880s-1993	Rock 1988:85

ITEM	DATE RANGE	SOURCE
Sprinkler cap	1890-1960s	Rock 1988:16
Pressure seal multiple friction	1906-1993	Rock 1988:82
Pressure seal internal friction	ca1903-1993	Swedberg and Swedberg 1985:19
Flat oval	1918-1993	Rock 1988:66,
Cone top - beer	1935-1970s	Rock 1988:29
Cone top - other	1935-1993	Rock 1988:29, 79
Cone top - soft drink	1953-1954	Rock 1988:71
Flat top beverage can (beer, soft drink, juice)	1935-1993	Rock 1988:29, 71
Church key opener - (beer and soft drink)	1935-1970s	Martells 1976:7-8; Bull 1981:8, 22-23
Steel body, aluminum top	ca1955-ca1963	Martells 1976:9-10
Notched side seam (with tabs) - American Can Company	ca1966-ca1976	Martells 1976:44; Rock 1980:16
All aluminum (2-piece) - major marketing	1963-1993	Martells 1976:10; Rock 1980:3
Pull tab opening - removable - national	1963-ca1976	Martells 1976:10, 14-19; Rock 1980:4, 8
Pull tab opening - non-removable	ca1972-1993	Martells 1976:10, 14, 19; Rock 1980:8
<b>Buttons</b>		
Bone	to 1930	Pool 1991:10-11
Metal, Sander's type	1873-1993	Pool 1991:5
Glass (peak)	ca1840-ca1917	Pool 1991:10-11
Prosser	1840-1900s	Pool 1991:8; IMACS 1990:475.4
Fabric covered (peak)	1850-ca1920	Pool 1991:10-11
Mother-of-pearl (peak)	1855-1930	Pool 1991:6-7, 10-11
Freshwater shell (peak)	1888-1930	Pool 1991:6-7, 10-11
Hard rubber	ca1851-1920	Pool 1991:8-11
Celluloid	1869-1945	Pool 1991:9
Bakelite	1909-ca1940	Pool 1991:9-11; IMACS 1990:475.4
Modern plastic	1920-1993	Pool 1991:10-11
Synthetics	ca1935-1993	IMACS 1990:475.4; Kirkpatrick 1991:3
1945-1993		Pool 1991:9
<b>General Items</b>		
Aluminum foil - candy and tobacco	ca1925-1993	Kirkpatrick 1991:4
Reynold's wrapping foil	1947-1993	Kirkpatrick 1991:5
Zipper	1893	Kirkpatrick 1991:3
In civilian clothing	1920-1993	
Linoleum - dark colors	1860s-1920s	Kirkpatrick 1991:7
With colors	1908-1993	
Viayl	1928-1993	Kirkpatrick 1991:7
Plastic ties	ca1963-1993	Kirkpatrick 1991:5
Enamelware - light/dark gray mottled	ca1900-1993	Kirkpatrick 1991:4
- blue and white mottled	ca1900-1993	
- white only	1940s-1950s	
- blue	1915-1993	
(Note other colors)		
Wheaties cereal	1924-1993	Kirkpatrick 1991:2
Nylons	1940-1993	Kirkpatrick 1991:2
Pantyhose	ca1965-1993	Kirkpatrick 1991:2

### Can Characteristics to Record

Log Cabin cans: ca.1895-1900 rectangular can - 7"x2"x3 1/2" with a tin handle and spout.

1896 first log cabin shaped tin. Had sharp, folded edges and a seam located anywhere on the base.

1901 can made by American Can Company had a twist type threaded cap and spout and a wire handle on the ridgelina.

1909 can made with a pry-up cap (with internal seal). Wire handle is absent. Sizes were free samples (small), 1 pint, 1 quart and 1/2 gallon.

1914 saw the first appearance of lithography.

1918 can made with a "Newman" closure that had a friction type lid - a press-on cap with an inner screw-off seal.

1919 can made with a new spout, that was short, and the can was indented where the spout joined the can body. The cap was multiple split-sided external friction type with an internal seal. Marked American Can "82A".

Between 1914 and 1919, side seams were "double" type, probably internal rolled. Sharp edges and external solder reduced.

Can manufacturing marks to 1929 include the above "82A" and "17A". Afterward, only "AC Co. 17AX" appeared on them - 1929 to ca.1979.

1933 can had lithography on all four sides (previous cans did not have any on the ends), and base seam near, not on, the center of the can.

1940-1942 can lithography on sides only.

1942-1948 no cans, glass containers only.

SOURCE: Jim Rock, Tin Canisters, Their Identification 1988:57-61

Tobacco Tins:

Type: lunch box (large with handle and could be used later as a lunch box), upright pocket (the most common - oblong shape with a hinged, external friction lid, sometimes a strike plate on the base, internal rolled side seam), flat pocket (flat, rectangular, hinged lid that could fit into a pocket) and flat fifties (cigarettes tin, also hinged lid).

Dates: Upright pocket - ca.1905-ca.1988  
Flat pocket - 1892-ca.1920  
Lunch box - ca.1890-1940s  
Flat fifties - ca.1925-post WWII

Sanitary:

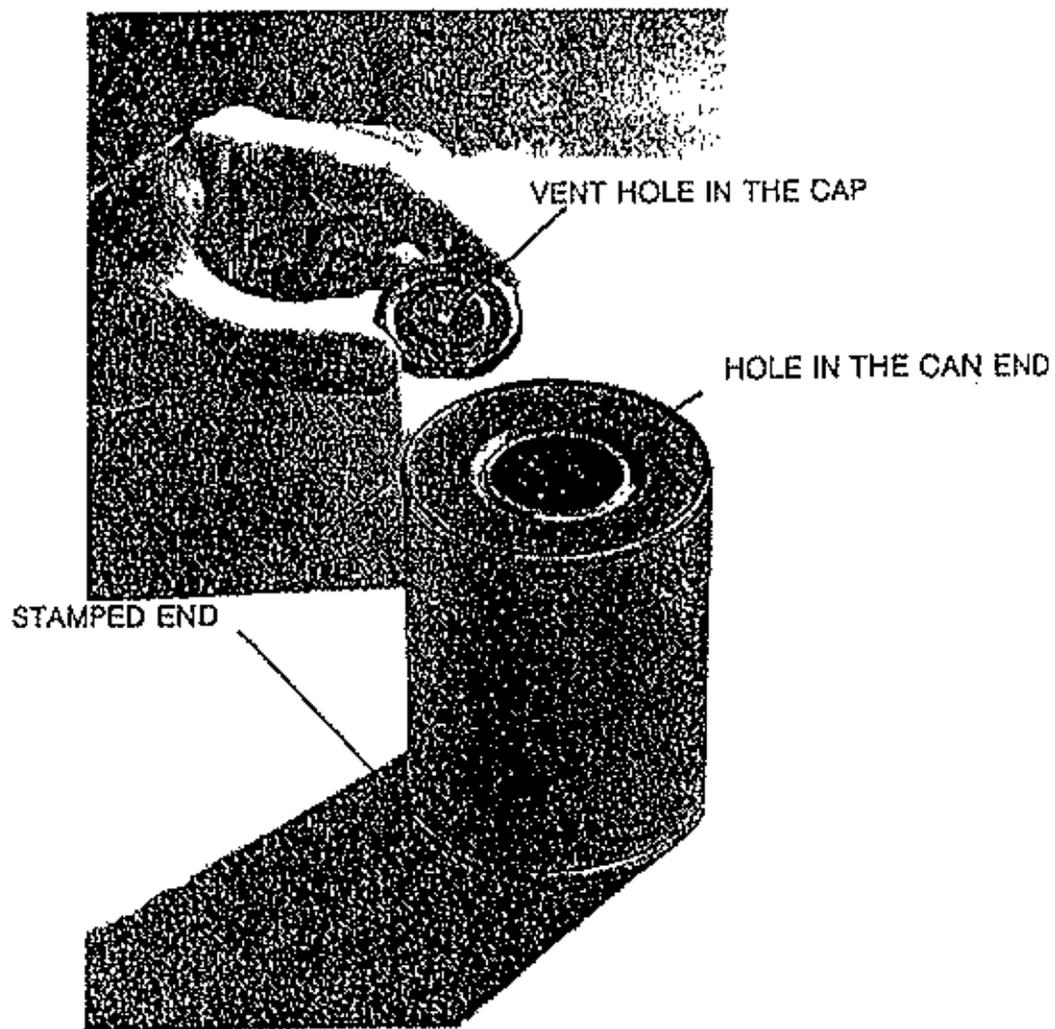
Appeared ca. 1904, no solder, gasketed and double-seamed sealing (ends crimped, side internal rolled).

Hole-in-Cap:

Appeared ca.1810 and in use until ca.1930+. Had stamped ends, overlapping or double seaming (1888-1901 changes were made on this new means of making a side seam - became an essential part of the "sanitary" type can, and was used on others as well).

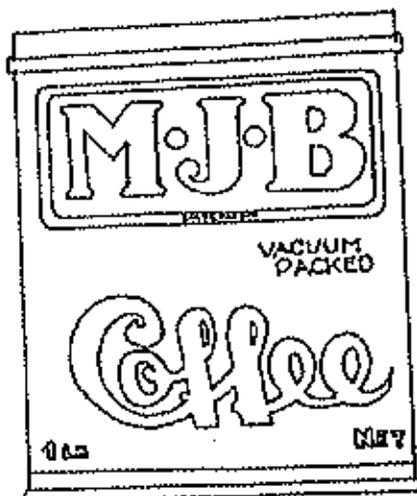
Vent hole:

Appeared ca.1900, had stamped ends, double seaming (most appear to be internal rolled), only solder is the vent hole. Around 1914 advertised as exclusively for evaporated milk. In use as late as 1985.

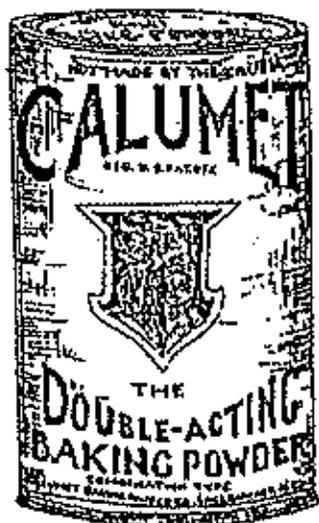


Hole - in - Cap Can

Adapted from American Can Company, The Canned Food Reference Manual, 1949:49.



MJB Coffee  
mid-1920 (illus)  
FRY TREE TEA



Calumet Baking Powder  
1859-1928  
Part of General Foods  
1928-1993  
1928-1936 (illus)

Plum Pudding



Key-wind slide strip  
tapered cylinder  
Sears, Roebuck & Co.  
1897

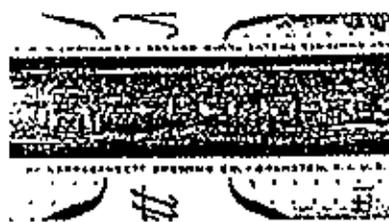


Royal Baking Powder  
ca.1855-1929  
Part of Standard Brands  
1929-1993  
FULL WEIGHT/1 lb/  
ROYAL BAKING POWDER/  
ABSOLUTELY PURE  
1899-1934  
Fiber can used:  
1934-1938  
1942-1958  
1963 on  
5-color lithographed  
w/lugged lid used:  
1938-1942  
1958-1963

SIDE SEAMS - SPECIAL



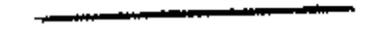
Straight soldered  
1935-ca.1955



Soldered w/notches  
American Can Co.  
1960s-ca.1976

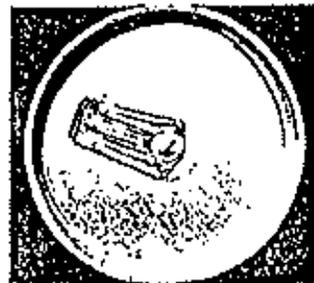


Notched seam  
Continental Can Co.  
National Can Co.  
1960s-ca.1976



Jack Martells  
The Beer Can Collector's Bible  
1976

PULL TABS



First pull tab  
Alcoa Aluminum  
1962



Key-hole pull tab  
U-tab  
1963-1965



Removable pull tab  
American Can Co.  
ca.1976

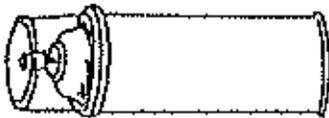


Push button top  
stay w/can  
1974

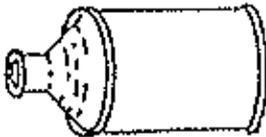


Non-removable pull tab  
Reynolds's Aluminum  
"Tip up Tab"  
1974/1975-1983

CAN FORMS



Aerosol Can  
1947-1993



Cone top - non-beverage  
1935-1993



Beverage Can  
Cone top - 1953-1994



Beer Can  
Flat top - 1935-ca.1970  
Flat top w/tab - 1952-1993



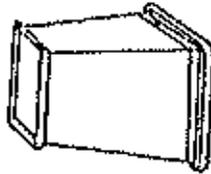
Beverage Can  
Flat top - 1953-1970s  
Flat top w/tab - ca.1962-1993



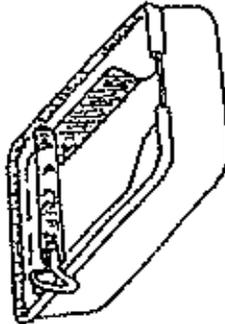
Oval and oblong w/long spout  
Lighter fluid, household oil



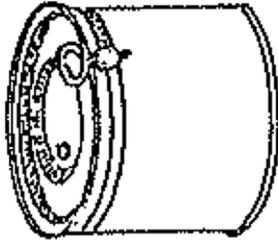
Key-wind side strip  
oblong  
ca.1850-1993



Key-wind side strip  
tapered  
1856-1993  
Various meats



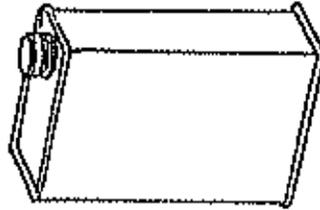
Key-wind top strip  
drawn - sardines  
ca.1897-1992



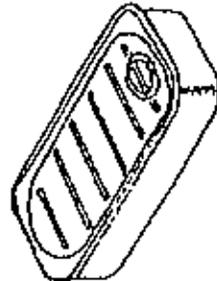
Key-wind side strip  
rectangular lid  
ca.1910-1920s



Key-wind side strip oblong  
Spam, lunch meats



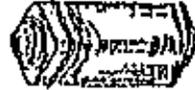
Oblong F w/threaded cap  
Varnish, wax



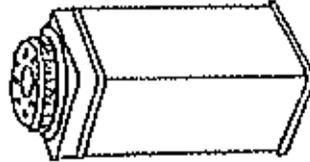
Easy open oblong can



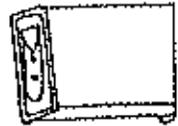
Flat oval  
ca.1900-1923



Square, oval and round-breasted  
1890-ca.1960  
Powder



Spice oblong  
dredge top - other openings  
Seasonings



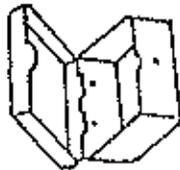
Round truncated  
simple screw cap  
Vinares



Flat, round can/external  
friction lid



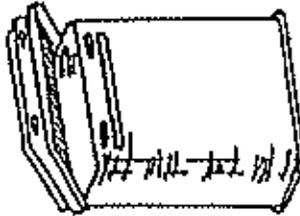
Key-wind top strip or  
Pull-tab  
pear-shaped ham tin



Hinged lid



Flat, hinged-lid tin  
ca.1918-1923  
Aspirin/tobacco



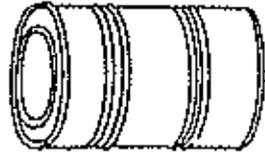
Hinged lid  
Band-Aid



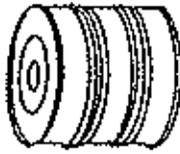
Upright pocket hinged lid  
ca.1901-ca.1906  
Tobacco



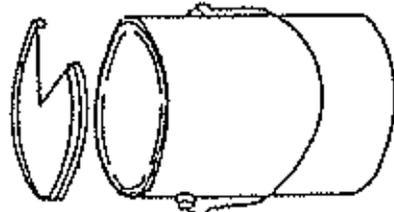
Long spout rectangular  
Early oil can



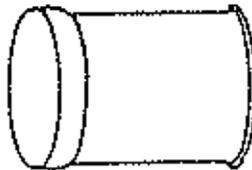
Sanitary hole-in-cap or  
Open-top can (3-pieces)  
ca.1900-?



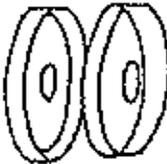
2-piece drawn redrawn  
sanitary



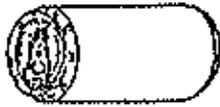
Pressure seal multiple  
friction - 1906-1923



External friction  
cylindrical closure cans

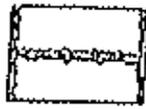


Pressure seal internal friction



2-piece redrawn  
w/pull tab  
Beverages, pudding  
cat food

SOLDER



Hand  
(uneven application  
irregular edges or surface)



Machine  
(even edges and thickness)

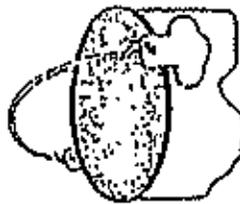
HANDLE



Bail - wire



Bail w/jugs  
(attached to side of can)



Cast  
(flange made of cast metal)



Molded in  
(rolled back onto self for  
softer edges)



Attached outside  
(around can body)



Holes punched in the can  
(recycled can)



Curved wire  
(the standard half circle)



Shaped wire

### Bottle Characteristics to Record

**Marks:** AB (diphthong) - check the heel of the bottle (if present) just above the cup-bottom mold seam near the vertical side seam for either a number and a letter (or visa versa).

ABCo - also check the heel, same reason as above as well as for the ABCo; same location.

When describing marks, please be as complete as possible. For example, "'O' (Owens Glass Co.)" does not provide enough information to indicate if it was made by the Owens Bottle Company (O in a square - 1911-1929) or the Owens Illinois Glass Company (I in an O with a diamond - 1929-1954 or I in an O - 1954-1993). Also, with these marks include the numbers - a preferred sequence is: (example)

3 (Mark) 7 or 3 (Mark) 7/11  
11

Use the slash only to indicate a new line. For a different side, use the double slash. If possible, draw the mark.

**Finishes:** If not certain as to type, please draw. Have included a copy of Fike's finishes for comparison.

**Plastic Caps:** These can most always be removed. If time allows, remove them, see if the liner is removable and check for any markings on the interior. Sometimes the companies marked them (e.g., Anchor, Owens-Illinois).



Bottle Base  
 'L' in Circle/Oval'  
 W.J. Litchford Glass Co.  
 1925-1935  
 Litchford Glass Co.  
 1957-ca.1980+



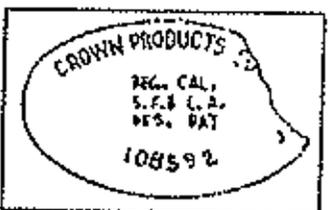
Bottle Base  
 H.J. Heinz Co.  
 79 - 1897-1903  
 Horneradahn, Mustard,  
 Apple Butter



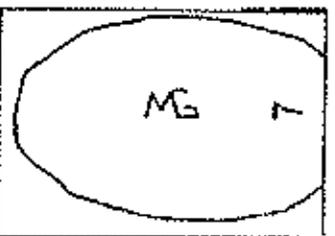
Bottle Base  
 'LM' or 'LM in a circle'  
 Litchford-Marble Glass Co.  
 1939-1956



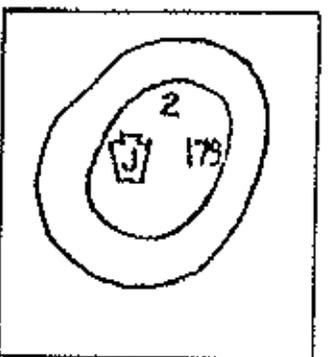
Bottle Base  
 Best Foods Inc.  
 Design patented 1930-19  
 for Turner Glass Corp.



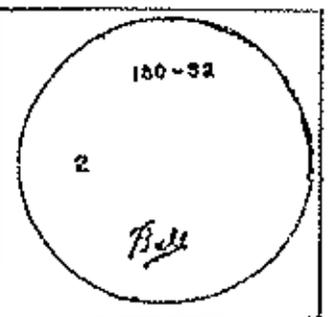
Bottle Base  
 Crown Products Co.  
 Design patented 1935  
 for Glass Containers Inc



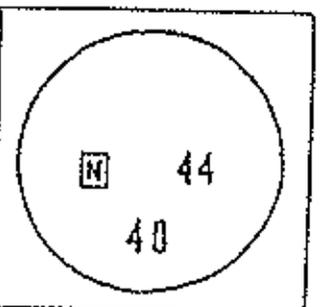
Bottle Base (also heel)  
 Maywood Glass Co.  
 ca.1956, but possibly earlier  
 Company - 1930-1961



Bottle Base  
 Knox Glass Bottle Co. or  
 1932-1963



Bottle Base  
 Bell Bros. Corp.  
 1907-1993



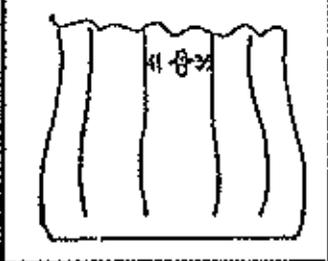
Bottle Base  
 Obean-Nester Glass Co  
 1916-ca.1980+



Bottle Body  
The Coca-Cola Co.  
1937-1951



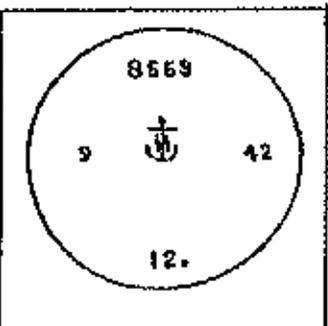
Bottle Base  
The Coca-Cola Co.  
City/State of Bottle  
1916-ca.1955 and 1953-1955  
Note maker's mark on bottle body



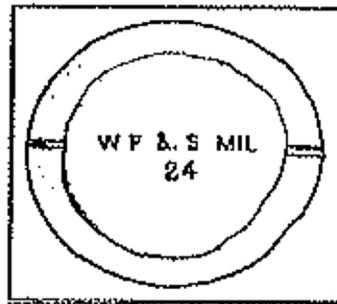
Bottle Body  
The Coca-Cola Co.  
Non-Coca-Cola bottle - colorless  
TALL, CONT. 7 FL. OZ. - 1912-1945  
City/State of Bottle - 1916-1955



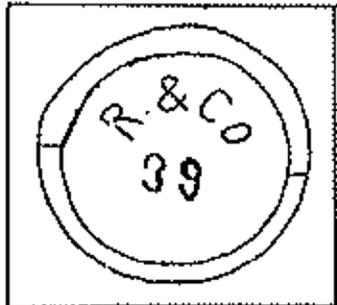
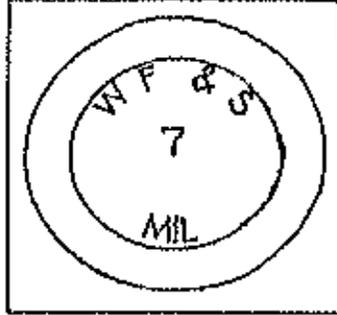
'C in Circle'  
Chattanooga Bottle & Glass Co.  
Chattanooga Glass Co.  
1927-ca.1950+



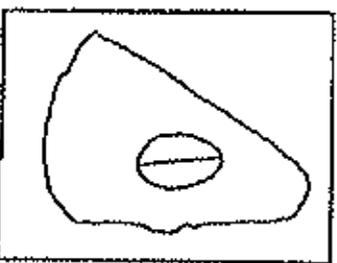
Bottle Base  
Anchor Hooking Glass Corp.  
1938-1963



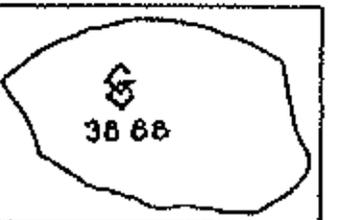
Bottle Base  
William Franzen & Son, Milwaukee  
1900-1920  
Example of straight across and  
arced



Bottle Base  
R & Co or R & CO  
Possibly Reed (Reid) & Co.  
1850-1904 (later part of ABCo)



Bottle Base  
Western Glass Manufacturing Co.  
1900-1909



Bottle Base  
Glass Containers Corp.  
1934-1967

STEEL CUT

External Friction Lid  
Hills Brothers Coffee  
1914-1922



External Friction Lid  
KC Baking Powder  
ca.1925-ca.1950

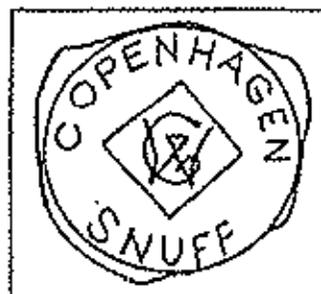
External Friction Lid  
J.A. Folger & Co.  
Golden Gate Baking Powder  
ca.1900-1922



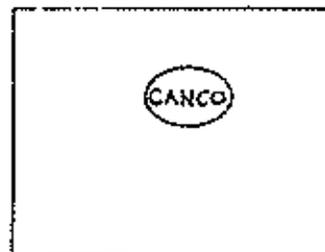
External Friction Lid  
KC Baking Powder  
'35 YEARS AGO' - 1925-1927  
'38 YEARS AGO' - 1928-1929  
'40 YEARS AGO' - 1930-1932  
'43 YEARS AGO' - 1933  
'44 YEARS AGO' - 1934  
'45 YEARS AGO' - 1935-1936  
'47 YEARS AGO' - 1937  
'48 YEARS AGO' - 1938-1939  
'50 YEARS AGO' - 1940-?



External Friction Lid  
Copenhagen Snuff  
1900

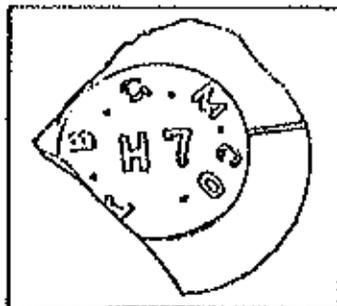


External Friction Lid  
Clabber Girl Baking Powder  
1931-1942

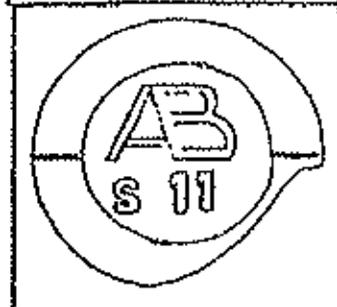


Sanitary Can End  
American Can Co.  
1923-?

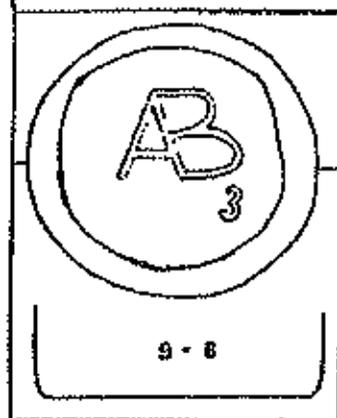
Rick R. Morris, Monique E. Kimball,  
Thomas F. Messeri, and Harding Polk W  
Gold Miners, Loggers, Shepherders, and  
Homesteaders: Exploitation of the Historic  
Resources of the Southwest. Vol. 19 in  
*Across the Colorado Plateau: Anthropological  
Studies For The Transwestern Pipeline  
Expansion Project.* In progress.



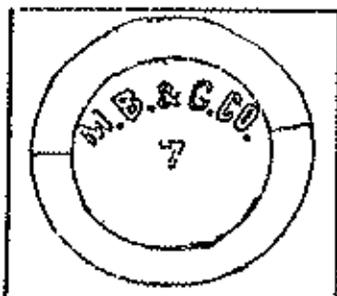
Bottle Base  
Adolphus Busch Glass  
Manufacturing Co.  
1888-1928



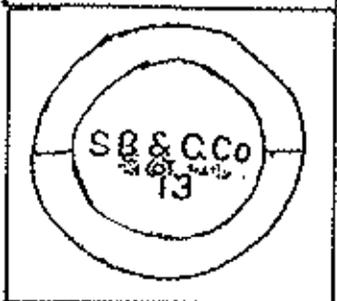
Bottle Base  
'AB (diphthong)'  
Used by both ABGM Co  
ABCo - 1904-ca.1916



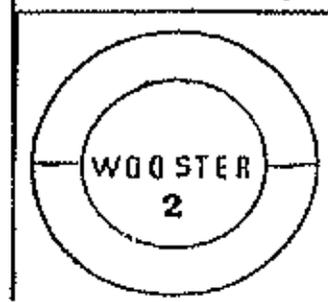
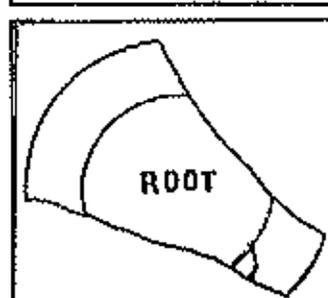
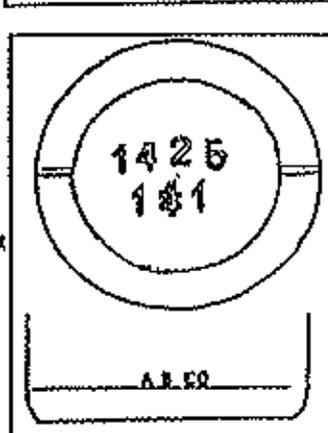
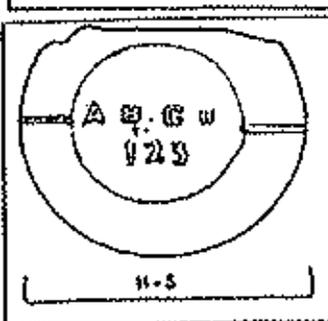
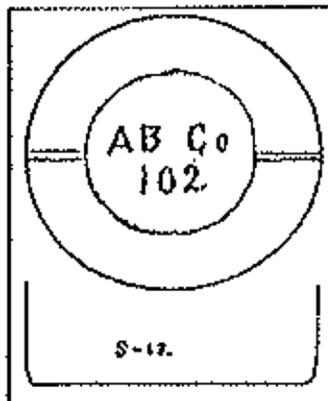
Note heel mark - Year and Plant



Bottle Base  
Massillon Bottle & Glass Co.  
1890-1904  
Became part of ABCo 1905



Bottle Base  
Sreater Bottle & Glass Co  
1891-1905  
Became part of ABCo 1905



Bottle Base  
American Bottle Co.  
1905-1929  
Merged w/Dewens Bottle Co. 1916

Note heel mark - Year and Plant

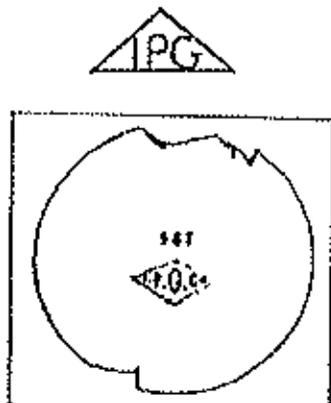
Note 'A B CO' on heel

Bottle Base  
Foot Glass Co.  
1901-1932  
'RO X OT' may be another  
company's mark - no listing

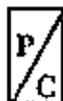
Bottle Base  
Woodster Glass Co.  
ca.1900-1904  
Became part of ABCo 1905

### Ceramic Characteristics to Record

- Marks:** If at all possible, please draw the complete mark. If not, then please include all information given. Describing the mark as completely as possible, including any numbers, can make it easier to date, particularly as some companies (such as the Mayer China Company) did include dates in their marks.
- Decoration:** First off, the phrase "highly decorated" unfortunately does not indicate how the vessel was decorated. Please indicate if it is molded relief (with as best a description of what the design is as possible, which is not always possible to do), transfer print, decal, hand painted, or a combination along with gilded scalloped rims. As time is of the essence in the field, a description such as "floral-leaf pattern" or "geometric transfer print" with a listing of color(s) is enough, and if the pattern is known (e.g., Willow ware), indicate that.
- Ware:** Please be careful on this. Not all white vitreous ware is porcelain. Some is highly fired white improved earthenware.



Bottle Base  
Illinois Pacific Glass Co./Corp.  
1902-1930

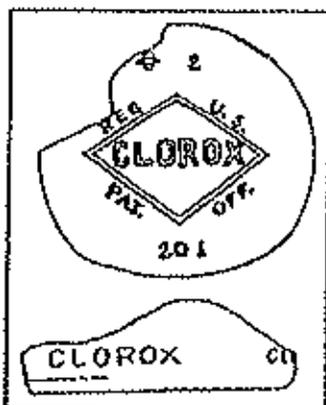


Bottle Base  
Pacific Coast Glass Co.  
1925-1930



Bottle Base  
Clicquot Club  
1851-? or 1860-?

TRADE  
CLICQUOT CLUB  
MARK  
REGISTERED



Bottle Base  
Owens-Illinois Pacific Coast Co.  
1932-1943  
Owens-Illinois Glass Co. West Coast Div.  
1943-1993  
Plant #s - 20, 21, 22, 23



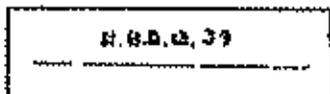
Bottle Body  
Old Quaker Whiskey  
Schenley Products  
ca.1934-ca.1968  
Bottle Cap - aluminum



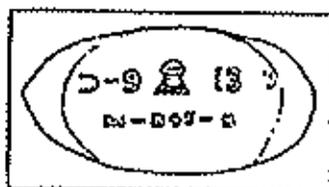
Bottle Base  
Owens Bottle Co.  
1911-1929



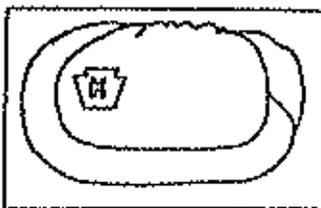
Bottle Base  
Illinois Glass Co.  
1918-1929



Bottle Base  
North Baltimore Bottle  
Glass Co. - 1885-1930



Bottle Base  
Caplan Glass Co.  
ca.1918-1938

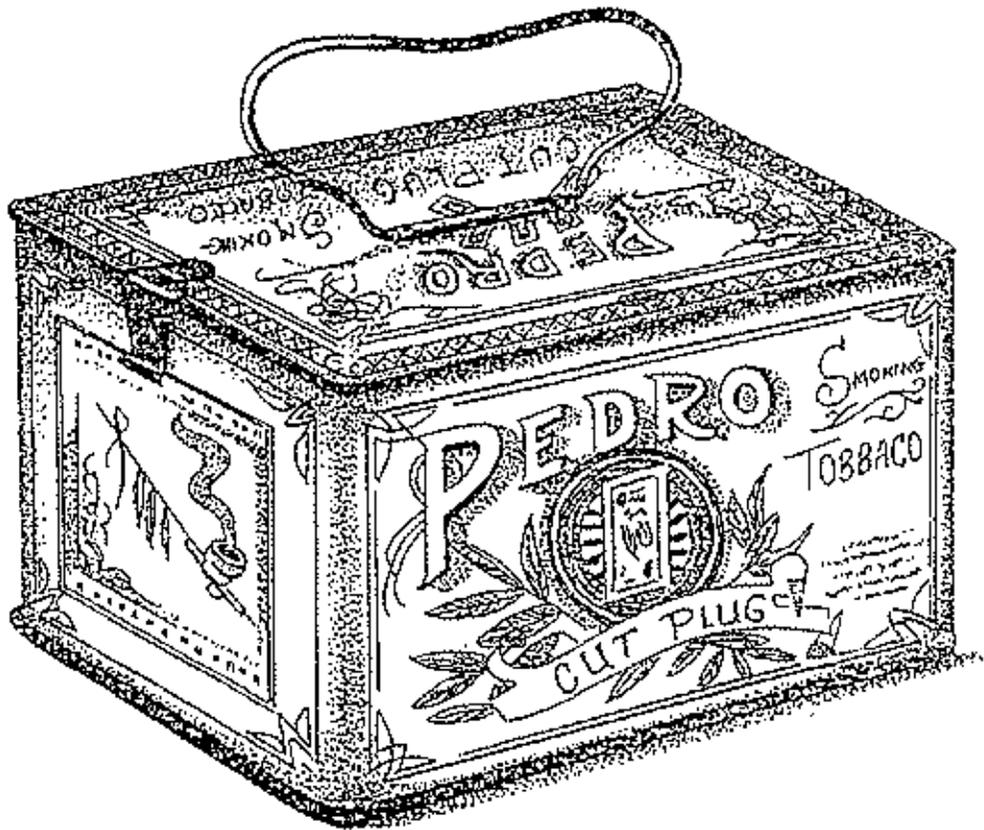


Bottle Base  
Knox Glass Co.  
1924-1958

FEDERAL LAW FORBIDS SALE  
OR RE-USE OF THIS BOTTLE

Bottle Shoulder  
'FEDERAL LAW.....'  
1934-1954

CANS AND CANNING



JIM ROCK  
1998

CAN ANATOMY

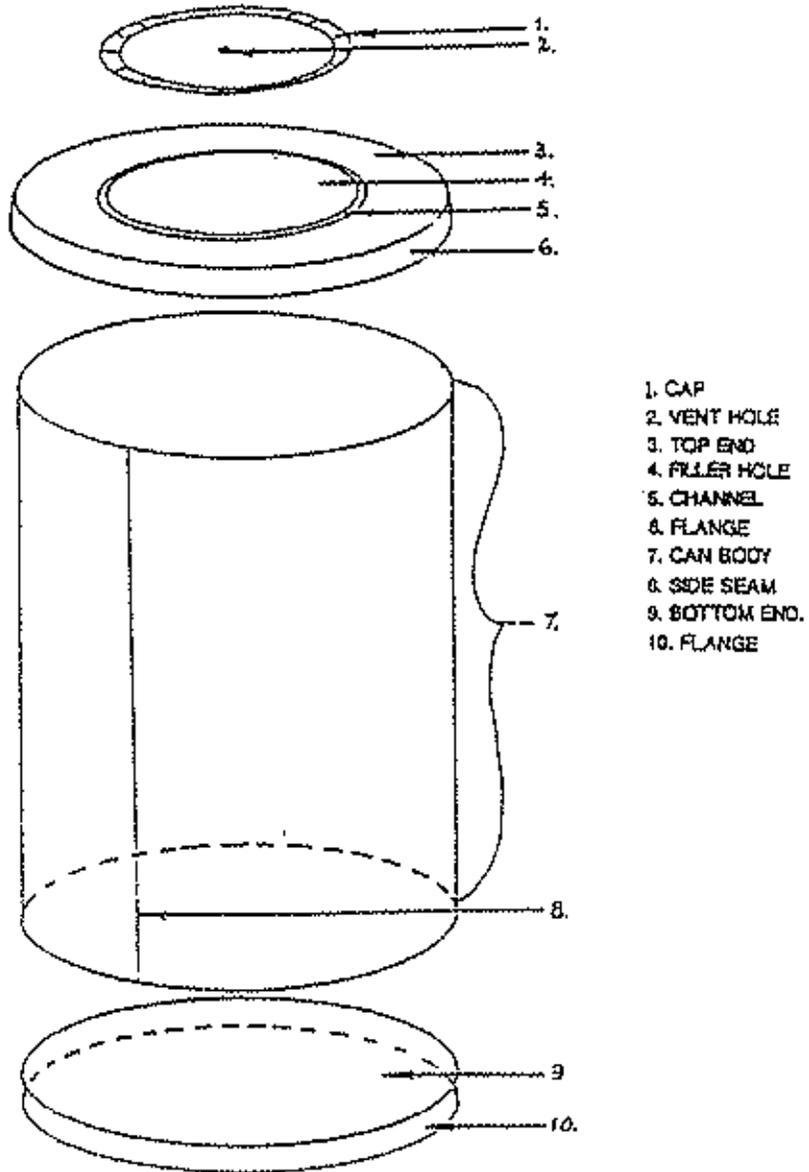
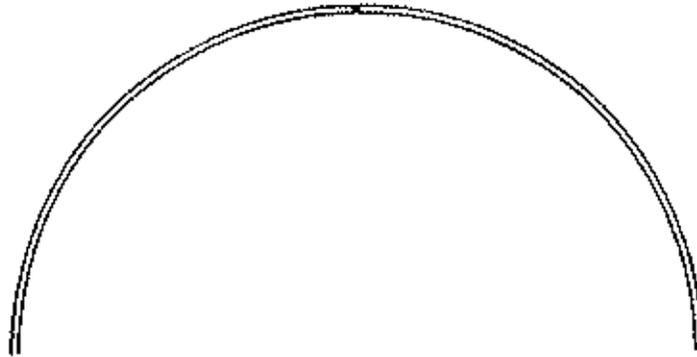


Fig. 1

Date

- 1300 - For the first time iron is tinned in Bohemia (Clark 1977:11).
- 1706 - The English passed a tariff protecting the tinplate industry (Clark 1977:11).
- Circa 1730 - England led the world in the production and marketing of tin  
to 1900 plate (Busch 1981:95; Swedberg and Swedberg 1985:10).
- 1780 - Small lead drums are manufactured to hold snuff (Clark 1977:11).
- Late 1790's - Paper labels were commonly found on cans (Clark 1977:11).
- 1758 - Rappee Snuff was being sold in Pound Leaden containers (Jones 1993:30).
- 1762 - Bohea and Congo tea was being sold in pound, half and quarter pound containers (Jones 1993:30).
- 1762 - Potable soup, of the best sorts, made separately from beef, veal, mutton and chicken was being sold in tin boxes (Jones 1993:30).
- 1795 - Emperor Napoleon I of France offered a monetary award for the development of an easy, safe way to preserve food for his armies (Swedberg and Swedberg 1985:10).
- 1798 - Aloys Senefelder of Germany invented lithography, a process in which a design was put on the surface of a smooth, porous stone with a greasy crayon. Water, followed by greasy printing ink, was applied. The oily parts rejected the water but absorbed the ink. The wet parts repelled the ink. The stone thus became a plate that printed on paper pressed against it. The technique reached the United States around 1820 (Clark 1977:11; Swedberg and Swedberg 1985:10).
- After 1800 - Embossing became common on cans (Clark 1977:11).
- 1809 - Nicholas Appert of France received an award of 12,000 Francs from Napoleon for preserving food in glass containers with corks and wire stoppers. He thought air caused spoilage, so he broiled the jars in water to eliminate the air and to cook the food (Clark 1977:11; Swedberg and Swedberg 1985:10).

Plumb joint



Lap seam

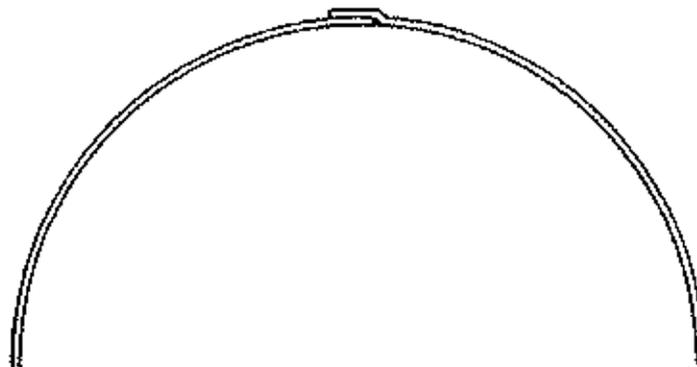
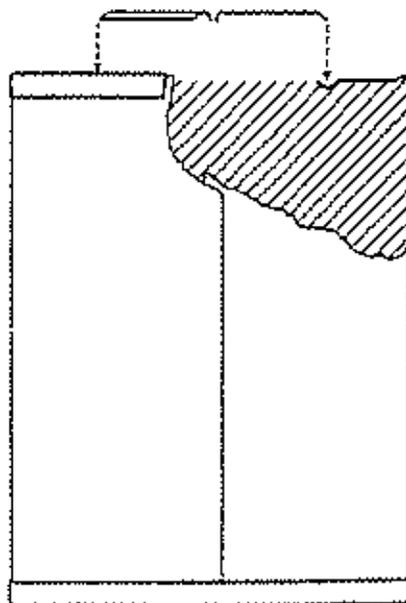
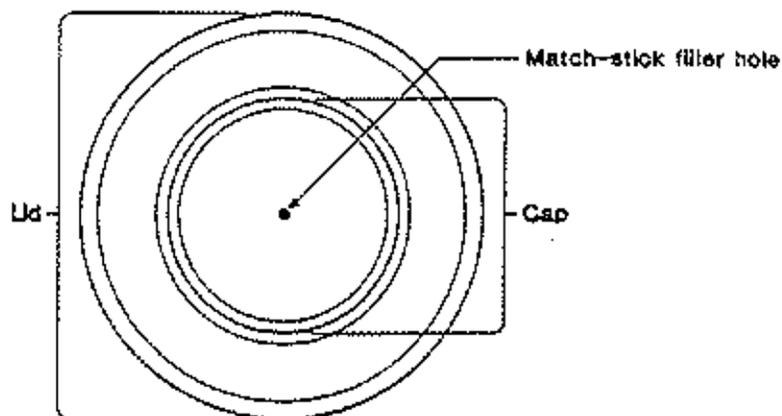


Fig. 2

- 1810 - Englishmen Peter Durand and Augustus de Meine, working independently, each received a patent for preserving food in tin containers. These containers were cylindrical in shape and made of tin plate - iron coated with tin. These containers were handmade by tinsmiths and often had plumb or lap side seams. The cap for closing the can was not vented. These were hole-and-cap cans (Anonymous 1961:5; Busch 1981:96; Clark 1977:11; Rock 1984a:100; Sacharow and Griffin 1970:9; Swedberg and Swedberg 1985:10).
- 1811 - An English patent was issued to Bryan Doukin and John Hall for canning in glass containers (Clark 1977:11; Rock 1984a:100; Sacharow and Griffin 1970:9; Swedberg and Swedberg 1985:10).
- 1812 - Tin-canned food was first marketed in England (Busch 1981:103)
- 1812 - Bryan Doukin and John Hall began the first commercial cannery in England (Anonymous 1961:5).

- 1813 - Doukin and Hall shipped tin cans to the British Army and Navy for testing (Anonymous 1961:8).
- 1817 - Messrs. Doukin, Hall and Gamble were selling meats in tin canisters of 4 lb. to 20 lb. weight (Jones 1993:30).
- 1818 - Peter Durand patented his tin plate containers in the United States (Clark 1977:13; Rock 1984a: 100; Sacharow and Griffin 1970:9).
- 1819 - Ezra Daggett and Thomas Kensett canned salmon, lobsters, oysters, fruits, meats and vegetables in New York. In Boston, William Underwood canned fruits and vegetables in crocks (Anonymous 1961:28; Busch 1981:96, 103; Clark 1977:11; Swedberg and Swedberg 1985:10).



1 inch

Fig. 3

- Circa 1620 - Tin can caps were modified to include a center vent hole. Bad air was believed to spoil the contents. By venting and heating the can, less failure was produced. Thus, the hole-in-the-cap can came about. It was not until the 1850's that the true reason for this canning success or failure was understood (Clark 1977:14; Collins 1924:34; Fontana et al 1962:68; MacNaughton and Hedges 1935:40; Kock 1964a:100; Sacharow and Griffin 1970:9).
- 1821 - William Underwood began packing fruit preserves, pickles and condiments in Boston in 1821. At first, he used glass jars. It was not until after 1850, that cans began to replace jars for his products. Canning in tin cans was made possible after 1810, but cans made by tinsmiths required a lot of time and labor. Once stamps were made for can ends and bodies, the tin can was much more practical. In 1865, Underwood's sons began canning devilled ham with a picture of a red devil on its label. Two years later, they registered this design under the new United States trademark law. The devil was registered as Number 82 in the ongoing list. The devil has been modernized over the years.
- "The W point of his tail, part of the lettering on the original label, was filed to a simple point, replaced, then taken away again. He's been given weapons, only to have them snatched back, and he's been getting thinner with each revision. The 1959 version by Robert G. Neubauer, Inc. had given him a harmless looking trident and a diabolical grin." (Anonymous 1934:85; Darling and McConnell 1993: 16; Morgan 1986: 105; Zumwalt 1960: 406-409).
- 1824 - Mechanical and seaming of round packers cans was first done in England (Anonymous 1961:11).
- 1825 - Thomas Kensett and Ezra Daggett were granted a U.S. Patent by President James Monroe for canning food in tins (Anonymous 1961: 6; Busch 1981: 103; May 1937:10).
- 1830 - Huntley and Palmers, English biscuit makers, began selling their products in tins (Clark 1977:11).
- 1837 - Thomas Kensett of New York City began canning in the 1820's as did William Underwood of Boston. Both of these canners began using tin cans following the financial panic of 1837 (Anonymous 1961: 25).
- 1839 - William Underhill and Co. of Boston and Thomas Kensett Sr. of Baltimore began shifting their packaging of oysters, lobsters, and salmon from glass to tin containers (Fontana et al. 1962: 70; May 1937: 435).
- 1840 - William Underwood and Co. of Boston were making their own tin containers. Peter Durand named this container "tin canister". The term can was coined by the bookkeepers at Wm. Underwood Co. They used "can" instead of cannister (Fontana et al. 1962: 67; May 1937: 12).

- 1847 - The Pendulum press was invented for stamping can parts. This was patented by Allen Taylor. This machine stamped a can end with extension edges (Busch 1981: 96, 103; Clark 1977: 11; Collins 1924:32; Fontana et al. 1962: 69-70; May 1937: 28, 435; MacNaughton and Hedges 1935: 41).
- 1849 - Henry Evans patented a foot-powered pendulum press. This press cut out can ends. William Numsem patented a combination die that cut out the ends, flanged them, and cut out the filler holes in the top. The machinery increased individual worker production from 5 or 6 cans per hour to 50 or 60 cans per hour. Stamped can ends are uniform in size and fit outside the can body, holding the can together. The end of the can which was used for filling usually fit outside the can body, but some cans had this end fitted inside the can at least through the 1870's. (Busch 1981: 96, 103; Collins 1924:32; Fontana et al. 1962: 69-70; May 1937: 28, 435; MacNaughton and Hedges 1935: 41; Rock 1984a: 100).
- Mid-1800's Canning spread widely, but no one understood why some foods kept and some did not. (Swedberg and Swedberg 1985: 10).
- By 1850 - Stenciling and paper transfer labeling was employed on tins (Clark 1977: 11).
- 1850-1860 Louis Pasteur of France learned that bacteria caused most food spoilage. He found that heating in a closed container killed these microscopic, single-cell plants and kept others out. This knowledge led to improved and speedier canning methods (Busch 1981: 96; Swedberg and Swedberg 1985:10)
- 1852 - Mr. Stevenson brought out the joker systems, the first substitute for the tinsmiths soldering iron used in the canning business. The "joker" was patented by Howe in 1876. This system was generally accepted in the 1880's (Collins 1924: 34; Stevenson 1914: 92).
- 1853 - Gail Borden visited the religious Society of Shakers at New Lebanon, New York, and observed that they used a globe-shaped copper vacuum pan for preparing medicinal herbs. Some sources say that the Shakers developed condensed milk (Swedberg and Swedberg 1985: 10).
- 1856 - Gail Borden perfected and patented his formula for condensed milk. In his process, he used the copper vacuum pan the the Shakers invented (Anonymous 1961: 29; Busch 1981: 103; Clark 1977: 11; Swedberg and Swedberg 1985: 10).
- 1856 - Bessemer Steel was invented. This allowed better, less expensive cans to be made. Steel also allowed thinner coats of tins than iron plate had required (Anonymous 1961: 6; Clark 1977: 11; Swedberg and Swedberg 1985: 10).

1857 - William Kelly duplicated Bessemer's improvement in converting cast iron into steel in the United States (Anonymous 1961: 6).

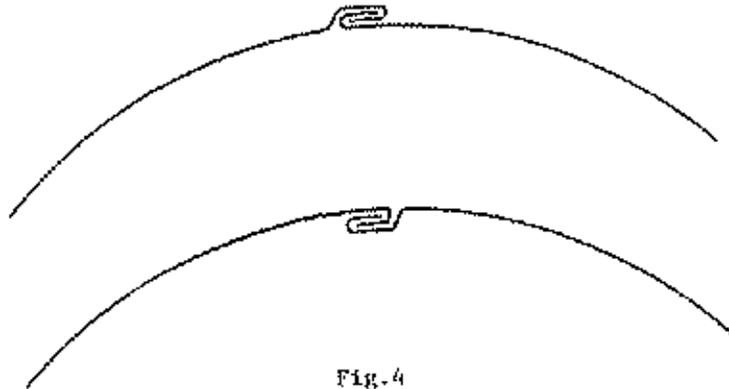
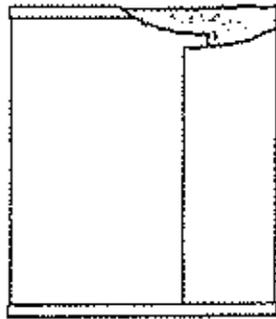


Fig.4

- 1860 - Locked side seams were perfected for tin cans (Anonymous 1961: 11).
- 1860 - P. Lorillard Company was established in 1860. Its primary products were Old Gold cigarettes, Between-the-Acts Little Cigars, and Union Leader Tobacco. Old Gold cigarette, were brand leaders in the 1930's, even though they were only introduced in 1926 (Anonymous 1934: 59).
- 1860's - The first non-food consumer can was developed by Dr. I.W. Lyon, a New York City dentist. This green can has a conical roof tapering to a small cylindrical dome. The can had exposed holes for dispensing powder when the top was removed (Anonymous 1961: 23).
- 1861 - A.L. Shriver of Baltimore invented a pressure cooker or "retort" that killed bacteria in filled cans. (Kloap 1971: 232) Anonymous 1961: 26 puts this date as 1874.
- 1861 - American canneries learned that by adding calcium chloride to their cooking water, the temperature of the water was raised and canning was more reliable (Busch 1961: 10).



1 inch

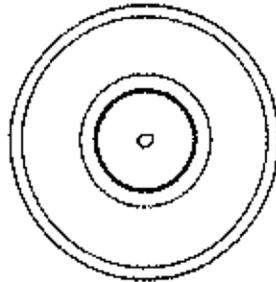


Fig. 5

- 1861-1865 The United States government purchased Borden's condensed milk for military distribution during the Civil War. This showed the public that canned products were safe and nutritious (Darling and McConnell 1993:16; Swedberg and Swedberg 1985: 10).
- 1861-1865 Can manufacturing became mechanized. Production of cans was 5,000,000 per year before the Civil War and 30,000,000 by the end of the conflict. Edward P. Heite points out in Archaeological Data Recovery on the Collins, Geddes Cannery Site, that it really was the standardization of dies for stamping can parts that led to standardization of can sizes (Anonymous 1961: 6; Heite 1990).
- 1865 - Silas Augustine Hsley started a tinware factory in Brooklyn, New York (Clark 1977: 11, 28; Swedberg and Swedberg 1985: 10).
- 1865 - Thomas M. Biddle and J.C. Hoagland created Royal Baking Powder. They began mining a baking powder formula in Fort Wayne, Indiana, in 1865. Ten years later they moved to Chicago. Their formula contained its own activator. They moved again from Chicago to New York, and in 1929, Royal Baking Powder was acquired by Standard Brands (Morgan 1986: 128 and Rock 1987: 28).

1865 -

Kerosene was successfully marketed in tin cans. (Anonymous 1961: 36).

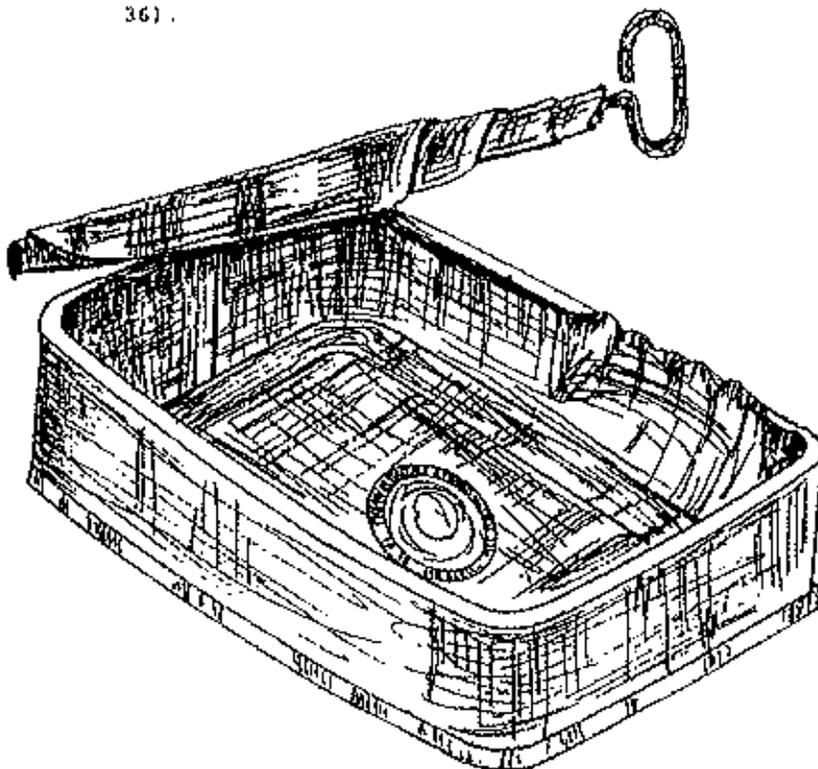


Fig. 6

1866 -

Key opened cans were introduced. The most common was the sardine can which had its entire end removed (MacNaughton and Hedges 1935: 42, 44; Rock 1984a: 100-101, Sacharow and Griffin 1970: 10).

1866 -

Borden's Company was founded in 1857. Gail Borden's condensed milk first went on sale the following year. In 1866, the "Gail Borden's Eagle Brand Condensed Milk" name was adopted. This was not the first accomplishment by Borden's. Mr. Borden settled in Austin, Texas and became an official surveyor and printer for the Republic of Texas. He laid out the streets of Galveston and founded the Weekly Telegraph and Texas Register newspapers. His first venture into the food business consisted of a meat biscuit. This product for travelers was foul-tasting, but it won high honors at the London Crystal Palace Exhibition. Borden's condensed milk dominated the market for many years. In the 1930's, "Elsie the Cow" became the mascot and spokes-animal for his condensed milk. Elsie even toured around the country, raising money for war bonds (Anonymous 1934: 17; Frantz 1951; Morgan 1986: 107; Rock 1987: 42, 43; Rock 1984; Zumwalt 1980: 53, 54).

1867 -

Libby, McNeill & Libby was started in 1867. It produced corned beef. The barreled corned beef was less expensive than live cattle and could undersell fresh beef. It was first brought to market in 1863. The company began using a tapered tin in 1875. This allowed a whole piece of meat to be taken from the can. In

- 1895, they added a key wind improvement to the can. The same label design was used until 1933. Today, they still sell canned beef, as well as bottled tomato juices and grapefruit juice. Libby, McNeill & Libby also sells pie fillings, corned beef hash and drink mixers. (Anonymous 1934: 90; Morgan 1986: 108; Rock 1987: 55-56; Zumwalt 1980: 279-280).
- 1868 - Edwin Norton began to make cans in Toledo, Ohio (Clark 1977: 11; Swedberg and Sedburg 1985: 10).
- 1868 - The forerunner of Standard Oil Trust began selling its oil in 5 gallon cans (Anonymous 1961: 16).
- 1868 - Enamels were put on tin can interiors to halt corrosion and discoloration of food (Sacharow and Griffin in 1970: 9).
- 1869 - Daniel, Joseph and Guy, the Somers Brothers, began making metal cans and tags in Brooklyn, New York. Ten years later (1879), they developed their own way to lithograph tin-plated sheets (Clark 1977:11, 28; Swedberg and Swedberg 1985: 10).
- 1869 - Campbell Soup Co. was founded in Camden, New Jersey. It was originally called Anderson and Campbell. At first, it made preserved vegetables, jellies, condiments and mincemeat. Their speciality was canned tomatoes. The label show two men hauling a sofa-sized can. Campbell Soup Company developed its line of soups in 1898. It advertised using troll-car posters. The red and white label was inspired by the uniforms of the Cornell College football team. It was gilded with a medal won at the National Expos Exposition in Philadelphia. After 1905, the medal was replaced with another one that was won at the Paris Exposition of 1900. Their advertisements after 1904 had a cherubic cartoon of children, called "The Campbell Kids". (In 1904, the company also introduced its pork and bean soup.) Today these chubby children have trimmed down, but are still used (Anonymous 1934: 21; Darling and McConnell 1993: 16; Morgan 1986: 110; McGrath 1983: 40-42; Zumwalt 1980: 68-71).
- 1870 - Salmon canneries of the Columbia River region of Washington were canning in handmade cans that were heavily soldered (May 1937: 112).
- 1870 - The London firm of Barclay and Fry patented the offset press. This allowed one-color lithography to be printed on a colored base. (Clark 1977:11; Swedberg and Swedberg 1985:10).
- By the 1870's Ginna and Company of Brooklyn, New York, was well enough established to create fine, artistic tins (Swedberg and Swedberg 1985:10).
- 1871 - Edwin Norton moved his tin plant to Chicago (Swedberg & Swedberg 1985: 10).
- 1872 - Large scale meat packing began in Chicago (Anonymous 1961: 28).

- 1872: Hills Brothers Coffee was started by Austin H. and Reuben W. Hills in San Francisco in 1872. They first imported dates and sold them in bulk. Then in 1882, they bought a retail store called Arabian Coffee and Spice Mills. The turbaned figure has been on the product since 1897. Its position has changed over the years, especially his feet. (Anonymous 1934: 47; Morgan 1986: 114; and Rock 1987: 38-39). Hills Brothers coffee was the first vacuum packed coffee, and it was first done in 1903.
- 1873 - Oliver Norton joined his brother, Edwin, in Chicago and the firm became Norton Brothers (Swedberg and Swedberg 1985: 10).
- 1870's - The Norton Brothers developed a lock-and-lap side seam for the tin can. This allowed automatic production of cans at the rate of 6,000 per hour (Anonymous 1961: 6).
- 1873 - W.H.I. Howe of New York acquired the English patent for "tagger" topped preserve cans. These cans could be returned and reused. The "tagger top" is known in two forms: First soldered tin with a removable lid and protected by a thin sheet of tinfoil. Second, a paint or kerosene can, rectangular or round, with a raised pouring spout and a screw cap, sealed with a thin plate of foil (Fontana et al. 1962: 74).
- 1875 - The first shrimp was canned in New Orleans (Anonymous 1961: 28).
- 1875 - R.J. Reynolds (RJR) split off from the American Tobacco Company as ordered by the United States Supreme Court in 1911. Two years later, the company introduced Camel cigarettes. These cigarette were a blend of pure Virginia and pure Turkish tobaccos, thus the Camel symbol. R.J. Reynolds had been in business since 1875; and by 1887, the company was producing 86 different brands of tobacco. Its first real success came when it introduced Prince Albert smoking tobacco to the American public in 1907 (although the test marketing had begun the year before). The Prince Albert slogan was, "Can't Bite Your Tongue". The brand's distinctive feature was its air tight tin package. This tin container was not taken out of the market until 1994.
- The Camel brand became very successful with its recent slogan, "I'd walk a mile for a Camel", which was introduced just after World War I. During the 1990's, the Joe Camel character appeared on a multitude of popular items, and it really gained a lot of attention. In the 1950's, Reynolds introduced SALEM cigarettes, which were filter-tipped and had menthol added to the tobacco (Anonymous 1934: 74; Morgan 1986: 90; McGrath 1983: 119-122; and Rock 1994: Personal Observations.)
- 1875 - Steel began being made using an open-hearth process (Clark 1977: 11).
- 1875-1885 - Steel gradually replaced iron as the basic material for tinplate (Kloap 1971: 232).

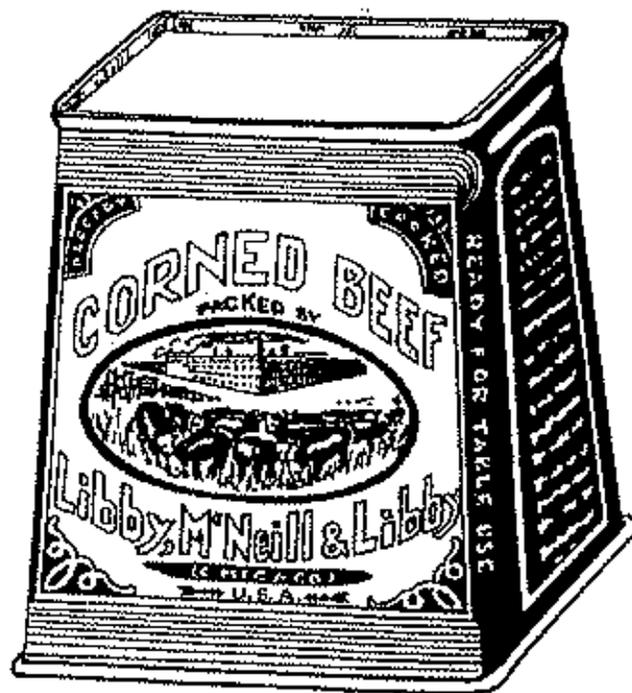


Fig. 7

- 1875 - Arthur A. Libby and J. Wilson of Chicago, Illinois, purchased the patent rights for the tapered meat tin. The patent had existed for nearly 10 years when this took place. Libby eventually bought out Wilson to have exclusive rights to this container (May 1937: 437; Pulati 1973: 16; Rock 1984a: 101).
- 1876 - The Howe "floater" was introduced into the can making industry. This machine automatically soldered can ends by rolling them, at any angle, in a bath of solder (Busch 1981: 97, 103; Collins 1924:34).
- 1876 - A patent for direct printing on roughened tinplate was granted (Clark 1977: 11; Swedberg and Swedberg 1985: 11).
- 1876 - Sardines were first packed in Maine (Anonymous 1961: 281).
- 1878 - The first Alaskan salmon cannery opened (Anonymous 1961: 281).
- 1879 - The Somers Brothers of Brooklyn, New York, developed their own process for lithographing tin containers (Clark 1977: 11, 27, 29).



Fig. 8

- Late 1870's - The Somers Brothers developed a lithographical cylindrical can with a disk top which spun around to reveal dispenser holes for Gerhard Mennen, a New Jersey druggist (Anonymous 1961: 23).
- 1880 - The majority of canning factories were making their own cans (Judge 1914: 55).
- 1880 - The seafood industry was making its cans by automation. Cans were made by drawing the base and body of the can from one piece of metal. Before 1880, seafood was canned in three-piece soldered cans (Fontana et al. 1962: 72).

- 1860 - California canned goods were being exported to England, the Orient, Australia, Western Siberia and the Pacific; a limited trade also existed with Germany, France, Belgium and Holland (Jacobs 1914: 34).
- Early 1880's - Chromolithography was introduced (Clark 1977: 11; Swedberg and Swedberg 1985: 11).
- 1880's - The slip-cover tin container was first manufactured and the lever-opening lid followed shortly (Anonymous 1961: 11).
- 1882 - Mechanical tinning pots were used for the first time (Clark 1977: 11).
- 1883 - The Norton Brothers, with their automatic can-making line began to experiment with a German open top can. They also invented and used a semi-automatic body maker that was capable of mechanically soldering the side seams. Before this time, their production line had only hole-in-cap containers (Busch 1981: 97; Clark 1977: 18; May 1937: 351-352).
- 1884 - The sardine can with a depressed top allowed the industry to stop venting the cans - no longer was a spot of solder present and the lid was not flat (Fontana et al. 1962: 72).



Fig. 9

- 1885 - The first evaporated milk made in the U.S. was canned by Helvetia Milk Condensing Company of Highland, Illinois (Sitting 1937: 237-739; Hunziker 1914: 13; May 1937: 183; Rock 1984b: 109).
- 1885 - Robert Wood Johnson, James Wood Johnson, and Edward Mead Johnson (Johnson and Johnson) formed a partnership in 1885 in Brunswick, New Jersey. In 1887, the company was incorporated as Johnson & Johnson. The Johnsons were in the surgical dressing business and proprietary medicine business. They made Quiniform and Corapin pills for "Dyspepsia, Indigestion and Diphtheria". The Johnsons learned of Sir Joseph Lister's identification of airborne germs as a source of infection. They quickly created a ready-made sterile, wrapped and sealed surgical dressing. Their packaging since 1888 has displayed a red Greek Cross as its trademark. By the 1890's, they were creating cotton and gauze antiseptic bandages. Next came a small tin of Italian talc to reduce skin infections. In 1894, they introduced a "kola" product to reduce nausea and regulate the pulse. In 1920, the "Band-Aid" adhesive bandage was created--quite by accident. And in 1928, they introduced the Tek Toothbrush. Today, Johnson and Johnson is best known for its Baby Powder, Baby Soap, and Baby oil (as well as its band-aids) (Baren 1992: 58; Morgan 1986: 85).
- 1885 - Pet Milk Co. was formed in 1885 in order to market evaporated milk (not condensed milk). Its name at that time was Helvetia Milk Condensing Company. They adopted this trademark in 1898. In 1923, the company changed its name to Pet Milk Company (Anonymous 1934: 60; Rock 1984: 110; Rock 1987: 46-48).
- 1886 - In 1886, Samuel Curtis Johnson (S.C. Johnson Wax) bought a parquet flooring business in Racine, Wisconsin. He prepared a wax paste for cleaning these floors. He recognized the need for other cleaning products for furniture, shoes and automobiles, so he began producing these as well. During World War II, ski wax was shipped to the Soviet Union for use by the Red Army. Soviet troops used this wax on their skis in the defense of Leningrad. After the war, "Pledge" became the furniture polish market leader. For many years, the company sponsored "Fibber McGee and Molly" on the radio.
- Today, the company also makes air fresheners, insecticides, shampoo and shaving creme (Anonymous 1934: 53; Baren 1992: 59; McGrath 1983: 79, 80).
- 1887 - Patrick J. Towle established a small factory to manufacture Log Cabin Syrup in St. Paul, Minn. The company canned its syrup in tall rectangular paper label tins (Reed 1981: 2).
- 1888 - Max Ams of the Max Ams Machine Company of New York, New York, invented a process that seamed cans with a double side seam (Sacharow and Griffin 1970: 9; Rock 1984a: 101).
- 1890 - The first automatic locker for making a lock beam was introduced (Stevenson 1914: 92).

- 1890 - Norton Brothers made a can from a single sheet of tin plate. Their machine speeded production, up to 6,000 cans per hour, and gradually replaced hand methods in can making (Clark 1977: 11; Kioap 1971: 232; Swedberg and Swedberg 1965: 11).
- 1891 - The McKinley Tariff Act was enacted. After this protective tariff began to function, imported tin products were taxed and their price increased. This helped the domestic tin industry to become competitive. By the 1920's, production of tin plating in the United States exceeded that of Great Britain (Clark 1977: 11; Swedberg and Swedberg 1985: 11).
- 1891 - Basker and Marcuse Manufacturing Company, a tin can maker, was founded in Richmond, Virginia, by Charles Basker and Milton Marcuse (Clark 1977:11; Swedberg and Swedberg 1985: 11).
- 1892 - Pineapple was being canned in Hawaii (Busch 1981: 97).

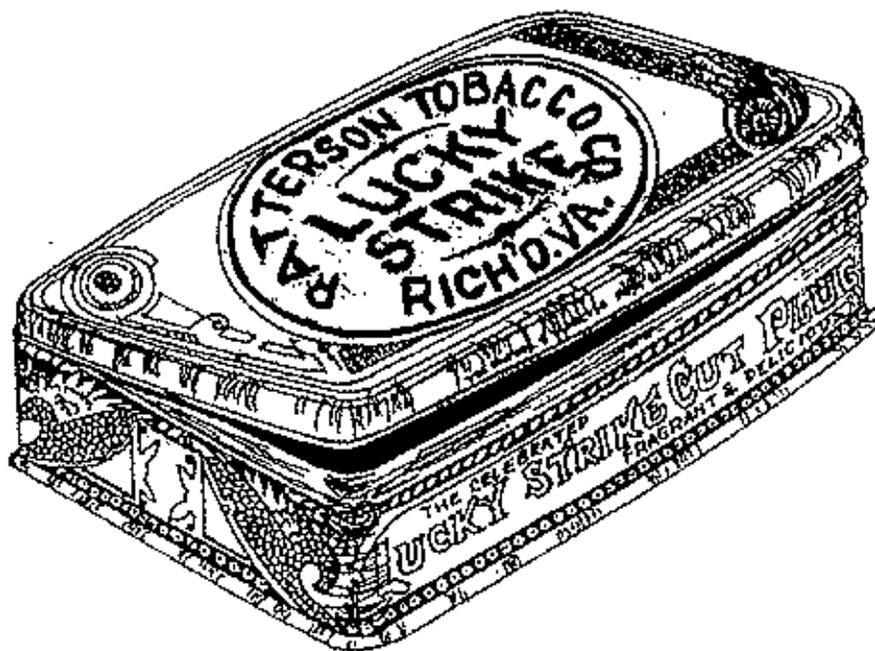


Fig. 10

- 1892 - The lithographical flat hinged lidded tobacco can was first marketed (Anonymous 1961: 39).
- 1892 - Maxwell House coffee was introduced in Nashville, Tennessee, at the Maxwell Hotel by Joel Owsley Cheek. The slogan, "Good to the Last Drop", was almost instantly adopted once Theodore Roosevelt said it in 1907 (Morgan 1986: 114; McGrath 1983: 85-97; Rock 1987: 41).

1893 -

Daniel G. Trench, Trench and Co., brought the first open-top can machinery from Europe and exhibited it at the World's Columbian exposition in Chicago. This method was known as the "The Karges System" (May 1937: 438).

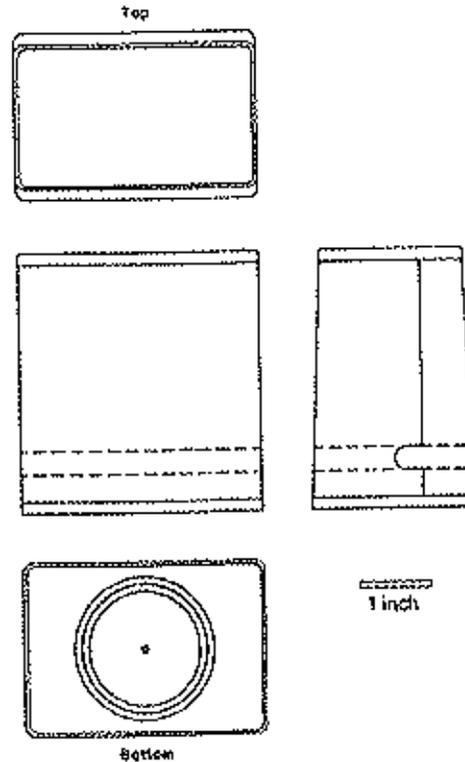


Fig. 11

1895 -

Edward Norton of Chicago, Illinois, perfected a method for scoring a strip on the side of a can that could be removed by a key, thus opening the can. The key-wind opening system was quickly adopted for the tapered meat tin. After 1903, vacuum packed coffee cans were usually opened by the key wind system as well (Cobb 1914: 94; Lee 1914: 44; Rock 1984a: 101).

1896 -

Charles Ams, of the Max Ams Machine Company, Greenwich Street, New York, patented a sealing compound of rubber and gum which replaced the rubber gasket used in sanitary, open top cans. The edge of the can top could be painted with this and then clamped on to the can machinery forming an air-tight seal (Busch 1981: 97; Collins 1924: 38; May 1937: 439).

1897 -

J.W. Fuller patented the design for the log cabin can. Design patent No. 26, 936, Pat. April 20, 1897. These cans had a paper label and folded seams. Very early cans had a wire handle on the ridge line of the cabin (Pulati 1973: 33; Reed 1981: 2-3).

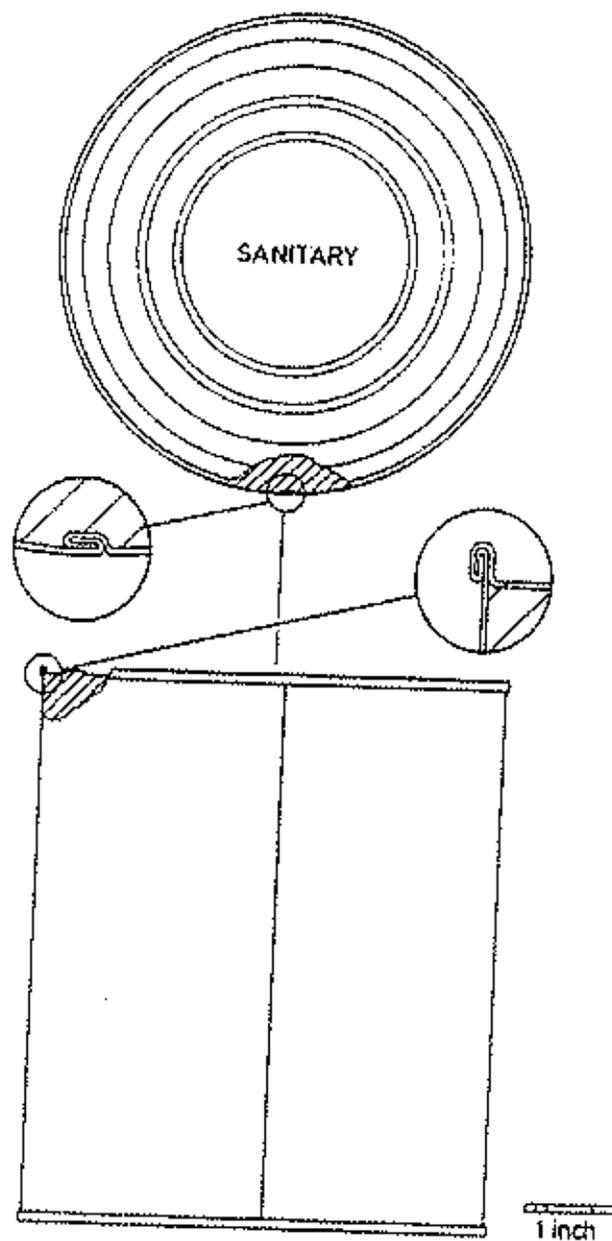


Fig. 12

- 1897 - The Ams Machine Company brought out a machine that applied the rubber and gum compound automatically to can ends and crimped the ends in a double seam. By the next year, he was producing these cans for the Cobb Preserving Company of Fairport, New York. Ams employees began calling these cans "sanitary cans" (Busch 1971: 97, 103; Collins 1924:39; Kay 1937: 88; Rock 1984a: 101).
- 1898 - The Cobb Preserving Company introduced the first fully automatic canning line (Clark 1977: 11).

- 1898 - Edwin Norton patented a vacuum pack tin (Anonymous 1961: 32; Swedberg and Swedberg 1985: 11).
- 1898 - The American Tinplate Company was organized by William H. Moore, Daniel G. Reid and William B. Leeds. A merger of more than thirty tin-plating companies resulted. These three men led the forming of the American Can Company in 1901 (Swedberg and Swedberg 1985: 11).
- 1899 - George W. Cobb, Sr. of Cobb Preserving Co., Fairport, New York, bought machinery from Max Amis Machine Co. and began manufacturing open-top cans for their products (May 1937: 439).



Fig. 13

- 1899 - Pacific Coast Condensed Milk Company of Kent, Washington, began canning its "Carnation" brand evaporated milk. Originally, Carnation Evaporated Milk was packed in hole-in-cap cans with 3/4" and 1/2" caps; but as soon as this machine was worn out, it was replaced with vent hole or hole-in-top equipment (Bitting 1937: 739; May 1937: 186-188; Rock 1984b: 110).
- 1899 - E.A. Stuart started Carnation Canned Milk Company in Kent, Washington. He selected a label that had a flower on it to reflect freshness and sweetness. He also wanted this label to be bright red and white. Stuart found what he needed in a downtown Seattle cigar store--the carnation. This trademark was adopted in 1899 (Anonymous 1934: 22; Morgan 1986: 107; Rock 1984b: 110; Rock 1987: 46, 47).

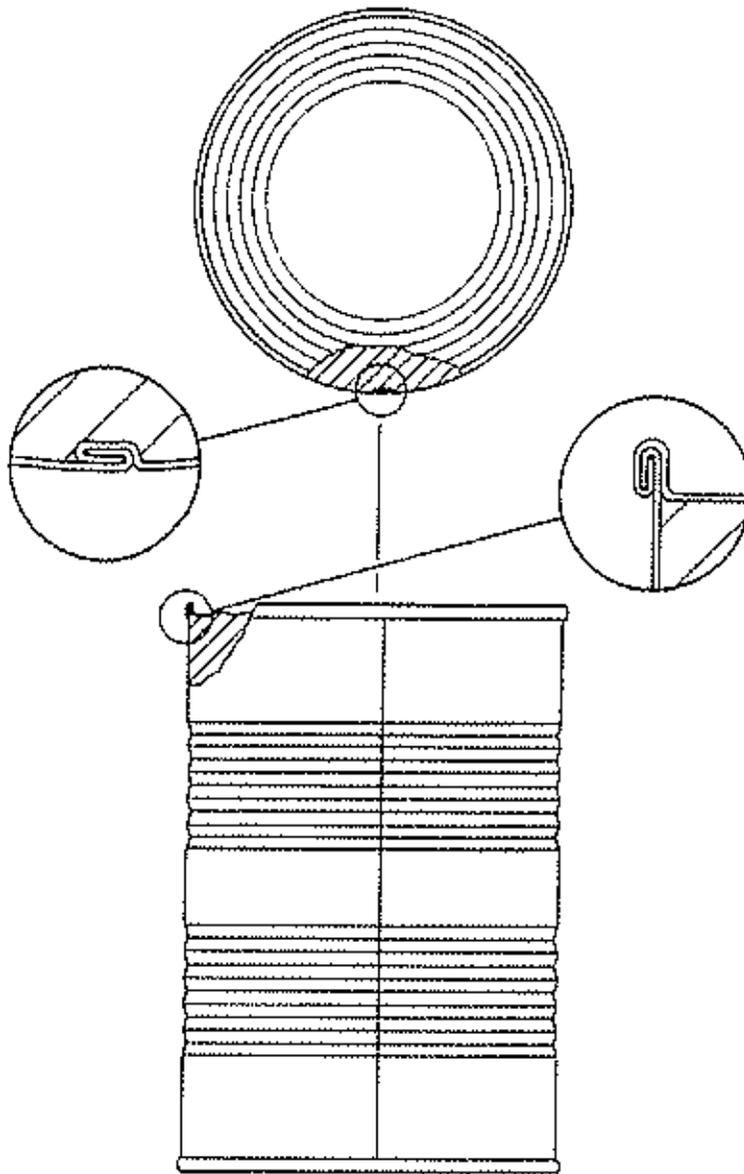


Fig. 14  
Modern Sanitary Can

1900 -

Advantages of the "open top" or "sanitary can":

(a.) The can enters the cannery with the bottom already double seamed, the body flanged and ready for attaching the top.

(b.) The top is fully opened for filling.

(c.) The double seam is the strongest part of the can.

(d.) The can may be flattened for shipping (McNaughton and Hedges 1935: 51).

- Circa 1900 Irregularly shaped cans were introduced with either slip or hinged covers (Anonymous 1961: 11).
- Circa 1900 The vent hole or hole-in-top can was introduced. This can is filled through a single small hole in the center of one end. The vent hole can was filled, vented and sealed through this small opening. One of the first products packaged in this type of can was evaporated milk (Hunziker 1914: 90; Pulati 1973: 28-29; Rock 1984a: 101).
- 1900 - Tindeco (Tin Decorating Company of Baltimore) was founded. It was incorporated in 1912 and, by 1920, the firm was a leader in tin lithography (Clark 1977:11; Swedberg and Swedberg 1985: 11).
- 1901 - Sixty firms operating more than one hundred factories, many of which were small, were purchased and united to form the American Can Company. The tins were sometimes marked A C Co., but in 1923, the name CANCO was adopted (Busch 1981: 98; 103; Clark 1977: 11; Swedberg and Swedberg 1985: 11).
- 1901 - Heekin Can began operating near Cincinnati, Ohio. Its symbol was an encircled H. James Heekin began roasting coffee in 1864 and later handled tea, spices, baking powder, and related products. Originally he made tins for his own products only, but as the company grew, he made them for others (Clark 1977: 11; Swedberg and Swedberg 1985:11).
- 1902 - Karo syrup goes on sale (Anderson 1997: 19).
- 1902 - Tuna is first put in cans (Anderson 1997: 19).
- 1902 - Nelly Bly, (Mrs. Robert L. Seaman) patented a steel oil barrel (50 gallon drum). This first barrel had a bulge shape. By 1912, 1000 of these were being made a day (Anonymous 1961: 38).
- 1903 - The rotary offset press was patented (Swedberg and Swedberg 1985: 11).
- 1903 - Hills Brothers of San Francisco was the first firm to vacuum pack coffee commercially (Clark 1977: 11; Swedberg and Swedberg 1985: 11).
- 1904 - Edwin Norton left American Can Company and helped found the Continental Can Company (C C Co.) (Clark 1977: 11; Swedberg and Swedberg 1985: 11).
- 1904 - Campbells begins canning Pork & Beans and the "Campbell Kids" debut in Philadelphia streetcar ads (Anderson 1997: 39).

- 1904 - George Cobb of the Cobb Preserving Company, using AMS machinery purchased in 1899, organized the Sanitary Can Company. Sanitary Can Company cans were completely made by machines; the interiors were lacquered to prevent chemical reaction of the product with the metal. Sanitary cans were airtight and needed no solder to fasten the side seam, top or bottom (Busch 1981: 98, 103; Clark 1977: 18; Collins 1924: 36, 37; Cruess 1948: 37-38; Kopetz 1978: 879; May 1937: 91-95, 440; Rock 1964a: 101; Swedberg and Swedberg 1985: 11).
- 1904 - The Cobb Preserving Co. of New Jersey started packing all its red fruits in the lined lacquered or otherwise coated "Sanitary Enamel Lined Can" (May 1937: 440).
- 1901 - The Pure Food and Drug Act stressed safe commodities. Interstate companies could no longer make false statements about ingredients or curative powers in their products. Adulteration of foods became illegal (Swedberg and Swedberg 1985: 11).
- 1906 - The paint can, with its remarkable closure, was introduced (Anonymous 1961: 30).
- 1906 - The U.S. Pure Food and Drug Act was passed (Anderson 1997: 47).
- 1907 - The bulge shape 50 gallon drum was replaced by the straight sided drum (Anonymous 1961: 38).

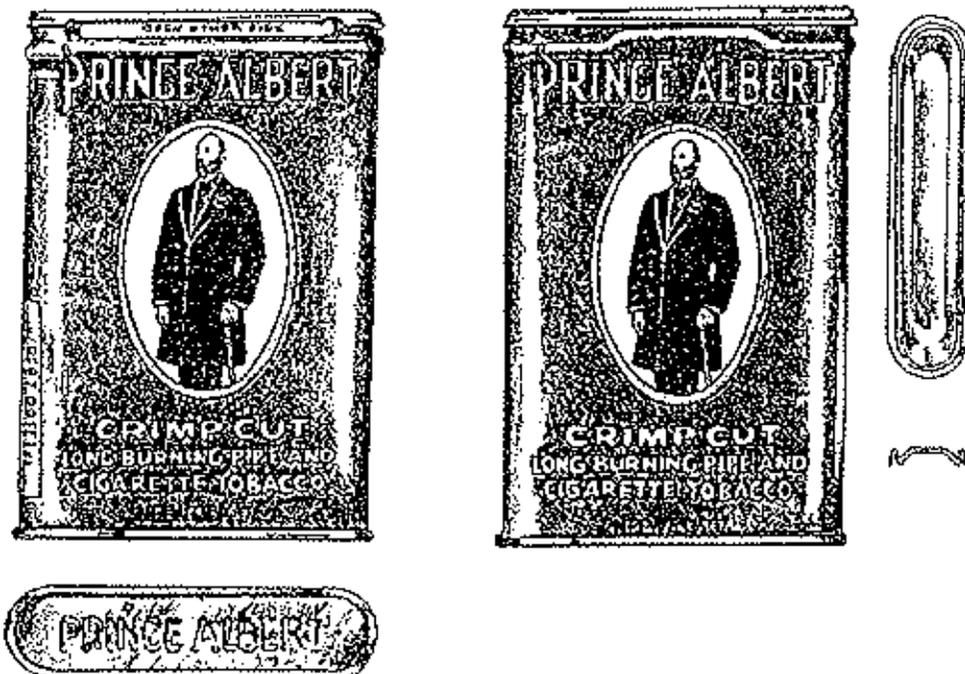
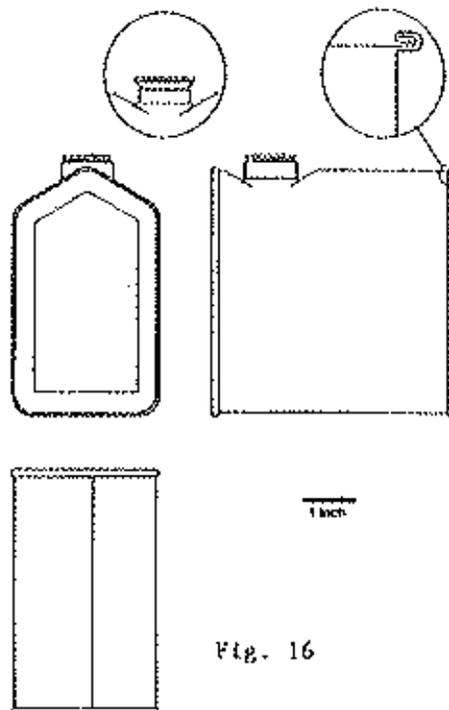


Fig. 15

- Circa 1907     The upright flat pocket tobacco can began being mass produced.
- 1900 -         The Sanitary Can Company was absorbed by the American Can Company (Busch 1981: 98; May 1937: 95, 440).
- 1909 -         A California sardine canner introduced canned tuna (Anonymous 1961: 29).
- 1910 -         Hawaiian pineapple growers begin canning pineapple and shipping it to the U.S. mainland (Anderson 1997: 65).
- 1911 -         Procter & Gamble developed Crisco--a hydrogenated vegetable shortening (Anderson 1997: 65).
- 1912 -         Mr. Tuttle, of Tin Decorating Co., Baltimore, (Tindecol patented the "Roly Poly" tobacco tin design. Design patent #41,239; November 5, 1912 (Helberg 1986: 3).
- 1913 -         Fruit cocktail is first canned by a California canner (Anderson 1997: 79).
- 1913 -         Campbells cans Cream of Celery soup for the first time (Anderson 1997: 79).
- 1914 -         Mr. Slea invented a three-part compound in 1894. This cleaning liquid, lubricant, and rust preventative was first packaged in glass medicine bottles; but by 1914, it was packaged in a can with a spout. The name Three-in-One Oil Company was adopted in 1909 (Anonymous 1934: 82; Morgan 1986:172).



- 1914 - Patrick J. Towle obtained a copyright for a lithographed log cabin shaped tin. These were marketed by 1919. These cans had a locking side seam (Pulati 1973: 32; Reed 1981: 5).
- 1914 - Continuous ovens came into use to dry (inked tin plate (Clark 1977: 11; Swedberg and Swedberg 1985: 11).
- 1916 - The "Lucky Strike" name goes back to 1886, when it was used for a plug-cut of tobacco. Lucky Strike Cigarettes were introduced into the marketplace by J.B. Duke's American Tobacco Company in 1916. It was brought out to compete with R.J. Reynolds' Camel cigarettes. In 1923, some of the first sky-writing was used to advertise Lucky Strikes. The Lucky Strike "Hit Parade" was on radio and it had slogans such as: "Reach for a Lucky instead of a sweet" and "With men who know tobacco best, it's Luckies two to one". In 1942, the slogan, "Lucky Strike means fine tobacco" was added to the box. Two years later, this was changed to: "L.S.M.F.T.". During World War II, the red-, green-, and black-colored tins and paper packages were changed to red, white, and black in color. The green was saved for use in the war effort. This was known as, "Lucky Strike Goes to War" (Morgan 1986: 91; Rock 1987: 64).



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PAGE THREE

inside of lid



Tin Decorating Company of Baltimore. This company was in existence from 1912 to 1965 and was known as Tindeco. The company was incorporated in May of 1912.

At first it produced tins for the American tobacco Company, but this business expanded into candy boxes, cookie and cake tins, medicine tins and talcum powder cans. By 1922, Tindeco's products also included kitchen objects such as trays, napkin rings, wastebaskets, plaques and crumber sets. In 1923 Tindeco and Harrison Cody copyrighted Peter Rabbit tinware saucers and cups, talcum powder tins, peanut butter pails, candy boxes, trays and candy lunch pails.

At the end of 1935 Tindeco was sold to Owens-Illinois Glass Company, the depression had taken its toll. The old Tindeco plant became Owens-Illinois Can Company, plant #31. Owens-Illinois Can Company specialized in fine lithography for tobacco, drug, tooth and talcum powders, food and candy tins.

In 1944, Owens-Illinois sold the plant to Continental Can Company Inc. of New York. Although owned by three companies, many of the accounts obtained by Tindeco were retained by Owens-Illinois and Continental Can. Millions of cans were made for American Tobacco Company and the plant was the largest producer of Bayer Aspirin tins in the country. In 1965, Continental Can Company closed this plant (Helberg 1985:3-10).

Helberg, Kristin  
1986 The Tin Decorating Company of Baltimore and the Subsequent Acquisitions by Owens-Illinois Can Company and Continental Can Company: A Short History. Tindeco Wharf Partnership, Baltimore, Maryland.

Fig. 17

1917 .

In 1893, a young German chemist, Felix Hoffman, who was working at the Faben Fabriken Bayer Drug firm, synthesized a product. Other chemists at Bayer, in Dusseldorf, realized the importance of this drug. They named it Aspirin. It was first sold as a loose powder in 1899, but in 1917 Bayer introduced Aspirin tablets. The right to make aspirin in the United States was held by a German company in New York; but when World War I broke out, this company was taken over by the United States government. After the war, the company was purchased by Sterling Drug Company of New York. The brand name/trademark of Aspirin became part of the reparations that were demanded by the Allies at the Treaty of Versailles in June 1919. Germany surrendered the brand name to France, Great Britain, the United States and Russia. Aspirin was sold only by physicians until 1915. In 1917, Ernst Moeller of the Bayer Company began compressing the powder into tablets and selling them in small tins produced by Tindero.

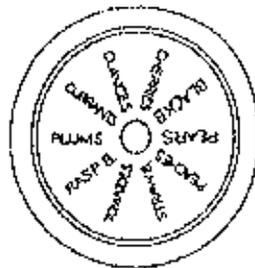
In 1921, aspirin was declared a common name for the drug, and no single company could employ the name exclusively (Anonymous 1934: 82; Anonymous 1961: 3-4; Rock 1989: 69).

1910 .

James A. Folger of San Francisco began selling coffee in vacuum sealed key-wind open cans (Stahl 1991: 3-4).

1918 .

America first begins canning mushrooms (Anderson 1997: 103).



1 inch

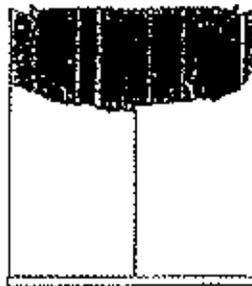


Fig. 18

- 1918 - Home canning cans were made. These tins had embossed tops listing many of the materials that could be placed in them. If an F was in the center of the top, they were made by National Can Corporation. (These cans also were made without embossed tops.) The tops was formed by a die so that it snapped securely in place. Wax is then placed around the cap in the recessed area to seal the cap (Palati 1973:11).
- 1921 - Zinc Oxide and zinc compounds in an enamel lining were found to prevent discoloration of canned corn.
- 1919-1927 Log Cabin Syrup tins were lithographed showing a child standing in the doorway. (Reed 1981: 5).
- Early 1920's American engineers perfected the "roll form" and "wing form" body makers for tin cans. Can making really increased in America with the perfection of "roll form" and "wing form" can bodies. The wing form process is where the flat body blank is shaped around a cylindrical block by two metal "wings" that clamp it down from opposite sides. The roll form has can blanks pass between two rollers feeding them against a deflecting plate, which in turn directs them around the forming cylinder. The improved "roll" and "wing" form speeded can production up to 250 cans per minute (Anonymous 1961: 11).
- 1921 - Canned citrus juice and grapefruit segments were being shipped from Florida (Anonymous 1961: 26).
- 1922 - American Can Company of New York developed "C-enamel" to line cans for citrus fruits and fruit juices (Clark 1977: 32, 33; May 1937: 441).
- 1922 - P.M. Chappel began canning dog food in Chicago (Anonymous 1961: 31).
- 1923 - Sanka decaffeinated coffee was introduced in America (Anderson 1997: 137).



Fig. 19

- 1923 - Helvetia Milk Condensing Company changed its name to Pet Milk Co (Bitting 1937: 168; Rock 1984b: 110)
- 1924 - The tops and bottoms of most cans were not soldered at all; they were fastened by rolled seams. Only the side seam was soldered (Collins 1924: 34).
- 1924 - Tomato juice in cans was first marketed in Indiana (Anonymous 1961: 26).
- 1925 - Tomato juice is first canned (Anderson 1997: 153).
- 1926 - Canned ham was introduced to the market (Anonymous 1961: 28-29).
- 1927 - General Foods purchased Towle's Log Cabin Syrup Company (Palati 1973: 32; Reed 1981: 2).
- 1927 - Continuous hot rolling of steel comes into use (Clark 1977: 11).
- 1928-1932 - Log Cabin Syrup tins were lithographed. They retained the black log background and a child standing in the cabin door on the rear panel. The difference was the child and the illustration on front are black and white rather than in color (Reed 1981: 6).
- 1929 - Cold reduced steel was first used in tin cans. This steel allowed the coating of tin on steel to be more uniform and higher in quality than before (Kloap 1971: 232).
- 1929 - Gerbers introduces canned baby food (Anderson 1997: 165).
- Late 1920's Photolithography was introduced (Clark 1977: 11).

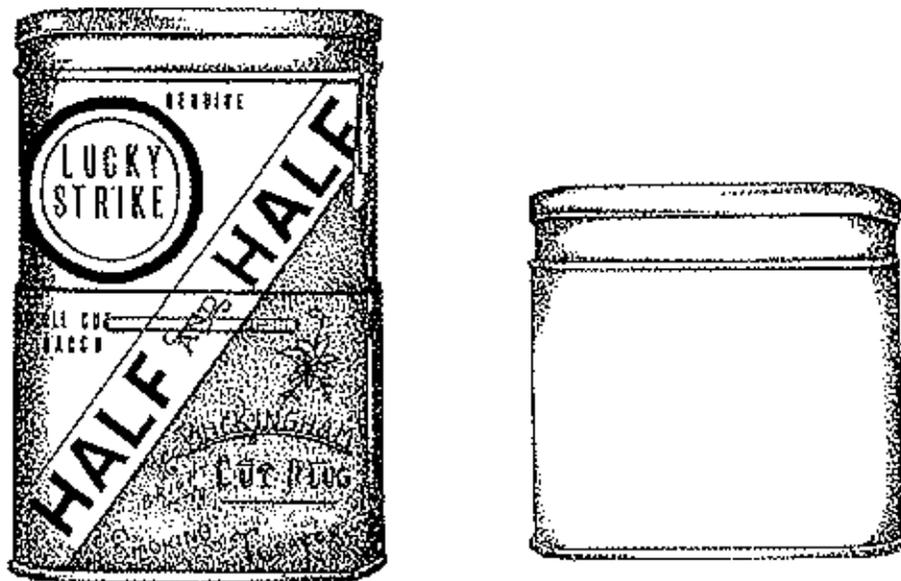


Fig. 20

- 1930 - The telescoping upright pocket tobacco tin was patented by the American Tobacco Company of New York.
- 1931 - The Minnesota Mining and Manufacturing Company ("3M") was founded in 1902. The company was established in order to mine carborundum. They made sandpaper and other abrasives that were used during World War I. In 1926, the company introduced a waterproof sandpaper. By 1935, it began making masking tape. Cellophane was invented by DuPont and 3M used it with an adhesive so as to make Scotch Clear Tape. Scotch Tape, itself, was introduced to the marketplace in 1931. This led, in the late 1950's, to a video recorder that used "Scotch Magnetic VR Tape" (Baren 1994: 92; McGrath 1983: 153).
- 1930's - The word "beer" is usually as prominent as the brand name, owing to the novelty of having beer in cans (Maxwell 1993: 96).



Fig. 21

- 1930's - Opening instructions, usually with illustrations, are included as part of the label on beer cans (usually near the seam) (Maxwell 1993: 96).
- 1930's - Contents are often described as "contains 12 fluid ounces-same as a bottle" on beer cans (Maxwell 1993: 96).
- 1933 - The first quart can of motor oil was sold (Anonymous 1961: 38)
- 1933-1939 - Log Cabin Syrup's lithography was on all four sides of the tin. These were cartoon Log Cabin tins (Reed 1981: 6-7).
- 1935 - C-enamel for can lining was introduced and beer was successfully canned in flat and cone top cans (Busch 1981: 100, 103; Clark 1977: 11; Maxwell 1993: 96).

- 1935 - The first beer can was marketed on January 24 in Richmond, Virginia. Eighteen breweries were canning beer by the end of the year (Maxwell 1993: 96).
- 1935 - The Vaughn Novelty opener, Church Key, was introduced to open flat top beer cans.
- 1935 - Beginning June 28, all beer cans produced were marked "Internal Revenue Tax Paid" (Maxwell 1993: 96).
- 1935 - Cone-top beer cans were first marketed in September. These have flat bottoms and short cones ("low-profile") (Maxwell 1993: 96).
- 1936 - Hormel introduces canned Spam (Anderson 1997: 107, 211).
- 1937 - Steel was first tinplated using an electrolytic process (Clark 1977: 11; Kloap 1971: 232).
- 1937 - Beer cone top cans produced after this date have concave bottoms and long cones ("high profile") (Maxwell 1993: 96).
- 1937 - J-spout beer cans were introduced (Maxwell 1993: 96).
- 1937 - Quart-sized cone cans were introduced in July for beer (Maxwell 1993: 96).



Fig. 22

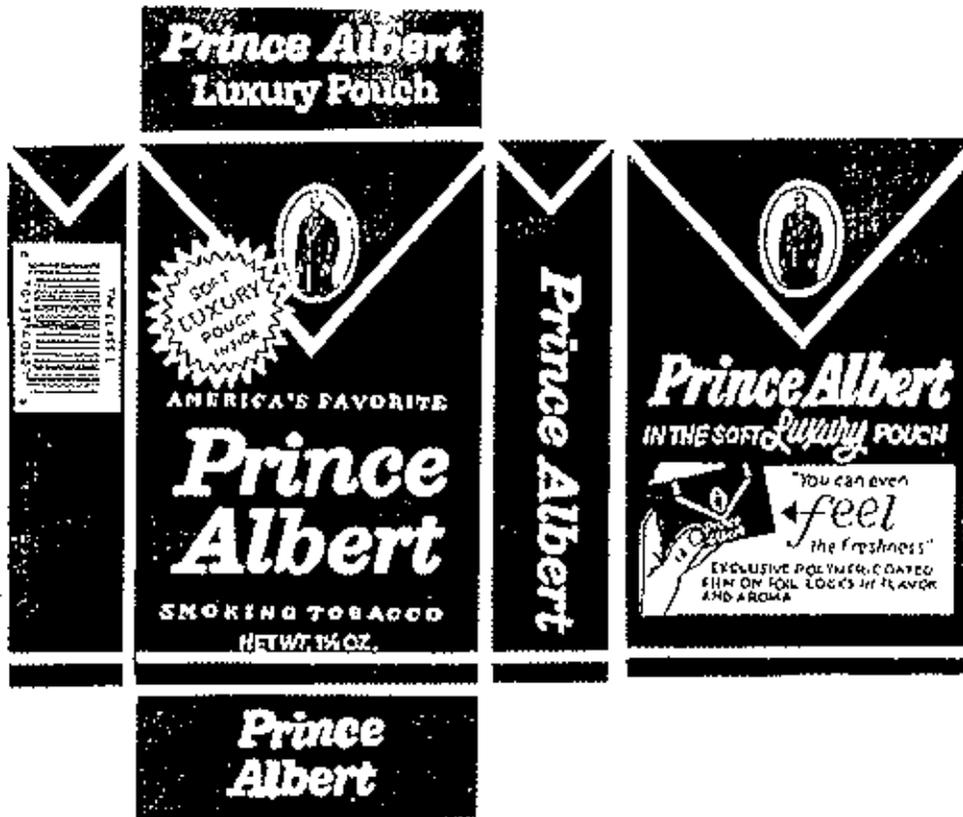
- 1938 - Clicquot Club Company of Mill, Massachusetts, began canning Clicquot Club Ginger Ale in a Continental Can Company cone top can. The citric acid in the ginger ale ate through the lining. This attempt at canning soft drinks was a failure (Toepfer 1976: 4).
- 1940 - J-spout beer cans were phased out of production (Maxwell 1993: 96).
- 1940 - Introduction of crown-tainer, which replaces the J spout for beer (Maxwell 1993: 96).
- 1942-45 - Food rationing: first sugar and coffee, then meat, butter, margarine, cheese and, finally, canned goods (Anderson 1997: 243).
- 1940-42 - Log Cabin Syrup tins retained the cartoon characters, but the end panels were not lithographed (Reed 1981: 7).
- 1942 - Electroplating of tin came into widespread use (Kloap 1971: 232).
- Mid-1940's - Instant coffee was introduced (Anderson 1997: 243).
- 1945 - Aerosol cans were marketed commercially (Busch 1981: 102; 103).
- 1942-48 - No Log Cabin Syrup tins were made (Reed 1981: 7).
- 1942-47 - Domestic canned beer production ceased due to World War II. Over 18 million cans of beer were produced for military use (Maxwell 1993: 96).
- 1942-47 - Military beer cans are silver or olive drab in color (Maxwell 1993: 96).
- 1942-47 - Military cans are not marked "Internal Revenue Tax Paid", but rather: "Withdrawn Free of Tax for Exportation" (Maxwell 1993: 96).
- 1946 - Minute Maid introduced frozen orange juice concentrate (Anderson 1997: 243).
- 1946 - Reynolds Metals introduced aluminum foil (Anderson 1997: 247).
- 1948-1954 - Log Cabin Syrup tins had lithographed brown logs and a red panel on the side of the can (Reed 1981: 7).
- 1950 - A new inside lining was developed for soda cans (Toepfer 1976: 4).
- 1950 - Pepsi introduced Pepsi in cans. These cans exploded on the shelf and Pepsi abandoned the idea of canning their product (Toepfer 1976: 4).
- 1950 - The "Internal Revenue Tax Paid" marking was removed from can and bottled beer labels March 30, 1950 (Maxwell 1993: 96).

- Circa 1950-1954 - Log Cabin Syrup tins were available in the "Frontier Village Series". This series had 10 different designs: 1) Home scene, rectangular door; 2) home scene, dutch door; 3) doctor's office, Dr. R.O. Well; 4) frontier jail; 5) stockade school; 6) express office; 7) blacksmith shop; 8) trading post; and 9) frontier inn. The first four cans came in small sizes. 5-7 (including a home scene can) came in medium sizes. 8 and 9 were in one gallon sized tins (Reed 1981: 8).
- 1953 - The first soft drinks were packed in cans (Anonymous 1961: 33).
- 1953 - A better can for soda was developed. Cantrell and Cochran (C & C) introduced Super Root Beer and Super Cola in cone top cans in New York and Los Angeles (Toepfer 1976: 4).
- 1953 - Juices for babies were first sold in cans (Anonymous 1961: 34).
- 1953 - Can-O-Pop Beverage Company of Sheridan, Wyoming, introduced their Root Beer in a flat top can in Southern California (Toepfer 1976: 4).
- 1953-54 - Most soda manufacturers began canning their products (Toepfer 1976: 4).
- 1950's - Schlitz markets the first 16-oz. punch top beer can (Maxwell 1993: 96).
- 1954-55 - Log Cabin Syrup cans were no longer in production (Reed 1981: 8).
- 1950's - Crowntainers phased out by mid-decade for beer (Maxwell 1993: 96).
- 1950's - Odd-sized beer cans marketed included 7-, 8-, 10-, 14-, and 15-oz. sizes (Maxwell 1993: 96).
- 1950's - Pastels and metallic colors become common features of can labels (Maxwell 1993: 96).
- 1957 - Aluminum cans were introduced for lubricating oil (Sacharow and Griffin 1970: 10).
- Late 1950's - Aluminum lids used on steel-bodied cans. These were often called "Soft-tops". "Soft-top" was often painted on the aluminum lid (Maxwell 1993: 96).
- 1958 - Primo Beer was sold in an 11-oz, paper-label, aluminum can in Hawaii (Busch 1981: 101, 103; Maxwell 1993: 96).
- 1959 - Adolph Coors Co. introduced the first all aluminum beer can in the U.S. This was a 7-oz can (Clark 1977: 11; Maxwell 1993: 96).
- Early 1960's - Some beer cans stated on can labels that they were "soft-tops" (Maxwell 1993: 96).
- Ca 1960 - One quart aluminum oil cans were introduced (Anonymous 1961: 38).

- 1960's - Beer cone top cans were completely phased out by this time (Maxwell 1993: 96).
- 1960 - Coke in cans began being marketed nationally (Toepfer 1976: 4).
- 1960 - All major soft drinks were available in cans (Anonymous 1961: 33).
- 1962 - First self-opening can ("snap-top" or "tab-top") beer can was introduced by Pittsburgh Brewing Company (Busch 1981: 103; Clark 1977: 11; Maxwell 1993: 96).
- 1962 - The first aluminum tear-top can was introduced (Kloep 1971: 232).
- 1963 - In January, Schlitz became first national brewer to use tab-top cans. By August, 65 brands are available in this design (Maxwell 1993: 96).
- 1963 - First 12-oz all-aluminum can issued (Maxwell 1993: 96).
- 1963 - Plastic six-pack holder (yoke) introduced (Maxwell 1993: 96).
- 1963 - The drawn and ironed (D&I) method for making aluminum beverage cans were perfected. The drawing and ironing process was quite different from the traditional can with a soldered side seam and both ends double seamed. In this newer process, the aluminum alloy or steel in sheet form is fed into a press where it is blanked and shaped into cups. The cup is then fed into an ironing press where the diameter is reduced and the side wall is ironed to reduce the gauge and achieve the necessary can height. In this step the thickness of the aluminum in the cup wall is reduced about 70%, while the bottom maintains its original thickness. The can is then trimmed, cleaned, printed, coated on the interior, necked-in, flanged and palletized for shipment. Of special note is the printing process which is done cylindrically. The printer can apply up to four colors and protective overvarnish on a can (Busch 1981: 101; Kloep 1971: 232).
- 1964 - Continental Can's "U-tab" design was introduced for beer cans (Maxwell 1993: 96).
- 1964 - Tab-top with "smile" heads were introduced for beer cans (Maxwell 1993: 96).
- 1964 - Gallon beer cans were introduced (Maxwell 1993: 96).
- 1960's - Composite cans gained popularity for frozen orange juice and oil containers (Kloep 1971: 232).
- Mid 1960's - Soda canners began using pull top cans (Toepfer 1976: 4).
- 1965 - First "ring-pull" can marketed on beer cans (Maxwell 1993: 96).
- 1965 - Tin-free steel cans were first made (Busch 1981: 103; Clark 1977: 11; Kloep 1971: 232).

- 1965 - TFS (tinfree steel) was the same as tinplate with not tin, but instead of a much thinner (1/30 as thick) layer of chromium-chromium-oxide, designed to protect the steel from rusting in transit and in storage before it was made into cans.
- Once the can had been fabricated, the coatings on the inside and outside gave it the necessary extra corrosion resistance which had previously been supplied by the tin. The success of this material depended upon the welded and cemented cans introduced at about this time because the conventional can could not be soldered without the tin plating. The cementing process extrudes a thin layer of plastic cement along a 1/4-in strip at the one edge of the body blank. The blank is then formed to a cylindrical shape and the two edges are held together for about 25 milliseconds to allow the nylon cement to become at least partially set. The can is then released from its clamped position and cooled to room temperature.
- The second method of TFS fabrication is welding. Electric resistance heating is used in the welded can because of the necessity to keep the heat effects of the weld to as narrow a strip of the can as possible. In this process, the can body is formed into a cylinder and the diameter is fixed by four tack welds spaced about 1-1/2 in. apart along the length of the can. The can body is then continuously seam welded by passing a high current through the overlap can edges as it passes between two rotating copper electrode wheels. In both of the above methods, the resultant body is compatible with existing line equipment with minor modifications (Kloap 1971: 232-234).
- 1966 - Welded-seam beer cans were introduced (Maxwell 1993: 96).
- 1966 - "Neck-in-chime" cans (lid smaller than can body) were introduced for beer cans (Maxwell 1993: 96).
- 1967 - Tin-free steel (TFS) beer cans were introduced (Maxwell 1993: 96).
- 1967 - A nation-wide standard for "bar coding" Universal Product Code (UPC) was adopted (Seideman 1993: 59).
- 1970 - Some soda canners began using aluminum cans (Toepfer 1976: 4).
- 1970 - Some soldered end cans, hole-in-top, vent hole filler, were still being used for canned milk (Sacharow and Griffin 1970: 10).
- 1972 - Oregon bans the use of ring-pull cans (Busch 1981: 102; Maxwell 1993: 96).
- 1972 - Beer cans with specialized shapes were first marketed.
- 1972 - Push-button can openings were introduced by Coors for beer (Maxwell 1993: 96).
- 1973 - Universal Product Code (UPC) was adopted as the industry standard. It became a business juggernaut, not a technological curiosity (Seideman 1993: 62).

- 1973 - Borden stopped using "Elsie the Cow" in its advertising (Anderson 1997: 391).
- 1974 - On June 26, 1974, the first UPC product was sold at Marsh Supermarket in Troy, Ohio (Seidenman 1993: 63).
- 1974-79 - Beer cans were issued commemorating the U.S. bicentennial (Maxwell 1993: 96).
- 1975 - American Can Company begins producing push-button cans (Maxwell 1993: 96).
- 1977 - Coors phases out push-button beer cans (Maxwell 1993: 96).
- 1970's - Production of 11-oz., 15-oz., and gallon cans ceases (Maxwell 1993: 96).
- 1970's - UPC computer codes introduced on beer cans (Maxwell 1993:96).
- 1980 - 3M brought out a soft top, peel scotch tab, for fruit or vegetable juice cans (Popular Science 1980: 88).
- 1981 - Production of ring-pull cans ceases (Maxwell 1993: 96).
- 1984 - Straight-sided steel beer cans were taken out of production (Maxwell 1993: 96).
- 1986 - American Can Company sold its can division.
- 1987 - American Can Company officially changed its name to Primarica Corporation on April 29, 1987, at its annual meeting in Houston, Texas.
- 1980's - UPC computer codes standard feature on all beer cans (Maxwell 1993: 96).
- 1980's - Multiple neck-in chimes were present on cans produced in the early years of the decade (Maxwell 1993: 96).
- 1980's - Single, longer neck-in chimes were prevalent during latter years of the decade, on beer cans (Maxwell 1993: 96).
- 1993 - Borden streamlined "Elsie the Cow" and brought her out of retirement in their advertisements (Anderson 1997: 403)



1994

The tin upright "Prince Albert" tobacco can was replaced with paper (Rock 1984: Personal Observation).

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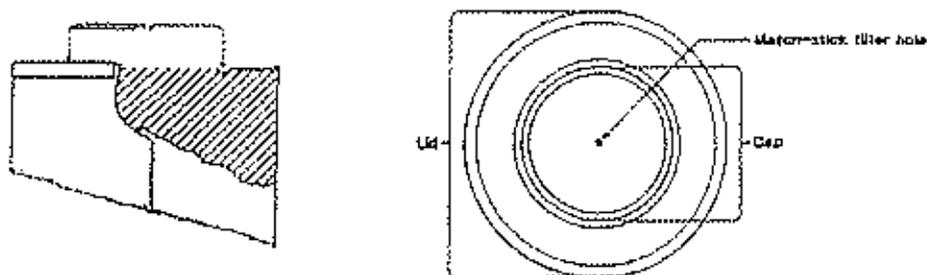
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## CYLINDRICAL CAN END TYPES

### Hole-In-Cap 1823 - WWII

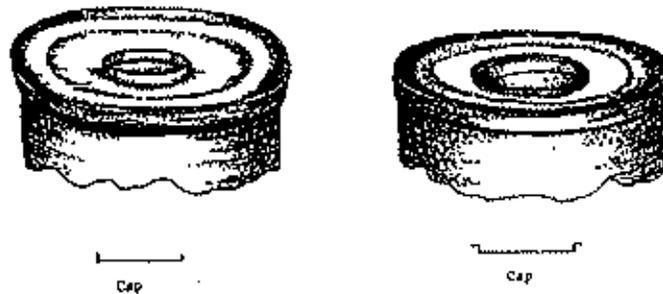


The hole-in-cap can, ca. 1820 to at least the late 1930's developed from the hole and cap can. The original hole was cut by hand and a piece of tin was then cut to fit over it and soldered in place to seal the can. A vent hole was added to the cap so that excess air could be forced from the can by heating it.

In 1823 Pierre Antoine Angilberg introduced "exhausting" in the canning industry. This process placed a small hole in the center of the can cap, the vent hole, which allowed excess moisture and air to exit as the can was heated in a water bath. It was thought that this air caused the product to go bad. In reality the problem was bacteria, but this was not known until Pasteur conducted his experiments in the 1850's. The vent hole allowed the cans to be heated after they were filled thus forcing out excess air and moisture. This process killed the bacteria within the container. Once this was done, the vent hole was sealed with a drop of solder and a much more satisfactorily sealed can was created. At times a small piece of tin was soldered to the underside of the cap to prevent the solder closure of the vent hole from contaminating the food.

In the 1840's the drop press allowed the can ends and hole to be made in one step and standardization of these closures became common. The majority of these cans were used from canning fruits and vegetables, but many other products were also sold in them (Clark 1977: 14; Fontana et al 1962: 68-69; Heite and Heite 1989: 102; May 1937: 12; Rock 1984a: 99-100; Sacharow and Griffin 1970: 9).

Hole-in-Top  
(Hole and Cap)  
1885 - WWII



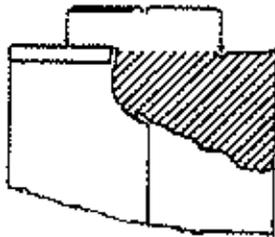
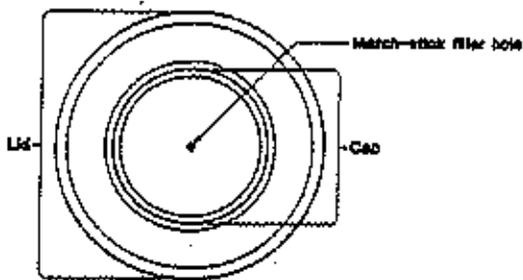
The most common of these closures are the Giebee and McDonald seals. They are quite frequently found on condensed milk cans and were experimented with unsatisfactorily on evaporated milk cans after 1885. The Giebee type closure, illustrated here on the left side of this page, has a rim that projects above the central filler hole at the can top and it is crimped over the rim after it is inserted into the hole. The McDonald seal, illustrated here on the right, is a tight fitting cap with a depressed center and a flange. The cap is pressed into the filler hole leaving the flange overlapping the can top. These two closure methods are not as tight sealing as the soldered hole-in-cap can, the vent hole can, or the open top sanitary can (Heite and Heite 1989: 102; Hunziker 1914:74,76; Keen 1982).

Vent Hole  
or  
Matchstick Filler Hole  
1900 - Mid-1980's



Matchstick filler hole or vent hole cans were introduced around the turn of the century. These cans had flush profiles and only a small pin-hole in the center of one end. The stamped tops and bottoms of these cans had lips that overlapped the can body. These cans are true hole-in-top cans. The pin-hole or "matchstick" filler hole is in the top of the can in the packing process. Often, once the vent hole is sealed with a drop of solder, the can is turned over placing the pin-hole on the base when the label is applied to the can. In their 1914 ads, F.G. Dickerson Co. of Chicago calls these cans vent-hole and Phelps Can Company of Baltimore vent hole. They are advertised exclusively for evaporated milk. In the mid-1980's the vent hole can was replaced by the sanitary can in the evaporated milk industry (Fontana et al 1962: 74; Judge 1914; Pulati 1973: 29; Rock 1984b).

Hole-in-Cap  
1823 - WWII



Hole-in-Top  
1835 - WWII

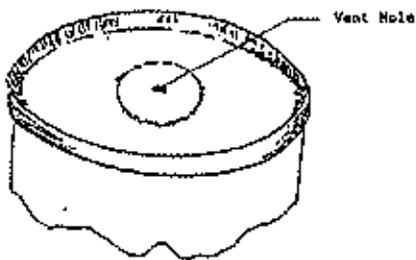


Cap



Cap

Vent Hole  
1900 - Mid-1980's



Sanitary Can  
1890's to date



Sanitary Can  
1890's - to Date



The sanitary can cannot be considered an American invention. It is the European double-seamed can that has been Americanized. The individual who is generally given credit for this adaptation was Max Ams. The Max Ams Company was established in 1868. They were a large exporter of fish and meat products. They found it necessary to adopt the double seam can to meet foreign competition. Their goods, packed in standard soldered cans, were being discriminated against because of the extensive use of solder.

The Karges system of can manufacture had been developed in Germany and was exhibited in the Columbian Exposition in 1893. This system used a rubber ring gasket. In 1894, J. A. Steward of Rutland, Vermont took out the first U.S. patent for a stationary closing machine that worked with this type of system. Max Ams was granted a patent for a seam lining compound in 1896. However, Julius Branzinger, later Vice President of Max Ams Machine Co., took out two patents in 1898 and 1899. These included a lining machine and a double seamer.

Charles M. Ams, Max Ams Company, recognized the real weakness in the system was the thick rubber gasket so he developed a coating of rubber solution to replace it. This compound made all the difference in the world in the product.

In 1898, the Ams "solderless" cans were tested by the Cobb Preserving Company. They canned Bartlett pears and were quite happy with the results. The "solderless can" has also been called the "open top can", but is best known as the "sanitary can". The "sanitary can" has no internal solder, and its top, bottom, and side seams are gasketed and closed by double-seaming. In 1904, the Sanitary Can Company was formed. California was the first state to begin using "sanitary cans" when the very first shipment of them was sent to the Golden State Packing Company of San Jose. The machinery used to make these cans could turn out 25,000 cans a day. In 1908, American Can Company purchased and took over the four Sanitary Can Company plants. American Can Company felt that the true advantage of the "sanitary can" was that the entire cap was put on after the can was filled. This was a radical change from the hole-in-cap can where larger fruits etc., had to be cut up into small enough pieces to be pushed through the hole in center of the cap. By 1910 many California canners were incorporating this new technology in their plants.

"Sanitary Can" production dominated can production in the West by 1911, but it took nearly thirty more years for it to gain complete control. (Busch 1979: 6; Busch 1981: 97-98; Clark 1977: 11, 18; Cobb 1914: 94-96; Collins 1924: 36-37; Cruess 1948: 37-38; Fontana et al, 1962: 72-73; Hunziker 1914: 74; Jacobs 1914: 36; Keen 1982: Kopetz 1978: 87; May 1937: 91-92; Rock 1984a: 101, 105-106; 174; Stevenson 1899: 509).

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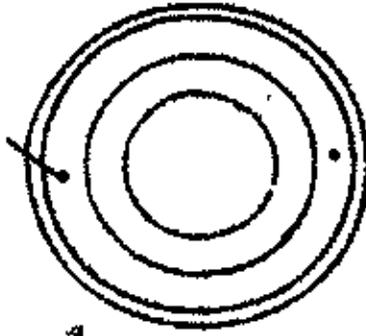
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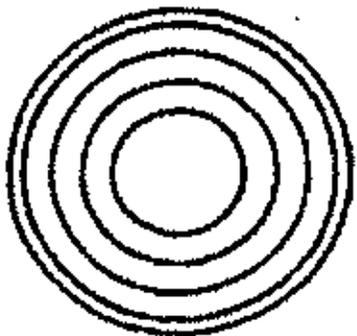
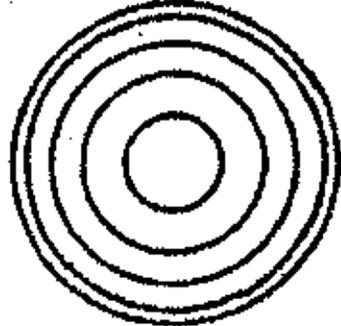
14oz Milk Tins:

Diaples in Can

**C**  
2 15716 d x 3 14716 h  
W/CR



**J**  
2 31/32 d x 3 15716 h  
and  
2 31/32 d x 4 7/8 h

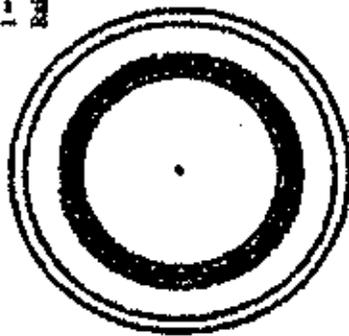


**H**  
2 31/32 d x 3 7/8 h  
Carnation Pet 1959

**L**  
2 15716 d x 3 14716 h  
Formed w/  
1" post 1954  
Raised Areas Shaded

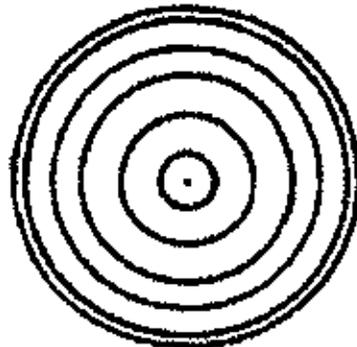


**A**  
2 31/32 d x 3 7/8 h  
and  
2 31/32 d x 4 11/32 h  
Depressed Ring Shaded

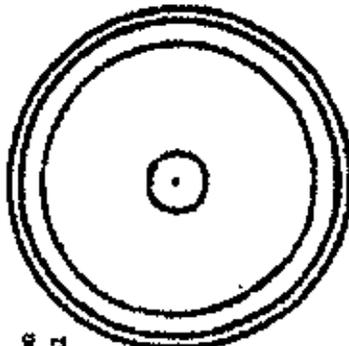


Eric Gleason  
704 Cass St  
The Dalles, Or. 07058

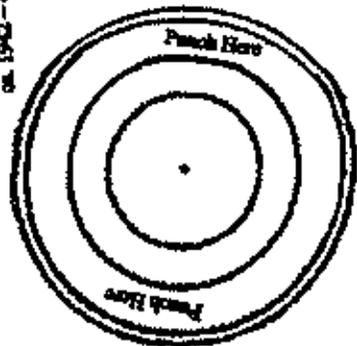
**B**  
Carnation  
ca. 1948 - 57



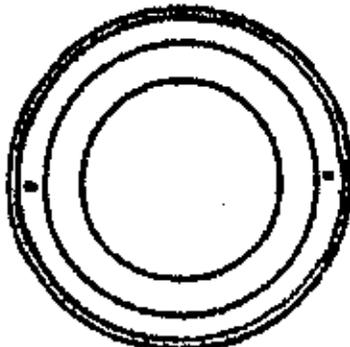
**K**  
Carnation  
ca. 1929 - 42



**D**  
Carnation  
ca. 1942 - 46



**G and GR**  
2 15716 d x 3 15716 h  
or  
2 15716 d x 4 3/8 h



2 31/32 d x 3 7/8 h

Condensed/Evaporated Milk Cans--Chronology for Dating Historical Sites (Don Simonis)

Type	Diameter	Height	Cap Diam.	End Seams	Side Seams	Dates
1	3.0	3 4/16	1 12/16	S	S	1875-1885
2	2 15/16	3 5/16	1 9/16	S	S	1885-1903
3	2 15/16	4 6/16	1 12/16	S	S	1885-1903
4	2 15/16	3 5/16, 4 6/16	1 4/16	C/S	C	1903-1908
5	2 8/16	2 8/16	1.0	C	C	1903-1914
6	2 15/16	4 6/16	1 1/16	C	C	1903-1914
7	1 15/16	4 6/16	12/16, 7/16	C	C	1908-1914
8	1 8/16	2 8/16	M	C	C	1915-1925
9	2 8/16	2 7/16	M	C	C	1920-1930
10	2 15/16	4 6/16	M	C	C	1915-1930
11	2 8/16	2 6/16	M	C	C	1917-1930
12	2 8/16	2 6/16	M	(4 rings embossed)	C	1931-1948
13	2 15/16	4 4/16	M	C	C	1917-1929
14	2 15/16	4.0	M	C	C	1917-1929
15	2 15/16	3 14/16	M	C	C	1917-1929
16	2 7/16	2 7/16	M	C	C	1931-1948
17	2 15/16	3 14/16	M	("Punch here" embossed)		1935-1945
18	2 7/16	2 8/16	M	C	C	1920-1931
19	2 15/16	3 14.5/16	M (if with raised rings then 1945-1950{?})	C	C	1950-present
20	2 8/16	2 5/16	M	C	C	1950-present

Types 1 and 2 condensed milk, so will be cut out, not punch holes, etc.

"N. YORK" until 1900, then "BORDEN"

M- match stick filler solder on raised circle (post hole and cap); still used today in milk cans.

S- soldered seams used on early cans.

C- crimped seams on later cans.

1) Types of Can Openings: (from Buckles et al. 1978:412-415)

The manner of opening a can reflects, to a degree, what was contained within the can. The types of openings which are recognized should be recorded as per the description/illustration below. In addition, the number of cans with different types of opening should be estimated.

There are other variants of can openings which can be used. These openings are useful for insights into can functions. Key opened, removable lids, paint lids and pry out lids, as an example, contained relatively non-perishable items such as tobacco, cocoa, and others. Each is traditionally associated with a particular product type. Key openings are associated with lard cans, potted meats, sea foods and others. A special type of hole-in-top can with an inside flap was used in the salmon canning industry (Bitting 1912:67-68). It is not an opening, but a variant of the hole-in-top can construction. Cans which have either puncture holes, spouts, or have been opened with a "church key" all probably contained liquids, thus requiring small openings to remove the contents. Cans cut completely around and X-Cut lids are indicative of fruit or vegetables which require larger holes for removal of the product.

2) Can Contents and Sizes: (from Buckles et al. 1978:416)

Another method of determining the possible contents of cans stems from traditional use of can sizes within the industry of canning. No set governing standards as to either can sizes or contents can be applied across the board due to the fact that the canning industry itself was not standardized.

Can sizes have been standardized in practice, to degrees, and can be classified by numbers or names used by grocers.

<u>Number or Name</u>	<u>Height</u>	<u>Diameter</u>	<u>Contents</u>
5 oz.	2-7/8"	2-1/8"	
6 oz.	3-1/2"	2-1/8"	
8 oz. regular	3"	2-11/16"	Fruits & fruit cocktail
8 oz. tall	3-1/4"	2-11/16"	
Picnic, Oysters	4"	2-11/16"	
No. 300	4-7/16"	3"	Tomato & pineapple juice
No. 300X	4-9/16"	3"	Tomato juice
No. 1 tall	4-11/16"	3-1/16"	Fruits, tomato juice, pineapple juice
No. 303	4-3/8"	3-3/16"	Tomato & pineapple juice
No. 2 flat	2-1/4"	3-7/16"	
No. 2 short	4"	3-7/16"	Peas, corn, string beans, fruits
No. 2	4-9/16"	3-7/16"	
No. 2 1/2	4-11/16"	4-1/16"	Fruits
No. 3	4-7/8"	4-1/4"	
No. 10	7"	6-3/16"	Fruits
Gallon	8-3/4"	6-3/16"	Limited extent for olives, fruits & vegetables
No. 1 square	3-1/2"	3 x 3-1/2"	
No. 2 1/2 square	6-1/4"	3 x 3-1/2"	

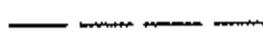
## Making a Three - Piece Can:

**Shearing** The large coil of metal is cut into sheets at the rate of 160 sheets per minute on the shear press.



**Shearing** The large coil of metal is cut into pre-scruffed sheets at the rate of 150 sheets per minute. The irregular ends of the sheets are designed for the maximum number of ends per sheet.

**Coating** An inside protective coating is placed on the sheets and cured.



**Coating** An inside protective coating is placed on the pre-scruff sheet and cured.

**Printing** The sheets are decorated with whatever printing the customer desires and then an over coat of varnish is placed on the decorated sheet and cured.



**Printing** The sheets are decorated with whatever printing the customer desires and then an over coat of varnish is placed on the decorated sheet.

The body sheets are now stacked on pallets for shipment to a fabricating plant.

**Coating** A second inside protective coating is placed on the sheets and cured.

**Scroll Shearing** The pre-scruffed sheets are now cut into small scroll sheets which will be fed into the end making press.



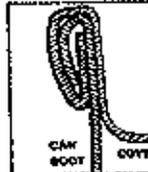
**End Forming** Ends are stamped out of the scroll sheets at the rate of 650 ends per minute. Finished ends are packed into tubes for delivery to fabricating plants and customers.

**Sitting** Body sheets containing up to 35 body blanks per sheet are slit into individual body blanks which will be formed into cans.



**Body Forming** Body blanks are fed into a bodymaker where they are formed into cylinders and joined at their side seams by solder, cement or weld.

**Flanging** The formed cylinder comes from the bodymaker to the flanger. Here the metal on both ends is rolled to form a flange on each end of the can. This flange will at a later time accept double seaming.



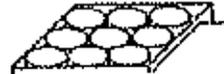
**Double Seaming** One end, either top or bottom, depending on customer specifications, is double seamed on the can.

**Spray Coating** A final coating is placed on the interior surface of the can. This is a specially compounded protective coating.



**Testing** A 100 per cent quality control inspection for any micro leak is given to every can.

**Baking** Here the final interior coating is baked and cured through a tunnel type oven where the time-temperature cycle must be controlled carefully.



**Packing** Cans are packed into cartons or placed on pallets for delivery to customers.

**Cup Blanking and Drawing** Press punches out hundreds of cups per minute from huge coils of aluminum or steel.

**Ironing and Dforming** Cup is forced through a series of rings to iron out can to full length and form bottom dome.

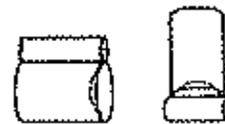
**Trimming** Can is spun as cutting tool trims to length.



**Cleaning** Washer cycles hundreds of cans per minute through multiple cleaning stations.



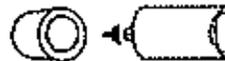
**Printing and Varnishing** At printing station, can is rolled against cylinder to print up to four colors simultaneously.



**Bottom Varnishing** Can is conveyed past applicator that varnishes bottom.

**Baking** Can winds through conveying system in oven to dry and set lithography.

**Inside Spraying** A protective specialty compounded coating is applied to inside of can.



**Baking** Trip through tunnel oven bakes and cures inside coating.

**Necking-in** Can necks are reduced at top to fit the designated end size.



**Flanging and Testing** The rim of the can is flanged for future double seaming of ends. Then, each can is mechanically tested for leakage. Finally, cans are automatically stacked in cartons or on pallets for shipment.

## Making a Two - Piece Can:

Courtesy of the Can Manufacturer Institute

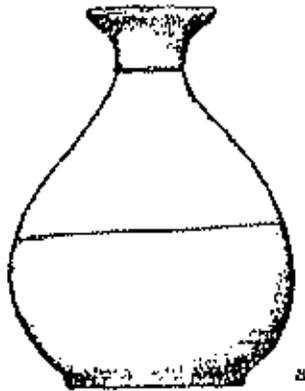
## CHINESE AND JAPANESE ARTIFACT TERMINOLOGY

The following pages illustrate Asian artifacts commonly found on archaeological sites and/or in museum collections. Also included is some of the terminology that has been used, by both archaeologists and collectors, to describe them.

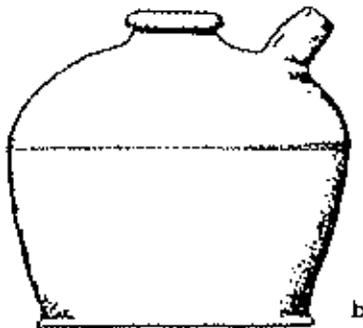
The terms starred (\*) are those used by the Asian American Comparative Collection, and are not necessarily the only "correct" designations.

Priscilla Wegars  
Asian American Comparative Collection  
Alfred W. Bowers Laboratory of Anthropology  
University of Idaho  
Moscow, ID 83843  
Revised 1993

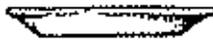
\*Utilitarian Brown Ware)



wine jug  
 wine bottle  
 wine jar  
 Ng Ky Py/Ng Ka Py/ng ky pay/ng ka pi  
 "wine" bottle  
 Tiger Whiskey  
 traditional shape beverage bottle  
 Tiger jug  
 \*liquor bottle



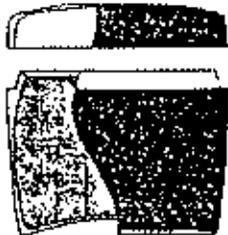
soy sauce jar  
 soy jar  
 \*soy sauce pot  
 soy sauce bottle  
 soya sauce container  
 soy sauce jug  
 soy pot  
 globular rice wine jar  
 globular liquid jar  
 spouted bottle  
 spouted soy sauce/soy pot  
 spouted jar



\*lid



\*shouldered food jar  
 food jar  
 wide-mouthed brownware container  
 shouldered jar, wide-mouthed  
 shouldered food storage jar  
 widemouthed food jar  
 straight-side shoulder jar  
 bean pot



d



e

\*lid

\*straight-sided jar  
 straight sided jar  
 small brownware jar

5cm (d, e only)

a - c from Felton, Lortie, and Schulz 1984:46; d - e from Chaca 1976:520.

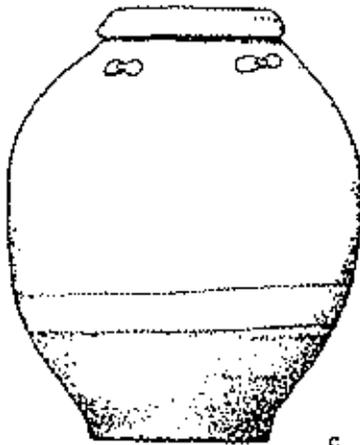


\*pan  
 domed lid/pan  
 shallow pan  
 shallow cooking pan

5 cm.

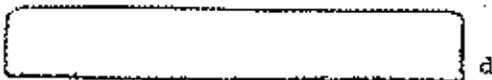


\*pan  
 earthenware bowl  
 earthenware food vessel  
 shallow pan  
 shallow cooking pan



huge globular jar  
 large brownware jar  
 huge globular shipping jar  
 globose jar  
 steep-shouldered jar  
 thick-walled globular jar  
 large globular jar  
 globular barrel jar  
 \*globular jar

76



\*lid  
 Straight-Sided with Rim lid



huge barrel-shaped jar  
 huge barrel jar  
 large wide-mouthed barrel-shaped jar  
 straight-sided jar (huge)  
 large barrel jar  
 straight-sided barrel jar  
 \*barrel-shaped jar

a - b from Chace 1976:520; c - e from Felton, Lornie, and Schulz 1984:45

Ceramic Tablewares



Swirl  
\*Double Happiness

bowl  
\*rice bowl



Blue Flower Ware  
Swatow Ware  
Three Circles and Dragonfly  
Three Circles and Longevity  
Three Circles and Butterfly  
Three Circles and a Dragonfly  
\*Bamboo

\*rice bowl



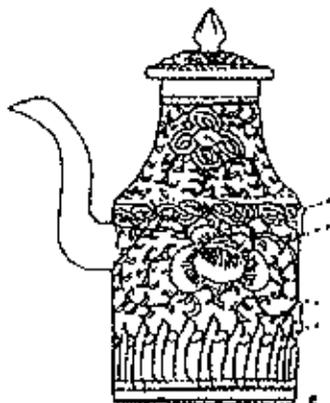
\*Celadon  
Celadon  
\*Winter Green  
green celadon  
Celadon Green

\*rice bowl



\*Four Seasons  
\*Four Flowers  
Enamel(l)ed Flower Ware  
Rose Verte

large bowl  
\*serving bowl  
soup bowl

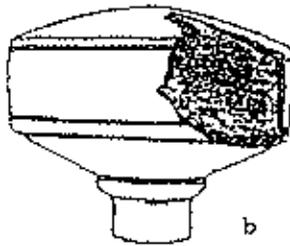


Plant with Central Flower  
Simple Flower  
Shanghai Ware  
\*Sweet Pea

wine pot  
wine warmer  
wine or soy  
sauce serving  
bottle  
teapot  
sauce pot  
\*liquor  
warmer



\*opium pipe bowl  
vapor inhaler  
opium pipa  
opium pipe head  
opium bowl  
yin low



socket  
flange  
pipe fitting  
\*bowl connector  
connecting flange  
brass fitting  
brass metal fitting  
metal fitting  
pipe fixture  
short brass cylinder with wide shoulders

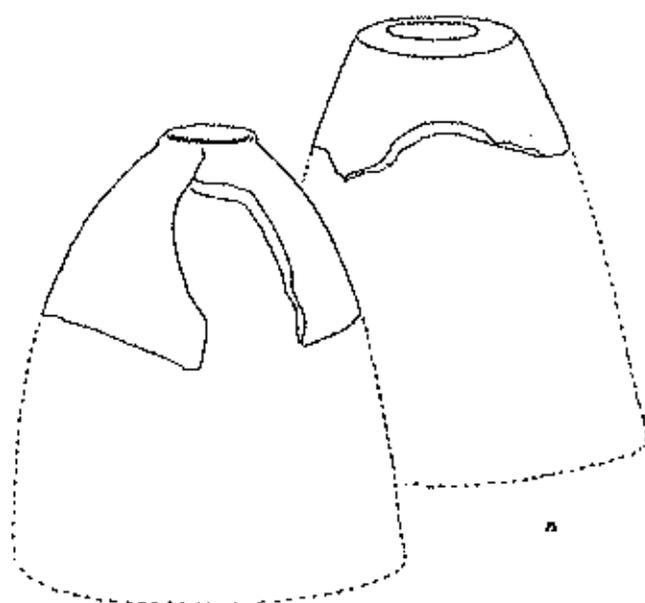


brass fitting  
\*saddle  
pipe fixture  
collar  
saddle-shaped piece  
pipe fitting  
connecting flange  
stem fitting

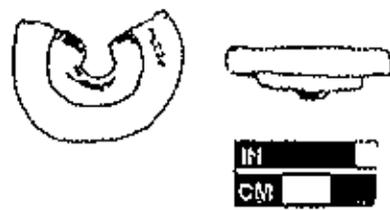


smoking pipe  
\*opium pipe  
smoking pistol  
opium pistol  
Yen Tsiang

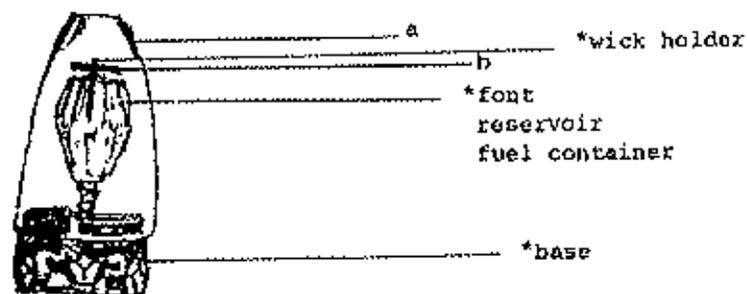
a - b from Benté 1976 :479; c - e from Benté 1976 :480. f from Asian Comp. Coll. Newsletter.



\*lamp cover  
 lamp globe  
 lamp chimney

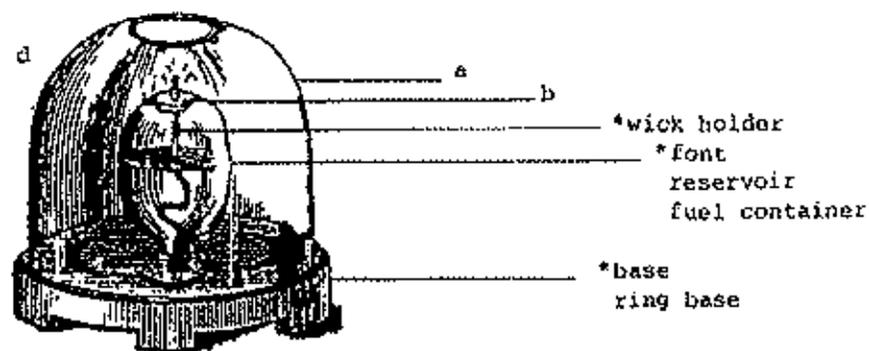


\*wick support  
 wick adjustment



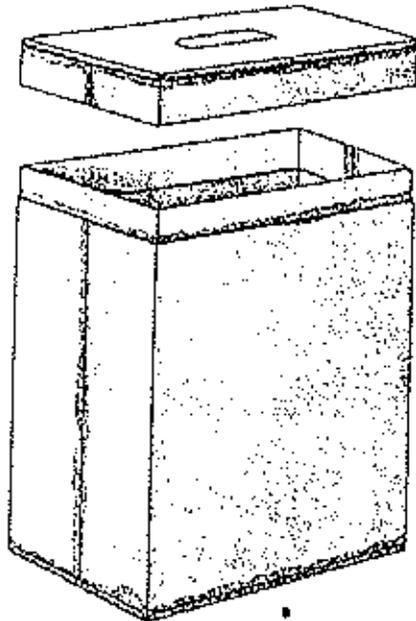
\*wick holder  
 \*font  
 reservoir  
 fuel container

opium heating lamp  
 \*opium lamp  
 opium burner  
 yin tene



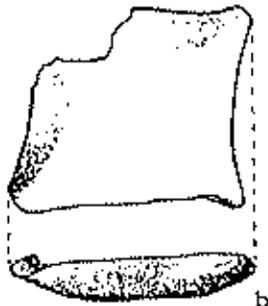
\*wick holder  
 \*font  
 reservoir  
 fuel container  
 \*base  
 ring base

a, from Benté 1976 :480; b, from ACC Newsletter 2(4):2; c, from Brassie and Bressie 1972:(99); d, from Holmes 1911:137.



opium tin  
 \*opium can  
 opium box  
 Chinese import box  
 herb/tea container  
 opium container  
 shipping tin  
 opium tin can

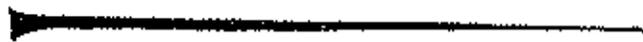
cm



furs tray  
 \*"furs" tray  
 "furs tray"

This term probably comes from a Chinese term transliterated fan; 11 fan equalled approximately 54 grains, and 12 fan was about 70 grains (Culin 1891:497).

cm



(length ca. 2 x)

c

\*opium needle  
 opium spoon/needle  
 wire poker  
 yen hauck

#### Gambling Paraphernalia



d

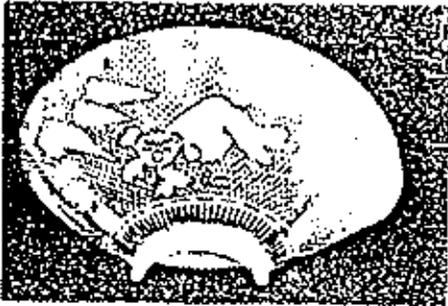
Fan Tan Counters  
 fan tan counters  
 \*gaming pieces  
 game marker

Go counter  
 game counter  
 gaming buttons  
 counters

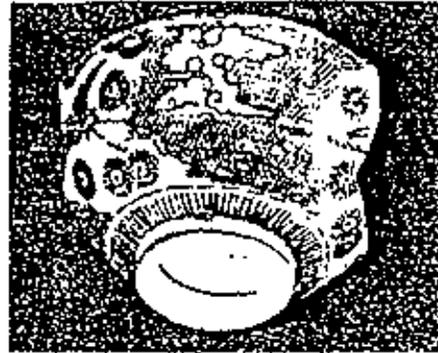
pak chü  
 (white pearl)  
 hak chü  
 (black pearl)

a - b from Felton, Lortie, and Schulz 1984:68; c from Holmes 1911:137.  
 d, from Asian Comparative Collection.

Japanese ceramics



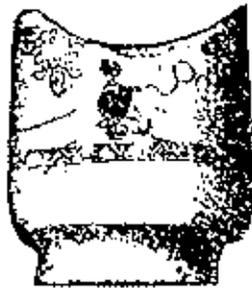
a



b

\*rice bowl  
medium bowl  
\*"bashed line" design

a, b from Costello and Maniery 1988: Figs. 53, 55.



c

\*straight-sided cup  
\*Kaga-style decoration

c from Asian Comparative Collection, ACC-85-6B.



d

\*Hō-ō bird design  
hoo bird  
"flying turkey"

d from Stitt 1974:187.

Japanese ceramics



\*decanter

\*"dusted" stencil design

a

a from Costello and Maniery 1988:Fig. 122.



\*sake cup

b

b from Asian Comparative Collection, ACC-86-3.



\*sake bottles

c

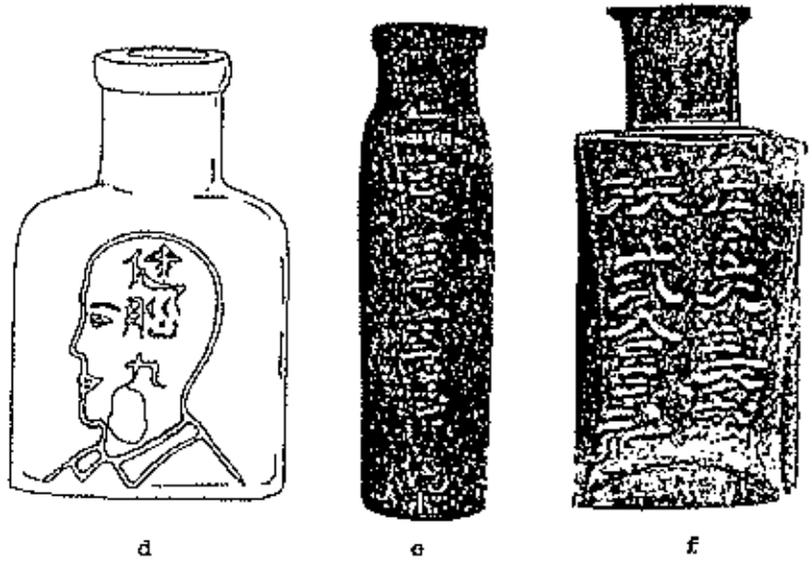
c from Munsey 1970:138.



Chinese

"a" is often erroneously called an "opium bottle."

a-c from Asian Comparative Collection. a, WCC-45; b, CCC-83-65; c, CCC-82-17.



Japanese

d, from Costello and Maniery 1988:Fig. 134.  
e, f from Asian Comparative Collection. e, ACC-86-22; f, ACC-86-24.

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# Useful Terms

## Ceramics

**Glaze** denotes items made of clay, whether they are porcelain, which have been fired only once and are unglazed.

**Blue and white** is a term used to describe a type of porcelain which is decorated with blue and white designs. It is made of porcelain which has been fired only once and is unglazed.

**Body** is the term of an object.  
**Body** is a type of pottery composed of at least 50% clay and the combined bodies of minerals. It is made of clay and is not necessarily true or hard paste porcelain. Blue and white was invented by Josiah Spode in the late 1700's.

**Decorative** means items composed of clay and fired at high temperatures.  
**China** particularly refers to any kind of ceramic body, such as "Flow Blue China." The true definition means hard paste porcelain.

**Cracking** refers to fine lines that appear on the glazed surface of earthenware which in turn allow the glaze to be penetrated. Cracking is caused by age and heat. It results because the body and glaze of an object were not fired at high enough temperatures to become completely vitrified.

**Earthenware** technically is one of the two classes of pottery. Earthenware have a porosity of more than 50%. They are composed of various types of natural clays and fired at high temperatures. They are opaque and not vitrified, although they may be glazed. As best examples are bricks and fire-wares are examples of unglazed earthenware.

**Embossed** designates a slightly raised design used to decorate the body of an object. Embossed designs are formed from the clay paste of the object before the piece is ever fired.

**Enamel** is a decorative applied to the top surface of ceramic items. These are made from the same materials as the body of the piece.  
**Fired** means to heat clay formed items at high temperatures.

**High-ware** refers to finished ceramic items that are "white" or "open" with a definite "inside" spray such as plates and sugar bowls, etc. as opposed to low-ware such as plates.

**Ironstone** is a term of ironware whose ground iron slag has been mixed with the clay. Ironstone was patented in 1813 in England by Mason.

**Mould** or **Moulded** is a term made in a desired shape before the clay paste has been fired to the object.

**Mould** means to shape the body paste to give form to an object, either by hand or in a prepared mold.  
**Opaque** is the opposite of transparent, and means that you cannot see through the object.

**Practical** refers to ceramic bodies which are produced with definite sizes rather than being totally round and smooth in shape.

**Paste** is the clay composition of a ceramic body before it is fired. It more commonly refers to hard paste or soft paste porcelain.

**Porcelain** is technically a form of earthenware because it is fired to a state of vitrification. However porcelain is distinguished from earthenware because porcelain is translucent. The term "porcelain" is used to designate top or hard paste porcelain whose principal ingredients is kaolin, a type of clay containing hydrated aluminum silicate.

**Porcelain** refers to objects formed from clay and fired at high temperatures. The two major categories of Porcelain are soft-paste and hard-paste.

**Porcelain** means raised ceramic decoration which stands out from the body of the object, shaped or applied before the object is fired.

**Porcelain** applies to ornately shaped porcelain bodies often having many embossed or relief designs on the body as well.

**Porcelain** is the ceramic that holds the objects in the mold during the firing process.

**Porcelain** is a semi-ocular shape, usually referring to the outer edge of ceramic items. The term originated from the back of a seating.

**Soft Porcelain** means any glazed earthenware pottery. It is opaque and not vitreous.

**Soft Paste** refers to a type of porcelain. Soft paste porcelain is fired at lower temperatures than hard paste porcelain. Originally soft paste porcelain was made in an attempt to imitate Chinese hard paste porcelain.

The word "soft" refers to the temperatures used and does not describe the texture of the ware.

**Spur** Marks are the marks left by the clay supports that were used to separate pieces and bowls during the firing process. The marks are small protrusions usually found in three places either on the back or front of the piece.

**Spur** Marks are the marks as spur marks.  
**Stoneware** technically is the second major classification of pottery. Stoneware have a porosity of less than 5% because Feldspar and quartz are added to the clay mixture, and they are fired at high enough temperatures to become vitrified. This is accomplished in the first firing. Stonewares are not fired to a state of translucency, however.

**Translucent** is the opposite of opaque and means that you can see through the object. Translucency is the chief characteristic of porcelain.

**Vitreous** refers to the glass-like quality given to ceramic bodies by pieces fired on these bodies. Stonewares and porcelains are completely vitreous because the

glaze and the body vitrified until the body and glaze became one entity, and thus the outer glaze cannot be penetrated. Earthenware, though, are not fired at temperatures high enough to make the body and glaze one entity. The glazes on earthenware are vitreous, that is glass-like, but they can be penetrated. That is why the glazes on earthenware are cracked.

**Vitreous** means the middle part inside the rim or border of ceramic ware such as the edge of a plate.

## Decoration

**Decorations** refers to decoration consisting Chinese styles. Cabot is an ore found in copper, silver, or tin. Cabot Blue is a color used to decorate ceramics obtained from an oxide of the mineral cobalt. The substance is brown in color when it is applied to the ceramic body, but the high heat during the firing process translates the color to a deep blue.

**Copper** lusters is a metallic glaze made from copper which has an iridescent look.

**Decorated** refers to handpainted relief decoration applied over the glaze on ceramic bodies. Such decorations often outlines designs in the pattern.

**Decorated** means to decorate with gold.  
**Glaze** refers to the liquid glaze substance which is applied to ceramics to make them impervious to liquids, and also used in various colors to decorate ceramics.

**Glaze** has the same meaning as glaze.  
**Monochrome** means that only one color is used in decorative an object.

**Mark** refers to the theme of decoration of an object, such as floral.

**Overglaze** designates that the decoration has been applied after an object has been glazed and fired.

**Polychrome** means that more than one color is used to decorate an object.

**Spur** refers to a fixed term of clay used for decorative. These appear in the dominant subject characterizing the decoration, such as spiral flutes or floral themes.

**Transfer** Decoration means that designs or patterns have been engraved on copper plates, the groove of the design filled with paint, after which the copper plate is heated and a heavy paper is pressed into the engraved design, taken off and in turn pressed upside down on an object which has been heated and coated with varnish. After the object has dried, the paper is washed off, but the design remains—thus the design has been "transferred" from the copper plate to this object.

**Underglaze** designates decoration applied before an object has been glazed and fired.

## Marks

"England" is found in some English marks from the last quarter of the sixteenth century. But was used on

all exported wares after 1561 to comply with American tariff laws.

**Letter** Mark is a printed mark, round or oval in shape, used in English marks during the latter half of the sixteenth century. See "Caulden" in the Marks section for one example.

**Impressions** are marks in the form of initials or symbols and pressed into the ceramic body before it is fired. See Milton for an example.

**Incised** marks are not into the ceramic body before it is fired.

**Limited (LTD)** is a word or abbreviation found in many English marks after 1850.

"**Made in England**" is raised by most authorities to be a category of twentieth century origin. But such a mark does not specifically date from any one year, and its use was not required; this sense derives from the same historical period may have this mark and others will not.

**Overglaze** designates marks placed on an object after it has been glazed. Overglaze marks are handpainted or printed. Marked applied overglaze can be worn off or rubbed off.

**Printed** Marks refer to marks made in the form of a transfer or stamp. Such marks may be applied either over or under the glaze.

**Raised** marks refer to marks formed in relief and applied to the piece.

**Registry** Marks (RMA) are marks or numbers impressed or printed on English ceramics after 1842. Printed raised marks were the first type used and continued until 1849. After that time the consecutive numbering system, professed with the initials "RMA" was used.

**Spur** refers to design marks. These registration numbers were assigned to companies in order to produce a shape or pattern design for three years. When later needed, these letters or numbers will tell you the year that job designs were first registered, but that does not mean that your example will have a certain right?

**Spur** marks were made on the day of the month of a certain year or even a certain year. The marks were continued after the three year period. Thus they only tell you when the company registered the design, and it is possible that they used the design before they registered.

**Spur** marks. Many designs, of course, were never registered.

**Spur** marks refer to a bow-tie shaped mark used to mark English ceramics during the 1850's. See "New Year Factory" for an example.

**Trade** Mark is a term used in English marks probably after the last quarter of the sixteenth century.

**Underglaze** refers to marks applied to ceramic bodies before they are glazed. Such marks are permanent and cannot be worn or rubbed off. (Although, of course, they can be covered over).

LOG CABIN IDENTIFICATION

Jim Rock  
Klamath National Forest  
Region 5  
USDA



LOG CABINS: HORIZONTAL LOG CONSTRUCTION

Origins .....1  
Log Preparation and Shapes .....2  
Corner Notching Styles.....6  
Chinking .....13  
Roof Structure Styles.....14

(Illustrations by Chris Colvard)

Jim Rock

Klamath National Forest

October 1979

## INTRODUCTION

Round log construction was introduced into the Americas by Swedes and Germans (Jordan 1978:33; Weslager 1955:263). In 1638 Swedes settled on the Delaware River and built cabins using horizontal log construction techniques. Log houses were also being built in New Sweden, Maryland by 1669 and in North Carolina by 1680 (Glassie 1963:5; Kniffen and Glassie 1966:58; Weslager 1969:148). Eighteenth century Germans in Pennsylvania used horizontal log construction techniques in house building that are common in Bohemia, Moravia, and Silesia today (Glassie 1963:5; Kniffen and Glassie 1966: 58-59).

In Europe, round log construction was the earliest form of horizontal log construction, but was quickly refined to make better and longer lasting structures. Early Roman invaders of Germany reported seeing log structures made with square-hewn logs (Brennell 1976:60). Hewn logs, squared logs, and planked logs appear to have been refinements that developed from round log construction and quickly replaced round logs in the majority of cases in Europe and the America.

Another method of construction, known as half timbering, was less common. It utilized heavy framing which was usually horizontal, but was sometimes vertical or diagonal. Spaces of up to two feet between the framing were filled with various materials (Kniffen and Glassie 1966:41). This style of timbering was earlier used in Britain, France, Germany, and Sweden. And was introduced in New England by English settlers. This style of log construction spread throughout Virginia and German Pennsylvania and was introduced by the Pennsylvania Dutch into Ohio, Wisconsin, Missouri, and Texas during the 19th century (Kniffen and Glassie 1966:41, 43).

Half round or semilunate horizontal log construction was most often used in the Deep South, but was supplanted by round log construction in Texas during the Great Depression (Jordan 1978:35). I assume this is true in the majority of areas where log construction was once again employed after it had fallen into disuse.

Perhaps the most easily recognizable attributes of log cabins derive from various methods of corner construction. In North America (from midwest to northeast and on into the southeast), the most common styles are the saddle notch, square notch, V notch, and the half dovetail notch (Kniffen and Glassie 1966:64; Jordan 1978:49).

Other attributes derive from various methods and materials used in chinking the logs. Many types of materials may be used, such as mud, paper, cement, or wood. In the Deep South the most common chinking style is that of nailing "sealing boards" on the exterior of the structure (Jordan 1978:43).

Roof styles vary with national origin, but appear to have blended in America over the years as contact between groups became more frequent. The gable style of roof is known early in Scandinavia, and was introduced by Swedes and Finns in Delaware. Roofs without ridgepoles may have their ancestors in Germany or England. The ridgepole and rafter roof style is thought to be a British trait, while the Anglo western roof style may be one that evolved through trial and error in Rocky Mountain areas of the United States (Jordan 1978:84).

#### LOG SHAPES AND PREPARATION

The oldest and simplest form of log preparation is to leave the logs round. The bark may be left on or peeled off the log. There is an advantage to peeling off the bark in that less moisture and fewer bugs get in to destroy the log (Jordan 1978:33).

Rough hewn logs are logs that are flattened only slightly on two opposing sides. This method provides a smooth surface for the interior and exterior of the structure and can create a slightly larger interior. The bark serves as chinking between logs if it is left in place but it may be removed. Hewing of logs is technologically more advanced, requires more skilled preparation, and provides better looking and longer lasting buildings. By removing some or all of the bark and sapwood, the more durable "heartwood" is left (Conner 1949:111; Jordan 1978:35).

Two-sided hewing is called "planking." This differs from rough hewing in that the log is shaped to about 5" x 7" in dimension and the bark usually is retained on the top and bottom of the log (Jordan 1978:35-56). Furthermore rough hewing usually removes only a small amount of material from each side of the log and can be done after the logs are in place, while planking must be done prior to placement (Jordan 1978:36).

Square hewing or four-sided hewing is often found in top and bottom logs of structures--the sill and the plate. Square-sided hewn logs are prepared before they are placed in the structure (Jordan 1978:36). Square-hewn logs are usually made with a foot adze or broad axe, though occasionally a whip saw, or today a chain saw, is used to square timbers. (Jordan 1978:35).

Rounded logs may be cut in half or split lengthwise to produce half-round or semilunate logs. These half logs can in turn be hewn to make them resemble planks. The flat side, split side, or cut side is placed toward the interior of the structure to provide more space and a smoother interior surface (Jordan 1978:36).

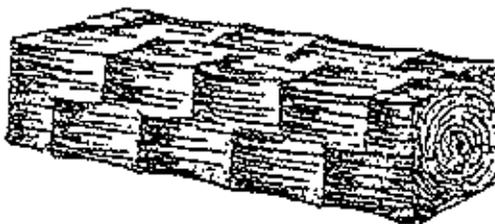
Preparation of logs utilizes several basic tools that leave their impression on the logs.

Logs are often shaped with a broad axe. This method of preparation requires scoring the log with the axe and then using a chalk line or string to mark the line one wishes to follow. The broad axe is then used to shave off the desired amount of material to leave a relatively smooth surface. Broad axes are either right or left handed, and all work must be set up for a consistent approach. Adzing--working with a foot adze--leaves a pattern of small indentations or scoops in the surface of the log. Jordan states, "Most craftsmen use a foot adze, a hoelike cutting instrument with a curved blade and long handle. Grasping the handle of the foot adze with the right hand about one-third of the way up from the blade, the carpenter rests the bottom of his right forearm on his right thigh. His left hand holds the handle near the butt end. Straddling the log, he makes short chopping strokes parallel to the surface of the log, chipping off the rounded bark surface in small chunks between each score. The craftsman moves backward as his work progresses (Jordan 1978:35; also see Sloane 1964:14-17, 26-27)."

Two types of saws are commonly used in shaping logs for cabins, the whip saw, and the chain saw. The whip saw leaves single distinctive straight lines crossing the log where its teeth cut in. The chain saw leaves deeper score marks, less regular in angle, and often shows a turn or circle effect where the saw blade ended. It is also true of chain saws that if the dogs are set, a fan-shaped pattern of cutting will be present. Milled lumber has a much more uniform appearance and shows less teeth marks. If a circle saw is used, a circular arc may be present.



adzed beam



broad axed



whip saw



chain saw

MILLED LUMBER



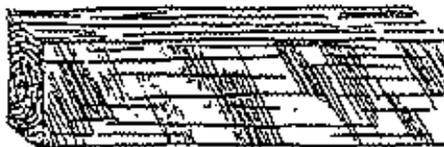
milled st saw



milled circle saw



marks of an up &  
down saw mill saw



pit saw

## CORNER NOTCHING STYLES



full-dovetail



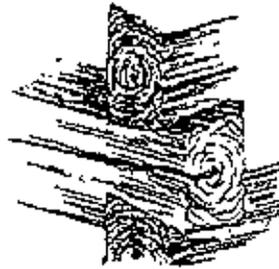
full-dovetail  
notch

Full Dovetail Notch - This corner notch is the most difficult type to make of those used in the Americas. It locks the logs together in both directions, forms a box corner, and slopes downward on every face. It is made by cutting slants or "splays" in different directions on the top and bottom of the log. This construction is shaped in such a manner that it will drain water to the exterior of the structure. The self-draining feature allows cabins made with this corner to last longer than many others. In the majority of cases, this corner will be used with squared timbers, but occasionally it has been used with round logs (Glassie 1963:10; Jordan 1978:48; Kniffen 1969:3; Kniffen and Glassie 1966:54, 56; Weslager 1969:338-339; and Wigginton 1972:64-69).

The full dovetail notch is the most complicated notch used in the Americas. It was introduced into the Middle Atlantic colonies by Swedish and German immigrants. It also is found in New Jersey, the Delaware Valley, eastern Pennsylvania, the great valley of the Appalachians, and as far south as northwestern Virginia (Glassie 1963:10; Jordan 1978:49; and Weslager 1969:152-153).



half-dovetail



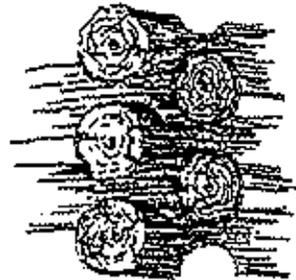
half-dovetail  
notch

Half-Dovetail Notch - This notch is often called a "mitre" dovetail notch. The half-dovetail notch varies from the full dovetail notch in that it has a splay or slant only on top of the log where it slopes upward. The bottom of the notch is flat rather than sloping and is called the tongue of the log. Even though this corner notch is not as strong as the full dovetail, it still forms a joint that is tightly locked and drains water outside the building. The half-dovetail is more easily made than the full dovetail, since it can be partly sawed rather than completely chipped out. The half-dovetail is usually found on hewn or squared logs (Bramwell 1976:61; Jordan 1978:54; Kniffen 1969:3; Kniffen and Glassie 1966:48, 56; and Waslager 1969:338-339).

Half dovetailing developed from full dovetailing, and is found most often in West Virginia, Kentucky, Virginia to the Cumberland, and even Ohio. It is also known in north Texas as the "Missouri notch." It originated in Czechoslovakia (Glassie 1963:10; Jordan 1978:54; Kniffen and Glassie 1966:63).



double saddle notch



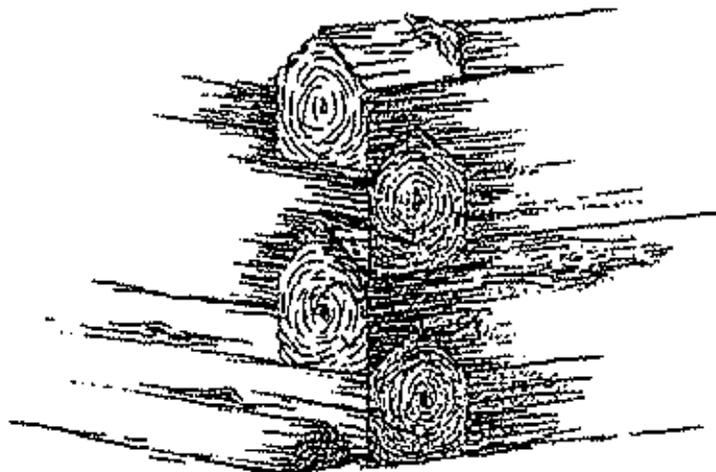
saddle notch



single saddle notch

Saddle Notch or Cradle Notch - This notch is perhaps the oldest type of notch. It has two subtypes, both of which are half saddle notches, with notches either on the top or the bottom of the log. The double saddle notch has scooped out depressions on both the top and the bottom of each log. This joint requires that the ends of the logs be left projecting beyond the corner. In America the projection is usually only a few inches. The single saddle on the bottom of the log drains water better than either the double or top saddle notch style (Bramwell 1976:61; Jordan 1978:58; Kniffen 1969:1; Kniffen and Glassie 1966:54; Waslager 1969:336-338; and Wigginton 1972:71-75).

Like the dovetail notch, the saddle notch was brought into America by the Swedes and Germans. It was most commonly used by them in barn and outbuilding construction. In the 20th century it has become the dominant building form in east Texas and the Deep South (Jordan 1978:5; Kniffen 1969:1; Kniffen and Glassie 1966:63).



"V" notch

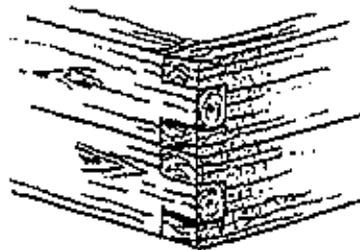
V Notch or Sharp Notch - This notch may have been derived from the bottom half saddle notch. It is cut into the log in the shape of a

sharp V so that the tapered, chamfered head of the lower log fits into the notch of the log above it. It is most often used on round logs, but can be found on shaped or hewn logs. If the log is hewn, this notch is shaped like the gable end of a house, and for this reason, it may be called a "roof topping" notch. The log end on the tongue, or crown, appears pear-shaped. This notch, though not as strong as a dovetail or saddle, sheds water rather well and usually is cut close to the end of the log to form a square corner (Jordan 1968:65; Kniffen 1969:3; Kniffen and Glassie 1966:44-45; and Sloane 1964:25; Waslager 1969:338-339).

The Schwenkfeldens, a German religious sect, developed the V notch in Europe and brought it to America as part of their cultural package. This Silesian sect introduced its use into Pennsylvania in the 1730's. From Pennsylvania this style spread into Appalachia, the Ohio Valley, western Maryland, Virginia, Kentucky, Indiana, Illinois, Missouri, and Texas. For the most part it was spread by people of German heritage (Glassie 1963: 10; Jordan 1978:85; Kniffen 1969:3; and Kniffen and Glassie 1966:54, 59).



square notch



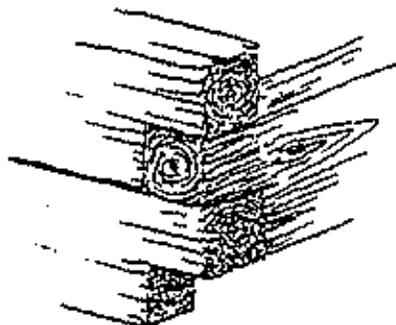
square notch

Square Notch - This notch is an alternative form developed from the V notch and half-dovetail notch. It does not lock because the notch is cut at right angles and requires pegging or spiking to hold. Material is only removed from one side of the notch. It holds water and thus increases rot of the timbers. The advantage of this notch is that it can be quickly made with a saw. This form of notching is often found in planked log construction (Jordan 1978:65, 68; Kniffen 1969:3; Kniffen and Glassie 1966:56; and Waslager 1969:338-339).

The square notch style of corner notching is Northern Bohemian in origin and dominates eastern Virginia and areas later settled by Virginians (Glassie 1963:11; Jordan 1978:65). In the United States, however, this style is associated with people whose origin is English, not Bohemian. It is found in Wisconsin, Alabama, Idaho, and Ohio as well as the inner coastal plain of the South from the Virginia Piedmont to east Texas (Glassie 1963:11; Jordan 1978:65, 68). This style is well known in California and Oregon. The half notch developed from this style and is usually found in the Deep South.

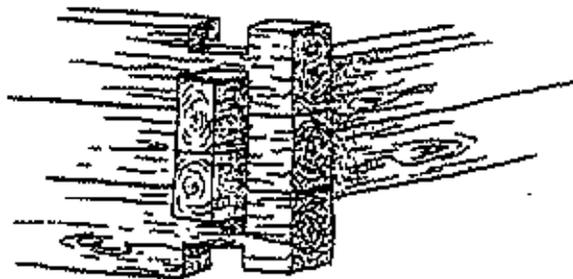


half notch



half notch

Half Notch - This corner notch is a variant of the square notch and is not self-locking. It is often seen in more recently constructed cabins. The half notch may be used with half logs, and if this is the case, the end of the log may look like a half moon (Kniffen 1969:5; Kniffen and Glassie 1966: 56; and Weslager 1969:339).



double notch

Double Notch - The double notch is similar to the square notch, but differs in that it extends beyond the corner of the structure and thus forms a locking joint. This notch retains water and will rot the logs more rapidly than many other notches. It is a rare notch in the United States, and is best known in Lincoln logs (Bramwell 1976:61; Jordan 1978:71; Kniffen and Glassie 1966:57; and Weslager 1969:339).

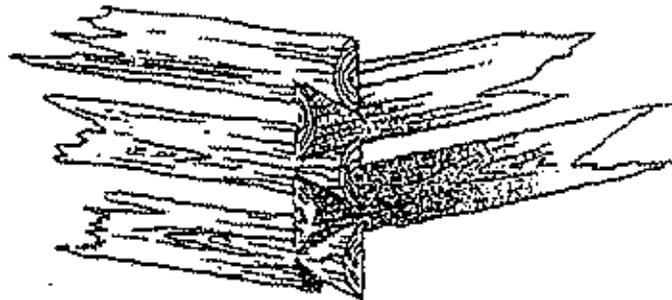
Scandinavians and Finns introduced the double notch into the Upper Great Lakes states in the 19th century. In Europe it is found from the Alps to the eastern European plain as well as in Norway and Russia. This style is also found commonly in northeastern New Mexico, but here it was introduced from Mexico where it had undoubtedly been brought from Spain (Bramwell 1976:61; Glassie 1963:11; Jordan 1978:65, 68, 71; Kniffen 1969:5; Kniffen and Glassie 1966:57; and Weslager 1969:152-153).



diamond notch

Diamond Notch - This is a notch that developed from the V notch. A V is cut on both the top and bottom and tapered to fit into notches above and below. This chamfered cut produces a diamond shaped crown. This notch firmly locks the logs in place (Kniffen 1969:3; Kniffen and Glassie 1966:54; and Weslager 1969:338-339).

The diamond notch style came to this country from Scandinavian and is found only rarely outside North Carolina and Virginia, from the Tidewater to the Piedmont (Glassie 1963:11; Kniffen and Glassie 1966:63).



semilunate notch

Semilunate Notch - This notch is used with half round timbers. It is very similar to a full dovetail joint and could also be called a half saddle notch (Jordan 1978:74).

This is the only notching style that may have been invented in America. It was used early in half log construction in the Deep South and later in east Texas (Jordan 1978:74).

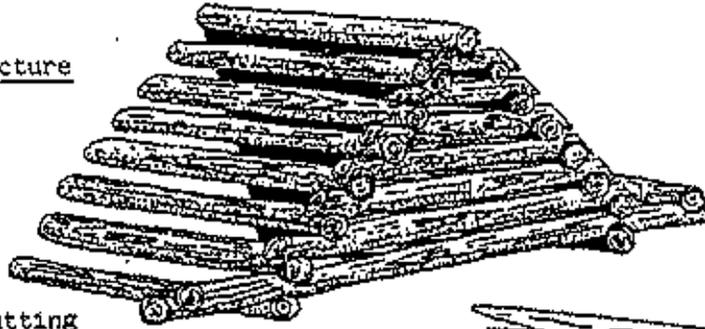
#### Chinks and Chinking

The chink is the space left between two logs in the wall of a cabin. Chinking is the material used to fill the spaces between logs. Chinking material may be the tree's bark, stone, wood, clay, mud, or mortar. Chinking may also be wooden sealing boards applied by nailing horizontal strips of wood over the chinks (Glassie 1963:9; Jordan 1978:43; and Wigginton 1972:104-106).

#### Floors

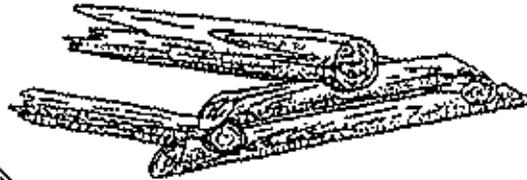
Cabin floors were often packed earth or clay, but in some cases wooden floors were made. Split logs or puncheons were made specifically for this purpose. A puncheon is a short, heavy log split one to three times to form a smooth surface. These logs were then placed on the earth and chinked or pegged, or both, to hold them in place (Connor 1949:114).

Roof Structure

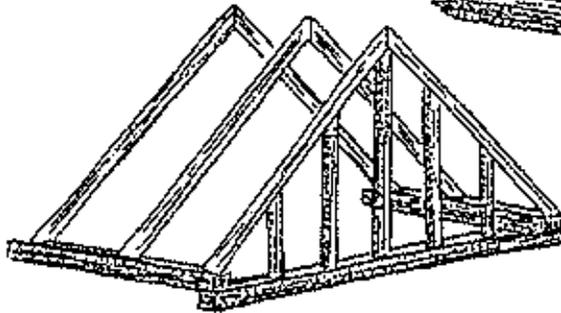


ridgepole and purlin, with butting poles

butting pole



Anglo western



lacking a ridgepole

Log cabins usually have two side-facing gables joined by a single uninterrupted roof (Jordan 1978:84). There are four major styles of roof construction. Ridgepole and purlin is the oldest style. It uses a ridgepole that runs the entire length of the roof. The purlins or "rib-poles" are parallel to the ridgepole at regular intervals. Roofs of this type usually have a slope of  $25^{\circ}$  to  $35^{\circ}$  (Jordan 1978:84). The ridgepole and rafter roof type uses rafters reaching from the ridgepole to the plate. The angle of this roof style is usually about  $45^{\circ}$ . The rafter may be lap-jointed onto the plate or mortised to it. Ridgepoles may be hewn or cut and, if necessary, spliced to reach the desired length. The rafters are left round and are called "pole rafters" (Jordan 1978:84; and Wigginton 1972:85-90). The Anglo western roof style is not a true gable roof because it has very little pitch. The unhewn ridgepole rests directly on the top logs of the cabin and rafters extend from it to the plates. Pitch can be as little as  $5^{\circ}$  (Jordan 1978:84).

Roofs may lack a ridgepole entirely. Construction of this type of roof requires adjacent rafters on opposite slopes of the roof that are lap-jointed or mortised together at the roof ridge. These are secured with a pin to the plate and to each other. These rafters may be hewn, sawed, or poles and they are spaced at about two-foot intervals. Lathing between these rafters at right angles adds additional support. The pitch of a roof of this type may be around 45°. Vertical studs may be employed to add support to the gable and rafters. Clapboards, either horizontal or vertical, enclose the gables (Jordan 1978:87).

### Conclusion

The origins of log construction techniques known in the midwest, eastern, and southeastern United States are described here. It will be very useful to know whether ethnic origins for construction techniques were retained by migrants who moved into the western United States. In the case of cabins located on National Forest land, interviews and historic records research may either support or challenge the idea that specific techniques were retained by ethnic groups. It may be true that by the time settlement was taking place here in the West, ethnicity had been filtered out of log cabin construction techniques, and that a true melting pot of cultural ideas was present.

Certain construction techniques may be confined to specific time periods in the west, while others may be represented from the earliest years to the present. Some construction styles may be associated with particular types of settlement in a given area. For example, hewn, dove-tail notched log structures may correlate primarily with a long-term year-round habitation sites, while round-log, square notched structures may reflect the builder's intention of using the site only temporarily or seasonally. Some construction styles may also correlate with certain functions. We might expect, for example, that trapper's line cabins, built to provide shelter to one man for only a few days per year, would be built small and sparingly, exhibiting such characteristics as round logs and Anglo-western roofs. We might expect early miner's cabins (particularly those on unpatented claims) to have been constructed in a similarly frugal manner. Homestead farm houses, on the other hand, would be expected to be larger, to be built with more care, and to have several rooms for family accommodations.

At the present time we know very little about the relationship between various forms of log cabin construction and human lifestyles. Hopefully, some meaningful patterns will emerge as we begin to gather more information about this fundamental aspect of man's technology.

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## A Glossary of Mining Terms



## THE MINER

*... he turns the river from its ancient bed, and hangs it, for miles together, in wooden flumes upon the mountain's side, or throws it from hill to hill, in aqueducts that tremble at their own airy height; or he pumps a river dry, and takes its golden bottom out.*

GLMSTED 1962

Compiled by

Mary Luecke

Brian Power

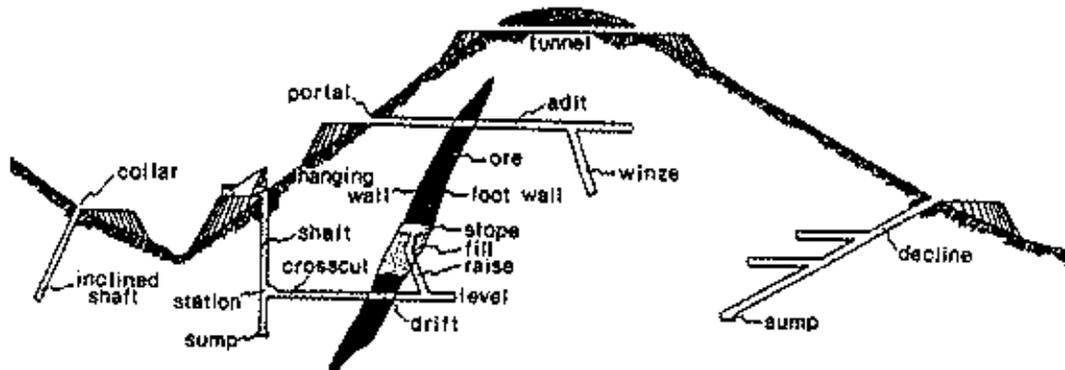
Jim Rock

Klamath National Forest

Region 5

USDA

**ADIT.** A mostly horizontal passage driven from the surface for the working of a mine. An adit has only one opening. This fact distinguished it from a tunnel, which has two openings.



Anatomy of a Mine from Prospect to Production. Intermountain Forest and Range Experiment Station, Forest Service, USDA, Ogden, Utah.

**AINLAY BOWL.** A gravity concentrator used for the recovery of gold and other heavy minerals from alluvial materials.

**ALLUVIAL.** Materials deposited by a stream.

**ALLUVIAL FAN.** A cone-shaped deposit of alluvium made by a stream where it runs out onto a plain or meets a slower stream. The fans generally form where streams issue from mountains into lowlands.

**ALLUVIAL GOLD.** Gold located in association with water-worn material.

**ALLUVIAL PLAIN.** Flood plains produced by the filling of a valley bottom are alluvial materials that consist of fine mud, sand, or gravel.

**ALLUVIUM.** A general term for all detrital deposits resulting from modern rivers, thus including the sediments laid down in river beds, flood plains, lakes, fans at the foot of mountain slopes, and estuaries.

**AMALGAM.** An alloy of mercury with gold or another metal. In the case of placer gold, a "dry" amalgam, one from which all excess mercury has been removed by squeezing through chamois leather will contain nearly equal proportions of gold and mercury.

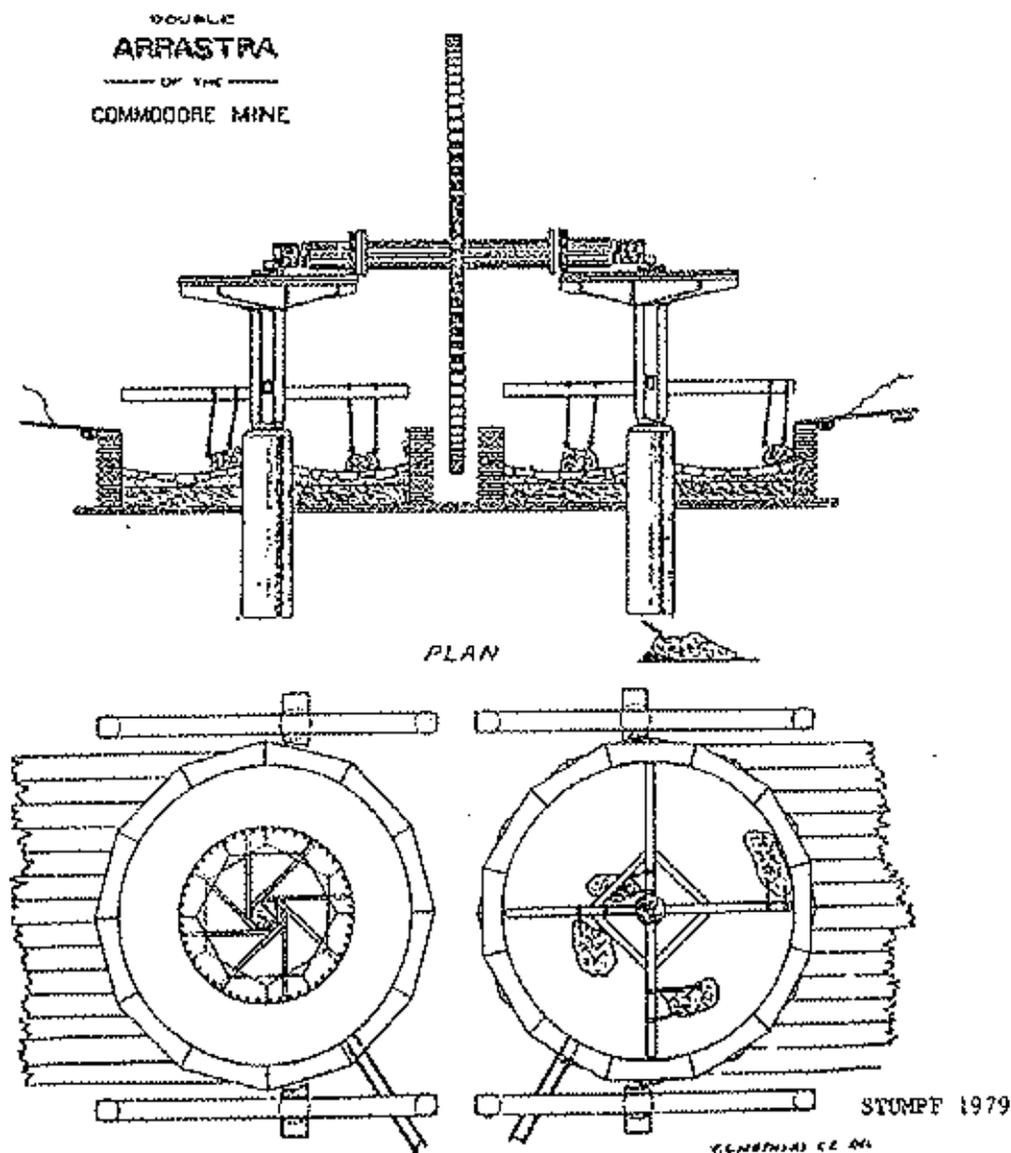
**AMALGAMATION.** The extraction of the precious metals from their parent materials by treatment with mercury.

**ANCIENT BEACH PLACER.** Deposits found on the coastal plain consisting of a line of elevated beaches.

**ANCIENT CHANNEL.** See Tertiary channel.

**ANNUAL LABOR.** See Assessment work.

**ARRASTRA.** A circular mill for grinding quartz by trituration between stones attached loosely to cross arms.



**ASSAY (verb).** To determine the amount of metal contained in an ore.  
1. The act of making such a determination. 2. The result of such a determination.

**ASSAY VALUE.** The amount of gold or silver, contained in an ore or other material, as shown by assay of any given sample.

**ASSOCIATION PLACER.** A placer location taken up by 2 to 8 persons and containing 40 to 160 acres. It is not a group of several claims but a single claim and requires only one discovery, and only \$100 a year assessment work. However, each person in such claim must be a bona fide locator and not simply loan the use of his name for the purpose of circumventing the law.

**ASSESSMENT WORK (ANNUAL LABOR).** Annual work upon an unpatented mining claim necessary for the maintenance of the possessory title.

**AURIFEROUS.** Containing gold.

**BAJADA PLACER.** Placers found in confluent alluvial fans along the base of a mountain range or in a mantle of rock debris along the lower slope of a mountain range, in arid regions. The deposits are mainly residual detritus and poorly sorted alluvium found in gulches and on slopes that are subject to occasional torrential rain wash. Bajada is the Spanish term for slope. This term has not found general use in placer mining, most bajada placers being referred to collectively as "Desert" placers.

**BANK-MEASURE.** The measurement of material in place, such as gravel in a deposit before excavation. In placer work, values are normally reported as cents per cubic yard and unless specified otherwise, this means a cubic yard in place, or bank-measure.

**BANKA DRILL.** A placer drill consisting essentially of a flush-jointed casing equipped with a serrated cutting shoe. The casing is rotated by means of a man or animal-powered sweep attached to the upper section. Men standing on an attached platform, chop up the drill core and remove it from the casing by means of hand-powered tools. Also known as an **EMPIRE DRILL.**

**BAR.** A deposit of alluvial material above or below the water line of present streams. Bars are found where the current slackens or changes direction.

**BED LOAD.** Soil, rock particles, or other debris rolled along the bottom of a stream by the moving water, as contrasted with the "silt load" carried in suspension.

**BEDROCK.** The solid rock underlying auriferous gravel, sand, clay, etc., and upon which the alluvial gold rests. In placer use, the term bedrock may be generally applied to any consolidated formation underlying the gold-bearing gravel. Bedrock may be composed of igneous, metamorphic or sedimentary rock. See - False bedrock.

**BENCH PLACER.** Gravel deposits in ancient stream channels and flood plains which stand from 50 to several hundred feet above the present streams.

**BLACK GOLD.** Alluvial gold coated by black oxide of manganese.

**BLACK SAND.** Heavy grains of various minerals which have a dark color, and are usually found accompanying gold in alluvial deposits. The heavy minerals may consist largely of magnetic, magnetite and hematite associated with other minerals such as garnet, rutile, zircon, chromite, amphiboles, and pyroxenes. In Western gold placers, the black sand content is commonly between 5 and 20 pounds per cubic yard of bank-run gravel.

**BLUE GRAVEL or BLUE LEAD.** Some of the deeper, water-saturated gravels found in California's Tertiary channels have a distinctive bluish-gray color and for this reason early miners referred to them as "blue gravel". At one time they were believed to represent a separate gravel flow, distinct from the overlaying red gravels. Actually, these blue gravels represent unoxidized portions of the gravel channels whereas the red gravels represent the oxidized portions of the same material.

**BOOMING.** A variation of ground sluicing in which water is stored in a reservoir and suddenly released to provide a rush of water, in a large volume, which erodes and transports the gravel. Booming is generally employed where water is scarce. In California the contrivances for collecting and discharging water are termed SELF-SHOOTERS. See - Ground sluicing.

**BRAIDED STREAMS.** 1. A braided stream is one flowing in several divided and reuniting channels resembling the strands of a braid, the cause of division being the obstruction by sediment deposited by the stream. 2. Where more sediment is being brought into any part of a stream than it can remove, the building of bars becomes excessive, and the stream develops an intricate network of interlacing channels, and is said to be braided. 3. Conditions which cause braiding are common in glacial areas where much sediment is added by the melting ice and in semiarid regions where the transporting power of streams is reduced by seepage and evaporation. In general, such conditions are not conducive to the formation of placers.

**BREAKOUT.** A point where a ravine or canyon cuts into, but not through, a channel. Usually applied to buried Tertiary channels.

**BREAST.** The working face of a prospect drift on the pay lead; the face of a gangway being mined.

**BUCKET-LINE DREDGE** or **BUCKET-ELEVATOR DREDGE.** A dredge in which the material excavated is lifted by an endless chain of buckets. Also known as Connected-bucket dredge. The type of bucket-line dredge generally employed in placer mining is a self-contained digging, washing and disposal unit, operating in a pond and capable of digging, in some cases, more than 100 feet below water. Its machinery is mounted on a shallow-draft hull and the dredge backfills its working pit (pond) as it advances. The capacity of individual buckets is used as a measure of dredge size. For example, an "18-foot" dredge is equipped with buckets having a struck capacity of 18 cubic feet each. Compare with Dragline dredge; also Suction dredge.

**BULLION.** Unrefined gold that has been melted and cast into a bar. In placer mining, the gold sponge obtained by retorting amalgam, is commonly melted with borax or other fluxes, then poured into a bullion bar. See - Sponge.

**BURIED PLACER.** Old placer deposits which have become buried beneath lava flows or other strata. See - Tertiary Channel.

**BY-WASH.** In many cases, hydraulic giants are capable of cutting more material from the bank, than can be swept into the sluices by means of the giants alone. In such cases supplemental water may be brought into the pit by means of a ditch, to assist carrying the material to the sluices. This is locally called **BY-WASH**, **BY-WATER** or **BANK WATER**.

**CAISSON.** A metal cylinder used to sink prospect shafts in loose ground or in the presence of a large quantity of water. Caissons are usually provided in sets of 4 or more telescoping units.

**CALICHE.** A brown or white material commonly found as a subsoil deposit in arid or semi-arid climates, and which is composed largely of calcium carbonate. It is commonly encountered in desert placers where its cementing effect adversely affects the mining and washing processes.

**CAPPING.** Volcanic flow materials or agglomerates that cover and in some cases, conceal underlying auriferous gravels. Commonly found associated with Tertiary channels in California's Sierra Nevada region. Also called **CAP ROCK**.

**CASING.** Steel tubing or pipe used to case a drill hole. In placer sampling it is usually driven into the formation ahead of the drill bit and when so used, is commonly called a "drive pipe".

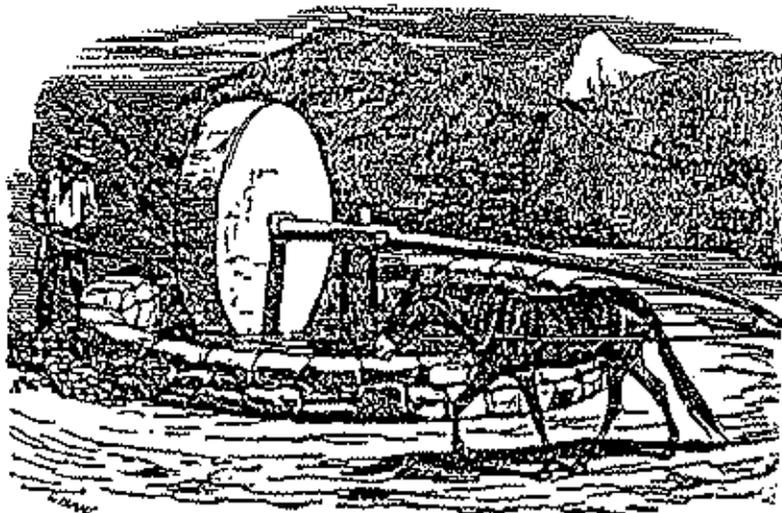
**CEMENT.** The Material that binds together the sand and gravel particles in an indurated placer or other formation. The cementing material can be calcareous, silicious or ferruginous. Also used when referring to the hardened formation as a whole. Cemented gravels must, in some cases, be milled to release their gold content.

CHANNEL. A stream-eroded depression in the bedrock, ordinarily filled with gravel. See - Tertiary channel.

CHURN DRILL. A portable drilling machine arranged to successively raise and drop a heavy string of tools suspended from a drill line. By means of the successive blows the formation is chopped up and the hole deepened. The type of churn drill designed for placer sampling is often referred to as a "Keystone" drill or "placer" drill.

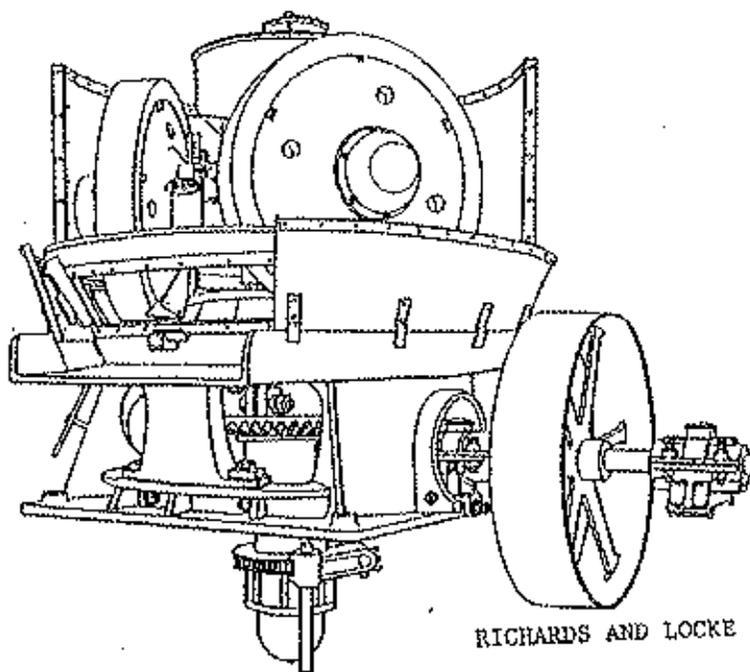
CHUTE. A flume for sliding ore.

CHILI MILL. A means of crushing ore by large rollers.



THE CHILI MILL.

OLMSTED 1962



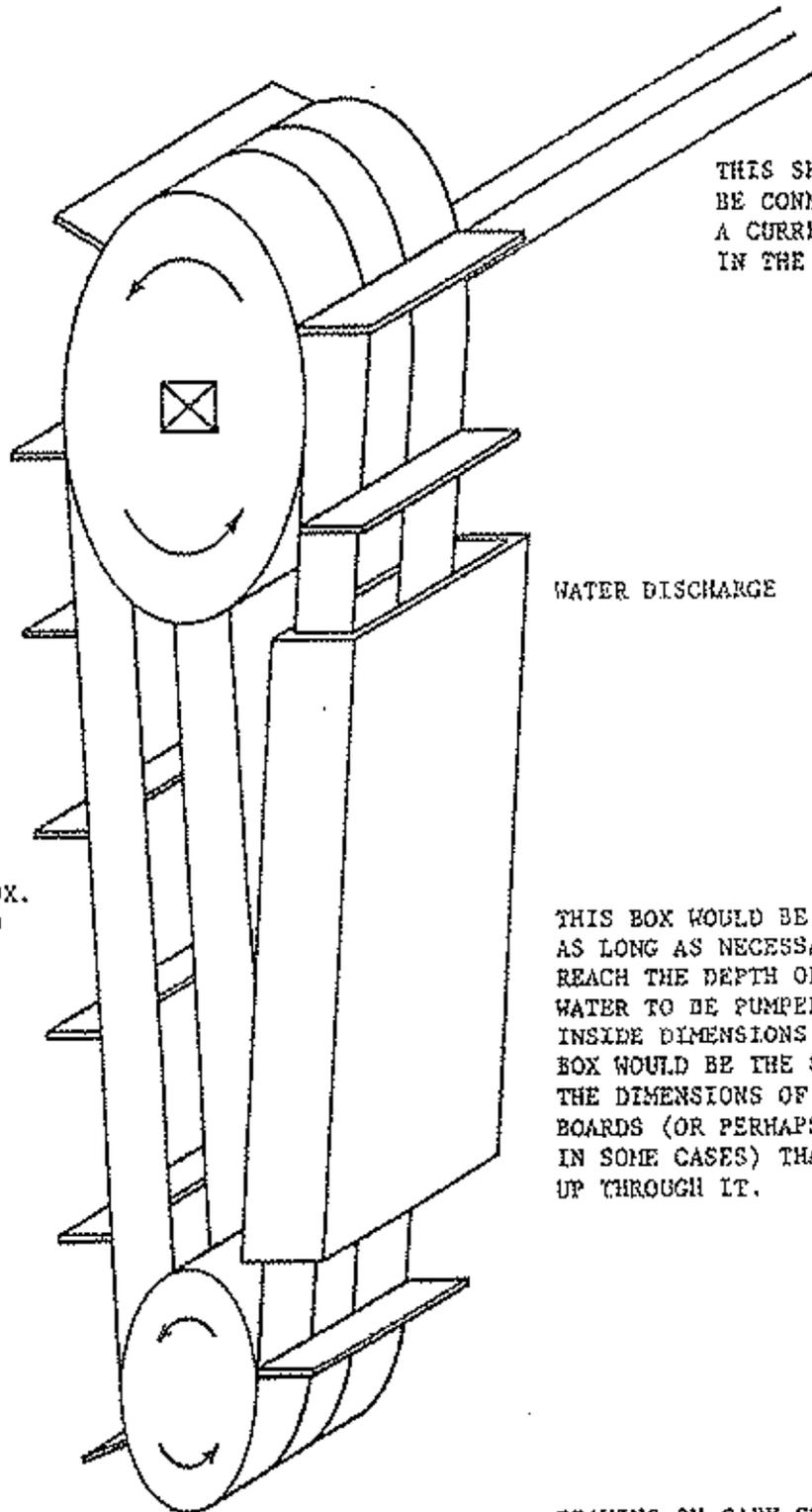
RICHARDS AND LOCKE 1940

The Garfield Chili mill.

CHINA PUMP or CHINESE PUMP. The pump is used in river mining, and it is usually placed downstream from the excavation. The power for this pump is the current of the stream. An undershot wheel is built and placed in the stream alongside the dam, so that the current impinges directly against the paddles. The pillow blocks on which the shaft rests are made of piles driven in the bottom of the river and buttressed by as large boulders as can be placed against them. The pillow blocks are not fast, but work in vertical slides and can be raised or lowered by levers, so as to control the running of the wheel. If necessary another wingdam is built out from the other side of the river, to turn the force of the current still more against the wheel. This wheel being very liable to be swept away and lost when high water comes, is constructed as simply and cheaply as possible. For the shaft a twelve-inch square timber is used, the ends rounded and protected with iron rings, into which the gudgeons of the two or two and one half inch cast journals are driven. The diameter of the wheel is usually ten or twelve feet, and the width, dependent on the work it has to do, from eight to eighteen feet. The arms are made of two by four scantling, sometimes morticed into the shaft, but preferably spiked to flanges made of double inch boards from sixteen to twenty inches deep. Three to four sets of twelve arms each are placed on the shaft, this depending upon the width of the wheel, and paddles made of inch lumber and twelve inches wide dip into the current. The journals turn in seasoned oak boxes resting on the pillow blocks. A wheel so constructed can be broken to pieces quite rapidly and the shaft, the valuable part, saved for another season's work when it would not be possible to save the wheel entire. Between the wheel and the pier on the side toward the dam, is the gear connecting with the countershaft, usually a rubber or leather belt running on a wooden drum three feet in diameter and with a twelve to twenty-four inch face, which runs the pump. The pump is simply an inclined box made of one or one and one half inch lumber and from sixteen to thirty-six feet long; attached in it at the bottom and under the water is another drum not as large as that on the countershaft; over these two drums and through the pump box or barrel runs a tight rubber or canvas belt, from twelve to twenty-four inches wide, dependent somewhat on the quantity of water that must be handled, and specially prepared, if the latter material is used, to resist rotting and the grit of the water; on the outer side of this belt, three feet apart, are fastened paddles three to six inches wide, and of length equal to the width of the belt. The belt and these paddles just fill the pump box, the lower end of which being open under the water surface and the upper end opening into the discharge flume or box, a continuous stream of water of large volume is pumped or elevated. For lifts of from twelve to twenty feet, this style of pump is very effective, and water is frequently elevated thirty feet by means of them. Some of the larger of these pumps handle fifty inches of water. With one or more of them to clear and to keep clear the area inside of the wingdam, the ground is ready for mining.

"CHINA PUMP"

BOARDS ARE APPROX.  
6" X 16" X 2" thick  
AND ARE SPACED APPROX.  
18" APART ON THE TWO  
6" WIDE RUBBER AND  
FABRIC BELTS



THIS SHAFT WOULD  
BE CONNECTED TO  
A CURRENT WHEEL  
IN THE RIVER

WATER DISCHARGE

THIS BOX WOULD BE MADE  
AS LONG AS NECESSARY TO  
REACH THE DEPTH OF THE  
WATER TO BE PUMPED. THE  
INSIDE DIMENSIONS OF THE  
BOX WOULD BE THE SAME AS  
THE DIMENSIONS OF THE  
BOARDS (OR PERHAPS BUCKETS  
IN SOME CASES) THAT PASS  
UP THROUGH IT.

DRAWING BY GARY STUMPF

THIS DRAWING WAS MADE FROM A SKETCH AND DESCRIPTION PROVIDED BY CHESTER BARTON OF HORSE CREEK DURING A TAPED INTERVIEW ON 4-12-77 AND 4-13-77. THE TRANSCRIPT OF THIS INTERVIEW, ON FILE WITH THE KLAMATH NATIONAL FOREST IN YREKA, SHOULD BE REFERRED TO. THIS DRAWING IS A VERY ROUGH REPRESENTATION OF THE PROCESS INVOLVED AND SHOULD NOT BE CONSIDERED COMPLETE, PROPORTIONALLY ACCURATE, OR TO SCALE.

CLAIM. See - Mining claim.

CLEAN-UP. 1. The operation of collecting the gold or other valuable material from the recovery system of a dredge, hydraulic mine or other placer operation. 2. The valuable material resulting from a clean-up. This may also be gold that has settled in a flume or been ground into the floor of a arrastra.

COARSE GOLD. The word "coarse", when applied to gold, is relative and is not uniformly applied. Some operators consider coarse gold to be that which remains on a 10-mesh screen. Others consider individual particles weighing 10 milligrams or more to be coarse gold. Some apply the term "coarse gold" to any particle that is relatively thick as compared to its diameter and can be easily picked up with the fingers.

COBBLE. A smoothly rounded stone, larger than a pebble and smaller than a boulder.

COLLAR. The mouth. The junction of a mine shaft and the surface. The term applied to the timbering or concrete around the mouth.

COLLUVIAL. Consisting of alluvium in part and also containing angular fragments of the original rocks.

COLOR. A particle of metallic gold found in the prospector's pan after a sample of earth has been washed. Prospectors say, "The dirt gave me so many colors to the pan".

CONCENTRATE. (verb) To separate a metal or mineral from its ore or from less valuable material. (noun) The product of concentration.

CONCENTRATION. The removal by mechanical means of the lighter and less valuable portions of ore.

CONFLUENCE. A junction or flowing together of streams; the place where streams meet.

CONGLOMERATE. Rounded waterworn fragments of rock or pebbles, cemented together by another mineral substance.

CONTACT. The surface along which two different rock formations come together. This is an item of importance where the contact is between igneous and sedimentary rocks because ore bodies often occur along or near such contacts.

COUNTRY ROCK. Rock outside of the vein or mineralized zone.

CRADLE. This device is similar to the rocker. It is designed so that the coarse stones and gravel stay in its hopper and water washes the sand and gold into the riffle-bars in the apron or bottom of the cradle.

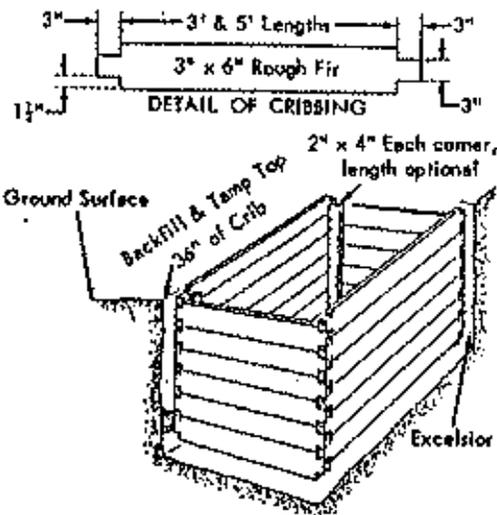


HOW CRADLE AND MANNER OF USING IT.

OLMSTED 1962

CREVICING. A small-scale mining method in which the miner removes detrital material from cracks and crevices in the bedrock, usually by means of pry bars and long-handled spoons, and washes the material to recover its gold content.

**CRIBBING.** Close timbering, as the lining of a shaft. In placer work, cribbing may be needed to support the walls of shaft or test pit put down in loose or wet ground.



Space between cribbing and test pit walls to be backfilled with excelsior when exploring loose ground.

WELLS 1962

*Test pit cribbing suitable for use in shallow placer ground. (From U.S. Bureau of Reclamation Concrete Manual, 7th edition, 1963).*

**CROSSCUT.** An adit which crosses the vein at right angles to it. This term is also generally defined as "an underground passage directed across an ore body to test its width and value or from a shaft to reach the ore body." A crosscut thus does not have to be an adit. It may connect two adits, or simply branch off the main adit to cross the ore.

**DEBRIS.** The tailings from hydraulic mines.

**DETRITUS.** A general name for incoherent sediments, produced by the wear and tear of rocks through the various geological agencies. The name is from the Latin for "worn" rock waste. A deposit of such material.

DIP. The inclination of a vein from the horizontal.

DIP BOX. A modification of the sluice box used for small-scale mining where water is scarce. It generally consists of a short sluice made of 1 x 12-inch lumber, and standing on legs arranged to provide a steep slope. The gold-bearing material is washed in batches by first shoveling it into the upper end of the dip box and then pouring water over it, usually from a dipper. See - Cradle.

DIRT. A miner's term for auriferous gravel or for the material being worked. See - Pay dirt.

DISCHARGE HEAD. The vertical distance from the center of a pump to the center of the discharge outlet where the water is delivered, to which must be added the loss due to friction of the water in the discharge pipe.

DISCOVERY. The finding of a valuable mineral deposit in place upon a mining claim. Although "discovery" and "valuable", as they relate to mining claims, have not been defined by statute, a long history of court decisions have held that in order for a location to be valid, there must be a discovery of mineral within the limits of the claim and the discovery must be such as would justify a person of ordinary prudence in the further expenditure of time and money, with reasonable prospect of success in developing a profitable mine. In some decisions the word "valuable" is interchanged with "profitable".

DISCOVERY CLAIM. (Alaska) A claim covering the initial discovery on a creek. Subsequent claims are commonly designated as one above, two above, three above; one below, two below, etc., depending on their position in relation to the discovery claim.

DIVINING ROD. Stick of witch hazel used in prospecting for lodes.

DOODLEBUG. A miners' term for a dragline dredge, a divining rod supposedly useful for locating gold or other valuable minerals. See - Dragline dredge.

DRAGLINE. A power shovel equipped with a long boom and a heavy digging bucket that is suspended from a hoisting line and is pulled toward the machine by means of a "drag" line. By manipulating the two lines (wire ropes), the bucket can be caused to dig, carry, or dump the excavated material. Such a machine is more properly called a dragline excavator. See - Dragline dredge.

DRAGLINE DREDGE. A dragline dredge consists of two units; a self-propelled power shovel equipped with a dragline bucket, and a floating washing plant which is similar to, but usually smaller than that of a bucket-line dredge. The washing unit contains a hopper for receiving gravel dug by the dragline; a revolving screen; riffled sluices or other gold-saving equipment, and a tailings stacker. Dragline dredges are generally employed to mine relatively small, shallow deposits.

**DREDGE.** A machine, operated by power, and usually mounted on a flat-bottomed hull provided with the equipment necessary to dig, process, and dispose of alluvial or other unconsolidated materials of a type found at the bottom of streams and rivers or in certain terrestrial and offshore deposits. See - Bucket-line drudge; Jet dredge; Suction drudge.

**DREDGE SUCTION.** The depth of gravel, or a particular vertical section within a placer deposit, that will pay to mine by dredging.

**DRIFT.** (geol.) Any rock material, such as boulders, till, gravel, sand, or clay, transported by a glacier and deposited by or from the ice or by or in water derived from the melting of the ice.

**DRIFT.** (mining) 1. A sub-tunnel running from the main tunnel to prospect for the pay lead; 2. A sub-tunnel run from the main tunnel across the pay lead to block out the ground and to facilitate its working; 3. Generally, a sub-tunnel.

**DRIFT MINING.** A method of mining gold-bearing gravel by means of drifts, shafts or other underground openings, as distinguished from surface methods for placer mining.

**DRILL.** See - Churn drill.

**DRILL CORE.** A cylindrical core of sand and gravel forced upward into the drill casing as the casing or "drive pipe" is forced into the deposit, usually ahead of the drill bit.

**DRILL FACTOR.** A figure used to designate the effective area of a drive shoe used in placer sampling. For example: A new, 7 $\frac{1}{2}$ -inch drive shoe has an open area of 0.306 sq. ft. but to allow for wear and other variables, some engineers use a lesser figure (commonly 0.27) in their value calculations. The figure so used is referred to as the **DRILL FACTOR.**

**DRILL LOG.** The record of a drill hole, usually recorded on a prepared form as the work progresses. The usual placer log, in addition to showing the drilling progress, type of material penetrated, its mineral content, etc., will also show the type and size of equipment used, personnel employed, cause of delays, and other details of the work. A complete log will also show the essential calculations and all factors used in arriving at the reported value.

**DRIVE PIPE.** See - Casing.

**DRIVE SHOE.** A hardened steel protective shoe attached to the lower end of a drive pipe or casing. The drive shoe is usually slightly larger in diameter than the casing and is provided with a beveled cutting edge. See - Casing.

**DRY DIGGINGS.** In the 1850's, placers in or along the banks of California's rivers were known as "Wet diggings", and those in the dry ravines adjacent to the rivers were referred to as "Dry diggings". Compare with DRY PLACER.

**DRY PLACERS.** Placers in arid or semi-arid regions, or generally where surface water is not available.

**DRY WASHER.** A device for recovering gold or other heavy minerals from dry alluvial material without the use of water. The typical dry washer is a small, hand-powered machine employing a sloping riffle board and a bellows or blower arrangement. The bottom of the riffle board is made of some porous material such as heavy cloth. Puffs of air forced up through the bottom by the bellows or blower, cause the lighter materials to hop over the riffles and work their way through the machine, while the gold or other heavy materials lodge behind the riffle bars.

**DRY WASHING.** The extraction of gold or other minerals from dry sand and gravel by the use of machines in which air is employed as a separating medium.

**DRYLAND DREDGE.** A mechanical washing plant, sometimes of appreciable size, designed to follow a dragline, or other excavator, as the mining cut advances. Some are equipped with trommel-type revolving screens and rock stackers, and are mounted on crawler-type tracks.

**DUMP.** 1. The fall immediately below a hydraulic mine outlet and in particular, the area available for tailings storage. 2. A specially prepared place outside of a drift mine, usually near the portal, where the pay gravel is deposited preparatory to washing. 3. A pile or heap of material, usually waste material, extracted from a mine.

**ELUVIUM.** Loose material resulting from decomposition of rock. Eluvial material may have slumped or washed downhill for a short distance but it has not been transported by a stream.

**EXPANDED METAL.** (Expanded-metal lath) A type of punched-metal screen. The style commonly used in placer mining, for saving fine gold, consists of a latticework of diamond-shaped openings (about 3/4" x 1 1/2") separated by raised metal strands that have a decided slope in one direction. When installed as riffles, with this slope leaning downstream, eddies form beneath the overhangs, thus creating conditions well-suited for the saving of fine gold. When used as riffles, expanded metal is generally placed over cocoa matting or similar material. A flat-lying style of expanded metal (without overhangs) is less-suited for this use.

**FALSE BEDROCK.** A hard or relatively tight formation within a placer deposit, at some distance above true bedrock, upon which gold concentrations are found. Clay, volcanic ash, caliche or "tight" gravel formations can serve as false bedrocks. A deposit may have gold concentrations on one or more false bedrocks, with or without a concentration on true bedrock.

**FINE GOLD.** 1. Pure gold, i.e., gold of 1000-fineness. 2. Gold occurring in small particles such as those which would pass a 20-mesh screen but remain on 40-mesh.

**FINENESS.** The proportion of pure gold in bullion or in a natural alloy, expressed in parts per thousand. Natural gold is not found in pure form; it contains varying proportions of silver, copper and other substances. For example, a piece of natural gold containing 150 parts of silver and 50 parts of copper per thousand, and the remainder pure gold, would be 800-fine. The average fineness of placer gold obtained in California is 885.

**FINES.** 1. The sand or other small-size components of a placer deposit. 2. The material passing through a screen during washing or other processing steps of a placer operation.

**FIRE ASSAY.** The assaying of metallic ores, usually gold or silver, by methods requiring furnace heat. Fire assaying, in essence, is a miniature smelting process which recovers and reports the total gold content of the assay sample, including gold combined with other elements, or mechanically locked in the ore particles. Consequently, the gold value indicated by fire assay is not necessarily recoverable by placer methods. For this and other reasons, the gold content of placer material is not normally determined by fire assay.

**FLAKY GOLD.** Very thin scales or gold pieces.

**FLASK.** The unit of measurement for buying and selling mercury (quicksilver). A standard iron flask contains 76 pounds of mercury.

**FLAT.** An essentially level gravel bar or deposit along the banks of a river.

**FLOAT.** A term much used among miners and geologists for pieces of ore or rock which have fallen from veins or strata, or have been separated from the parent vein or strata by weathering agencies. This term is not usually applied to stream gravels.

**FLOAT-GOLD.** Flour gold. Particles of gold so small and thin that they float on and are liable to be carried off by the water. See - Flood gold.

**FLOOD GOLD.** Fine-size gold flakes carried or redistributed by flood waters and deposited on gravel bars as the flood waters recede. Flood gold sometimes forms superficial concentrations near the upstream end of accretion bars. See - Float gold.

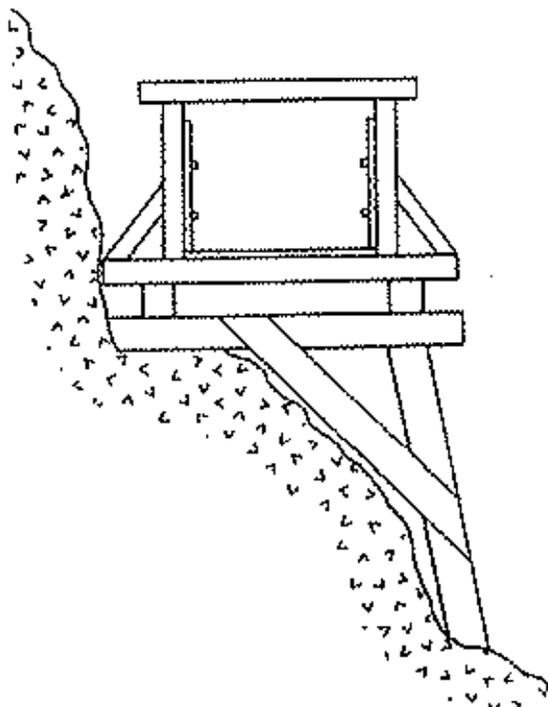
**FLOOD PLAIN.** That portion of a river valley, adjacent to the river channel, which is built of sediments during the present regimen of the stream and which is covered with water when the river overflows its banks at flood stages.

**FLOTATION.** The minimum working draft of a dredge. When a dredge "digs flotation" it excavates the ground to the minimum depth required for floating the dredge. This is usually done when passing through tailings or moving between nearby working areas.

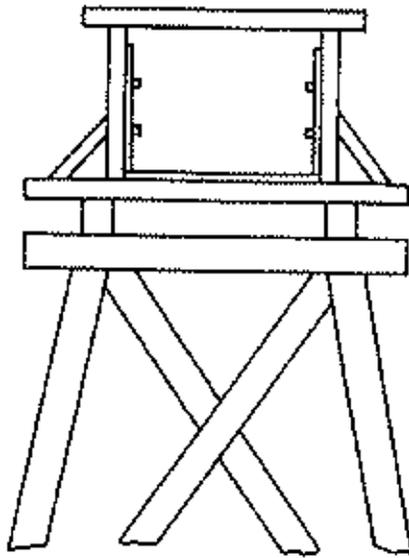
**FLOUR GOLD.** The finest gold dust, much of which will float on water. Flour gold, such as that found along the Snake River in Idaho, commonly runs 3 million colors to the ounce.

**FLOURED MERCURY (QUICKSILVER).** The finely granulated condition of quicksilver, produced to a greater or less extent by its agitation during the amalgamation process. The coating of quicksilver with what appears to be a thin film of some sulphide, so that when it is separated into globules these refuse to reanite. Also called Sickening and Flouring.

**FLUME.** An artificial channel, usually made of wood, for conducting water. Flumes are used in mining when ditches cannot be made. They often cross rocky sideslopes and canyons.

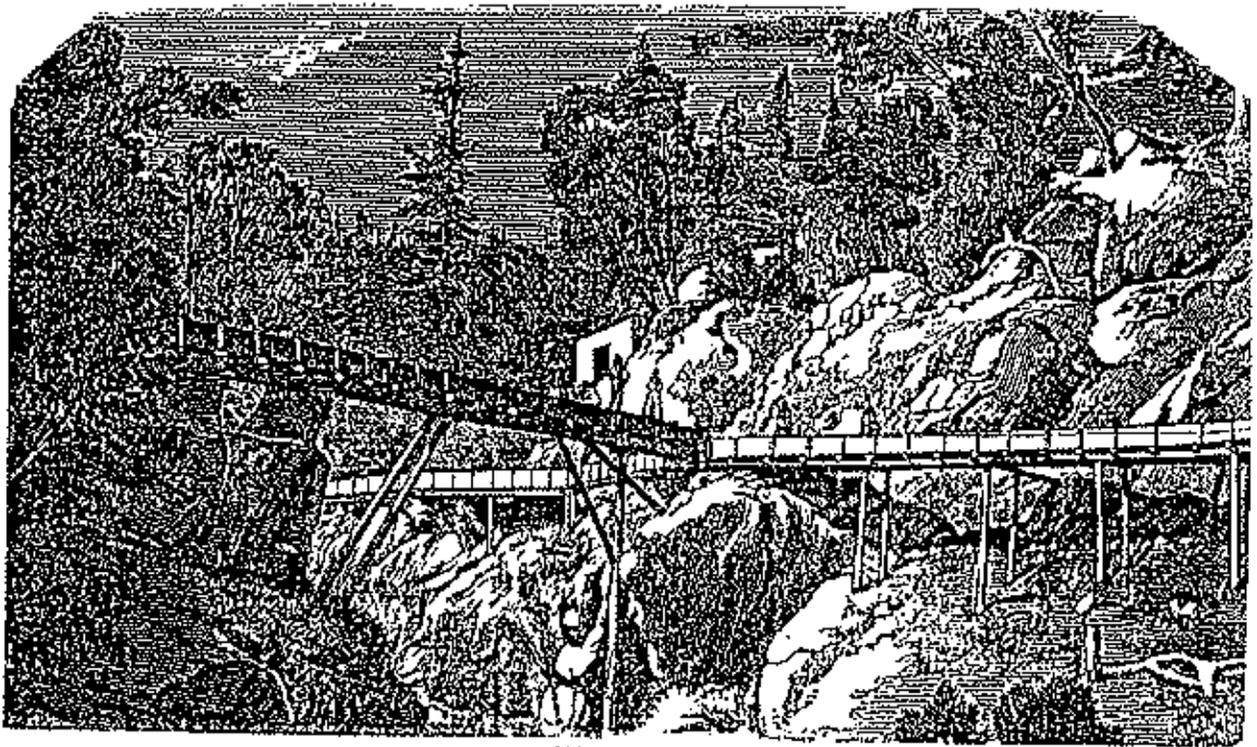


Method of constructing a flume along the side of a steep slope.



Treedled flume construction.

STUMPF 1979



FLUME IN A CANYON.

OLMSTED 1962

FLUVIAL. Of, or pertaining to rivers; produced by river action, as a fluvial plain.

FLUVIATILE. Caused or produced by the action of a river; fluvial.

FLUVIOGLACIAL. Produced by streams which have their source in glacial ice. See - Glaciofluvial.

FLUVIO-MARINE. Formed by the joint action of a river and the sea, as in the deposits at the mouths of rivers.

FOOL'S GOLD. A substance which superficially resembles gold; usually pyrite, a sulphide of iron,  $FeS_2$ .

FREE GOLD. Gold uncombined with other substances - placer gold.

FREE GOLD ASSAY. A procedure carried out to determine the free gold content of an ore. In the case of placer material; a procedure to determine the amount of gold recoverable by gravity concentration and amalgamation.

FREE-WASH GRAVEL. Gravel that readily disintegrates and washes in a sluice. Loose, clay-free gravels such as those found in accretion bars are generally free-wash gravels.

GAD. A small pointed wedge.

GIANT. See - Hydraulic giant or Hydraulic monitor; Intelligiant.

GLACIAL. Pertaining to, characteristic of, produced or deposited by, or derived from a glacier.

GLACIOFLUVIAL. Of, pertaining to, produced by, or resulting from combined glacier action and river action. See - Fluvio-glacial.

GOLD DUST. A term once commonly applied to placer gold, particularly gold in the form of small colors.

GOLD PAN. See - pan.

GOLD-SAVING TABLE. The sluices used aboard a dredge are customarily called gold-saving tables, rather than sluice boxes.

GRADE. 1. The amount of fall or inclination from the horizontal in ditches, flumes, or sluices; usually measured in inches fall per foot of length or inches fall per section of sluice. 2. The slope of a land or bedrock surface; usually measured in percent. A one percent grade is equivalent to a rise or fall of one foot per hundred. 3. The slope of a stream, or the surface over which the water flows; usually measured in feet per mile. Streams having a grade of about 30 feet per mile favor the accumulation of placers, particularly where a fair balance between transportation and deposition is maintained for a long time. 4. The relative value or tenor of an ore, or of a mineral product.

GRADED STREAM. A stream in equilibrium, that is, a stream or a section of a stream that is essentially neither cutting or filling its channel.

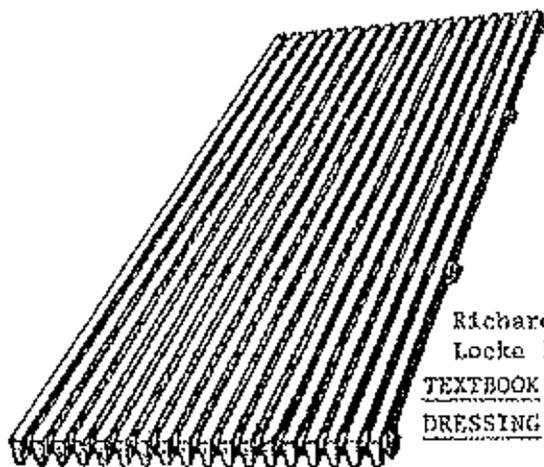
GRAIN. A unit of weight equal to 0.0648 part of a gram, 0.04167 part of a pennyweight, or 0.002083 part of a troy ounce. There are 480 grains in a troy ounce. A grain of fine gold has a value of \$1.12 (@\$35/oz.).

GRAVEL. A comprehensive term applied to the water-worn mass of detrital material making up a placer deposit. Placer gravels are sometimes arbitrarily described as "fine" gravel, "heavy" (large) gravel, "boulder" gravel, etc.

GRAVEL MINE. A placer mine; a body of sand or gravel containing particles of gold.

GRAVEL PLAIN PLACERS. Placers found in gravel plains formed where a river canyon flattens and widens or more often, where it enters a wide, low-gradient valley.

**GRIZZLY.** An iron grating which serves as a heavy-duty screen to prevent large rocks or boulders from entering a sluice or other recovery equipment.



Grizzly or bar screen.

Richards and  
Locke 1940  
TEXTBOOK OF ORE  
DRESSING

**GROUND SLUICING.** A mining method in which the gravel is excavated by water not under pressure. A natural or artificial water channel is used to start the operation and while a stream of water is directed through the channel or cut, the adjacent gravel banks are brought down by picking at the base of the bank and by directing the water flow as to undercut the bank and aid in its caving. Sluice boxes may or may not be used. Where not used, the gold is allowed to accumulate on the bedrock awaiting subsequent clean-up. A substantial water flow and adequate bedrock grade are necessary. See -Booming.

**GRUB STAKE.** Provisioning a prospector on a bargain to share his discoveries or on credit.

**GUTTER.** The lowest portion of an alluvial deposit; commonly a relatively narrow depression or trough in the bedrock. In some placers the pay streak is largely confined to a narrow streak or "gutter".

**HEAD.** 1. A measure of (water pressure. 2. The height of a column of water used for hydraulicking. For example, a hydraulic mine in which the point of water discharge is 200 vertical feet below the intake point (of the pipe) would be said to be working with a 200-foot head.

**HEAVY GOLD.** 1. Gold in compact pieces that appear to weigh heavy in proportion to their size. 2. Rounded, "shotty" or "nuggety" gold.

**HEAVY MINERALS.** The accessory detrital minerals of a sedimentary rock, of high specific gravity. The black sand concentrate common to placers, would more properly be called a "heavy-mineral" concentrate.

**HIGH-GRADE.** 1. Rich ore. 2. To steal or pilfer ore or gold, as from a mine by a miner.

**HIGH-GRADER.** One who steals and sells, or otherwise disposes of high-grade or specimen ores.

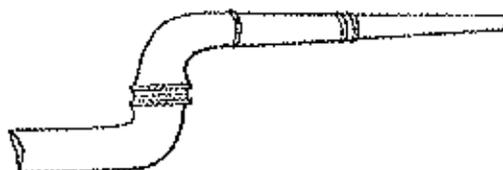
**HIGH TENSION SEPARATOR.** A machine, essentially consisting of a rotating drum, upon which a thin layer of dry sand or mineral grains are fed, and an electrode suspended above the rotating drum, or rotor. The electrode furnishes a high voltage discharge at high current flow. High tension separators employ a high rate of electrical discharge to separate various minerals according to their relative conductivity. Some are pinned to the rotor while others are attracted toward the electrode, with a resultant "lifting" effect. The pinning and lifting effects, imparted in varying degrees to different minerals, flattens or heightens their respective trajectories as they leave the rotor. Adjustable splitters placed in the trajectory are employed to cut selected minerals or groups of minerals from the thus stratified stream of material. High tension separators differ from electrostatic separators in that the latter employ charged fields with little or no current flow. High tension separators are extensively used for separating heavy minerals recovered from beach sands, monazite placers, etc.

**HILLSIDE PLACERS.** A group of gravel deposits intermediate between the creek and bench placers. Their bedrock is slightly above the creek bed, and the surface topography shows no indication of benching.

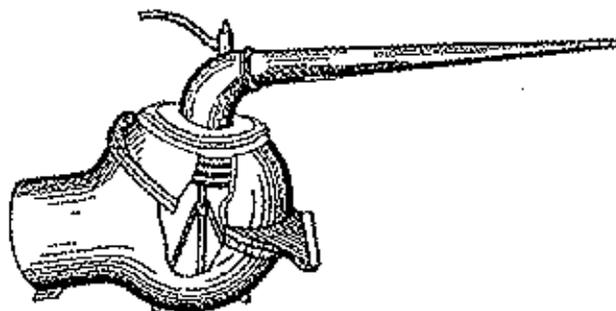
**HYDRAULIC DREDGE.** A dredge in which the material to be processed is excavated and elevated from the bottom of a stream or pond by means of a pump or a water-powered ejector. Large hydraulic dredges may be equipped with a digging ladder which carries the suction pipe and a motor-driven cutter head, arranged to chop-up or otherwise loosen material directly in front of the intake pipe. Dredges having this configuration employ a deck-mounted suction pump and they may carry the mineral recovery equipment on board the dredge or more commonly, they may transport the excavated material, by means of a pipe line, to a recovery plant mounted on independent barges or on the shore. See - Jet dredge; also bucket-line dredge.

HYDRAULIC ELEVATOR. A near-vertical pipe employed in hydraulic mining to raise excavated material from the working place to an elevated sluice, or to a disposal area, by means of a high-pressure water jet inducing a strong upward current in the elevator pipe. See - Rubel elevator.

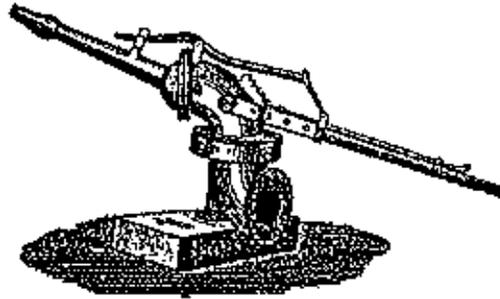
HYDRAULIC GIANT or HYDRAULIC MONITOR. The nozzle assembly used in hydraulic mining. The giant is provided with a swivel enabling it to be swung in a horizontal plane, and it may be elevated or depressed in a vertical plane. Nozzle sizes range from 1 to 10 inches in diameter and the larger sizes are provided with a deflector, enabling them to be moved with little effort. In California, giants discharging as much as 15,000 gallons per minute in a single stream at a nozzle pressure of over 200 pounds per square inch, have been used. The giant is also known as a "Monitor". Both terms stem from manufacturer's trade names. See - Intelligiant.



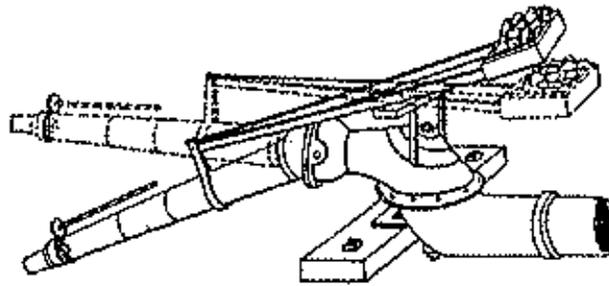
Goose neck.



Craig Globe Monitor.



Hydraulic Chisel.



Hydraulic Giant.

STUMPF 1979

**HYDRAULIC MINING.** A method of mining in which a bank of gold bearing earth or gravel is washed away by a powerful jet of water and carried into sluices, where the gold separates from the earth by its specific gravity.

**HYDRAULICKING.** Mining by the hydraulic method. Note spelling.

**INCHES OF WATER.** A common expression denoting the quantity of water (in miners' inches) available or being used in a placer operation. See - Miners' inch.

**INLET.** The point where a channel is cut off by a ravine or canyon on the upstream end. Usually applied to buried Tertiary channels. Compare with Breakout; and with Outlet.

**INTELLIGIANT.** The trade name for a hydraulic giant that is provided with water-powered piston and cylinder arrangements to control its vertical and horizontal traverses. Some models can be rigged for automatic operation and can run unattended in a preset arc or pattern. See - Hydraulic giant.

**JET DREDGE.** A type of hydraulic dredge. Jet dredging equipment may range from a simple, self-contained pipe-like venturi containing riffles, that is carried by a diver and operates entirely underwater to larger and more elaborate surface units carried on inflated rubber tubes or styrofoam floats. These devices, operated by one or two men, are similar in two ways: 1. They rely on a water jet and venturi effect to pick up unconsolidated stream-bottom materials and carry them to a gold recovery device, usually riffles. 2. The suction intake is normally hand-held and is guided by a diver working on the stream bottom. The typical jet "dredge" entails a small or modest capital outlay and is typically used for recreation-type mining. See - Hydraulic dredge.

**JET DRILL.** A churn-type drill employing a string of reciprocal hollow rods equipped with a drill bit. Water is pumped through the rods and discharged through an orifice near the bit. Cuttings resulting from the chopping action of the bit are carried to the surface by wash water rising between the drill rods and casing. Rods are added as the hole deepens, thus the drill cable does not go down the hole as would be the case in conventional churn drilling. Jet drills are well suited to sampling low-value minerals, such as ilmenite, occurring in beach deposits.

**JIG.** A machine in which heavy minerals are separated from sand or gangue minerals on a screen in water, by imparting a reciprocating motion to the screen or by the pulsation of water through the screen. Where the heavy mineral is larger than the screen openings, a concentrate bed will form on top of the screen. Where the heavy mineral particles are smaller than the screen openings, a fine-size concentrate will be collected in a hatch beneath the screen.

**LAGGING.** Poles or small timbers used for spanning from one stull piece to another for lining behind the timbers of a shaft or tunnel.

**LAKE-BED PLACERS.** Placers accumulated in the beds of present or ancient lakes that were generally formed by landslides or glacial damming. It should be noted that a lake-bed (or lake-bottom) placer might actually be a drowned stream placer.

**LAVA.** The term "Lava" as used by a placer miner, may designate any solidified volcanic rock including volcanic agglomerates.

**LEAD.** (pronounced leed) Deeply buried placer gravel, where rich enough to work, and particularly when in a well-defined bed, is often termed the "leed" or, "pay lead".

**LEVEL.** Mines are customarily worked from shafts through horizontal passages (adits) or drifts called levels. These are commonly spaced at regular intervals in depth and are either numbered from the surface in regular order or designated by their actual elevation below the top of the shaft. See - adit illustration.

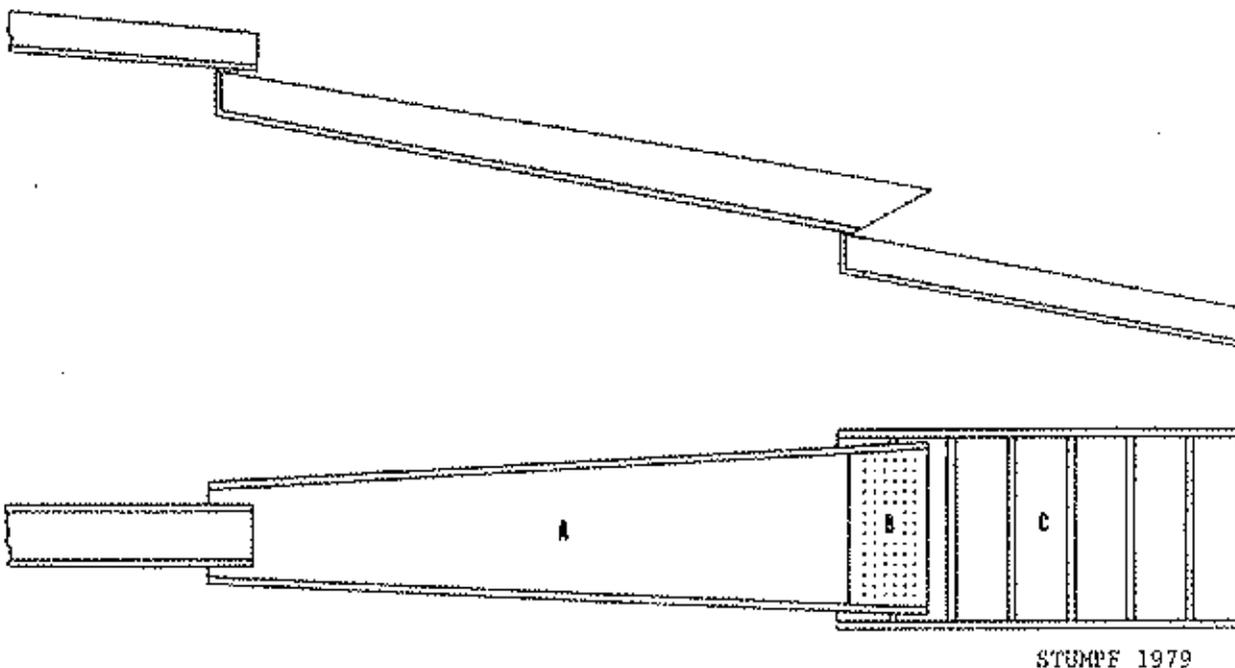
**LIFE.** Space between two levels.

**LIGHT GOLD.** Gold that is in very thin scales or flakes or in pieces that look large as compared to their weight. See - Flood gold.

**LODE.** A mineralized ledge, vein or deposit in place.

**LOCATION.** See - Mining claim.

LONG TOM. 1. A small, sluice-type gold washer widely used in California during the 1850's and 60's. The early long tom was built in two sections; a washing box equipped with a perforated plate to screen out the rocks; followed by a short sluice containing riffles. 2. A short auxiliary sluice used aboard a dredge to further reduce concentrate taken from the dredge riffles at clean-up time. 3. A short sluice used to wash placer samples.



STUMPF 1979

Long tom (side and top views) showing wooden trough (A), pierced iron plate (B), and riffle box (C).

LOW-GRADE. A term applied to ores lacking in quantity or quality of the metal for which they are mined; lean ore.

**MAGNETIC SEPARATOR.** A device in which a strong magnetic field is employed to remove magnetic materials from a sand or a concentrate, or to selectively remove or separate their constituent minerals. Magnetic separators are commonly used in conjunction with high tension separators to process the heavy mineral concentrates obtained from beach sands, monazite placers, tin placers, etc.

**MARINE MINING.** The exploitation of sea-bottom mineral deposits, including placers. See ~ Marine placer.

**MARINE PLACER.** A deposit of placer type minerals on the ocean or sea bottom beyond the low-tide line, as distinguished from beach placers. Some marine placers may contain material related to beach deposits formed during periods of low sea level. Others may contain stream-type placers or mineral concentrations formed on land and later drowned by a lowering of the coastal region.

**MEANDER.** One of a series of somewhat regular and looplike bends in the course of a stream, developed when the stream is flowing at grade, through lateral shifting of its course toward the convex sides of the original curves.

**MEDIUM-SIZE GOLD.** Gold of an approximate size that will pass through a 10-mesh screen and remain on a 20-mesh screen. Compare with Coarse gold; also Fine gold.

**MERCURY.** A heavy, silver-white liquid metallic element, useful in placer mining where its chemical affinity for gold is taken advantage of to help detain gold in a sluice box. Mercury placed in the riffles forms a gold amalgam which is removed at the time of clean-up and then retorted to recover the gold. The miners' term for mercury is "Quick-silver" or simply, "Quick". Symbol, Hg; specific gravity, 13.54.

**MILLIGRAM.** The one-thousandth part of a gram. As a matter of inconvenience, the milligram is widely used as the unit for reporting gold weights in placer samples. There are 31,103 milligrams in a troy ounce. With gold at \$35 per troy ounce, 1 milligram of fine gold is worth 0.112 cent and 1 milligram of ordinary placer gold is worth about 0.1 cent, or in other words, 10 milligrams to the cent.

**MILL-RUN.** The returns of a lot of ore; the assay of ore in quantity as distinguished from a specimen assay.

**MINERS' INCH.** A unit of water measurement. Originally it represented the quantity of water that will escape from an aperture one inch square through a two-inch plank, with a steady flow of water standing six inches above the top of the escape aperture. The miners' inch is now defined by statute in various states.

1 second foot = 40 miners' inches in Arizona, California, Montana and Oregon.

= 50 miners' inches in Idaho, Nevada, New Mexico, and Utah.

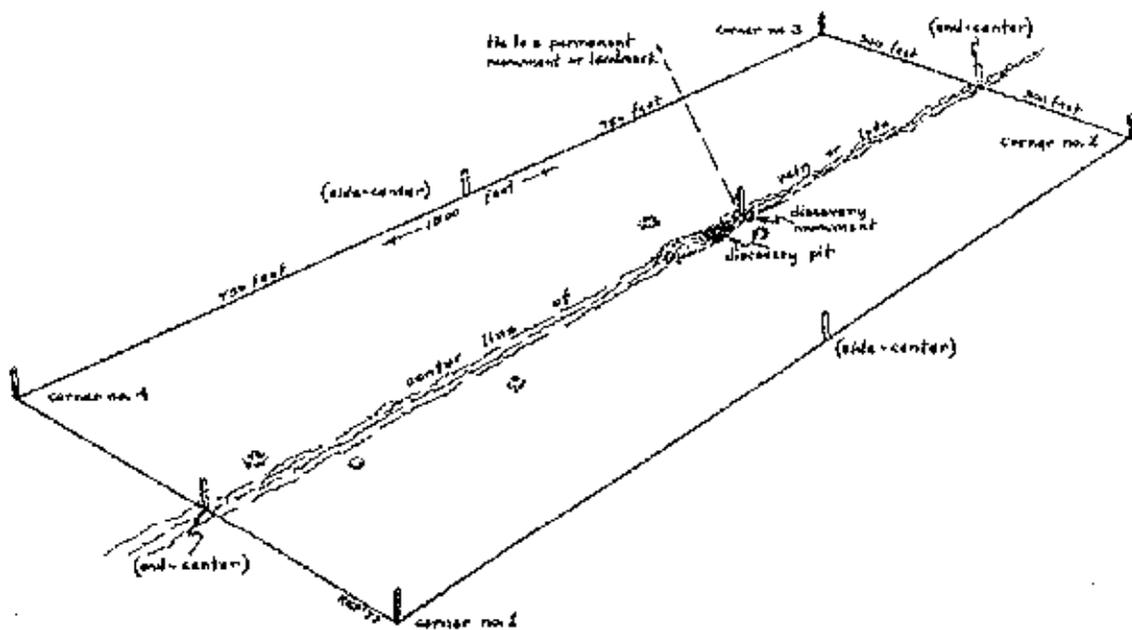
= 38.4 miners' inches in Colorado.

1 miners' inch equals 11.25 gallons per minute when equivalent to 1/40 second-foot.

1 miners' inch equals 9 gallons per minute when equivalent to 1/50 second-foot.

MINERS' PAN. See - Pan.

MINING CLAIM. That portion of the public mineral lands which a miner, for mining purposes, takes and holds in accordance with the mining laws. A mining claim may be validly located and held only after the discovery of a valuable mineral deposit. See - Discovery.

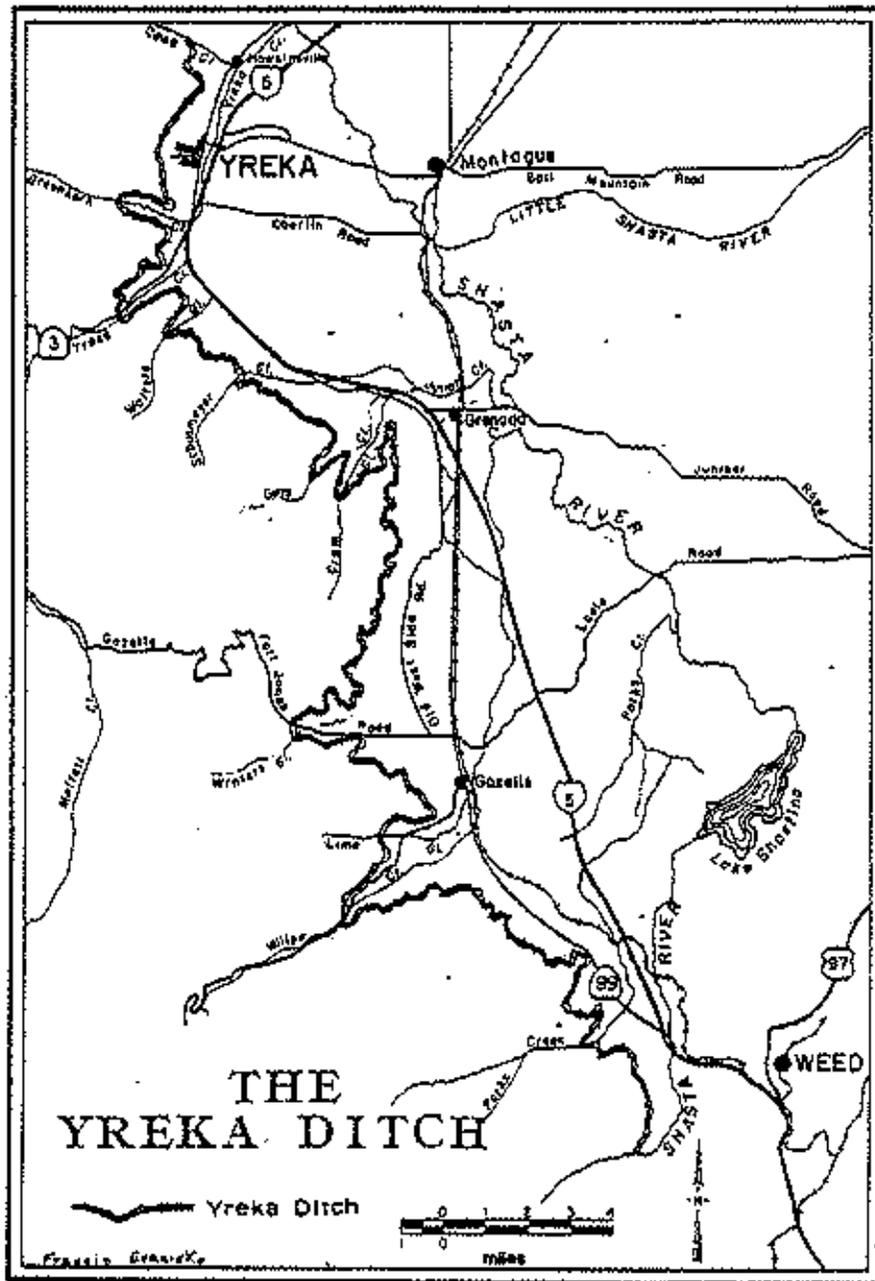


Sketch of a typical lode mining claim, showing usual claim dimensions, placement of claim monuments and

other features. Some states require additional "side-center" and "end-center" monuments at the points indicated.

FRUIT 1977

MINING DITCH. A long narrow excavation made in ground by digging. These ditches were used to bring water to claims for working the ground directly or for developing power needed in mining. They may be coupled with flumes and/or pipes. (The Yreka ditch was 95 miles long.)



**MOSS MINING** or **MOSSING**. The gathering of moss from the banks of gold-bearing streams for the purpose of burning or washing it, to recover its gold content. Under certain conditions, moss or similar vegetation will capture and hold small particles of gold being carried downstream by flood waters. See - Flood gold.

**MUCK**. A permanently frozen overburden overlying placer gravels in the interior of Alaska. It is composed of fine mud, organic matter and small amounts of volcanic ash. It varies in depth (thickness) from seldom less than 10 feet to 100 feet or more in places. This overburden (muck) must be removed and the underlying gravels thawed before dredging is possible.

**NATIVE GOLD**. 1. Metallic gold found naturally in that state. 2. Placer gold.

**NUGGET**. 1. A water-worn piece of native gold. The term is restricted to pieces of some size, not mere "colors" or minute particles. Fragments and lumps of vein gold are not called "nuggets", for the idea of alluvial origin is implicit. 2. Anything larger than, say, one penny-weight or one gram may be considered a nugget. See - Pepita.

**NUGGETY**. Like or resembling a nugget; occurring in nuggets; also abounding in nuggets.

**OUTCROP**. The exposure of bedrock or strata projecting through the overlying cover of detritus and soil.

**OUTLET**. The point where a channel is cut off by a ravine or canyon on the downstream end. Usually applied to buried Tertiary channels. Compare with Breakout; and with Inlet.

**OVERBURDEN**. Worthless or low-grade surface material covering a body of useful mineral.

**OFFSHORE DEPOSITS**. Mineral deposits on the ocean or sea bottom beyond the low-tide line. See - Marine placer.

**PAN**. 1. A shallow, sheet-iron vessel with sloping sides and a flat bottom, used for washing auriferous gravel or other materials containing heavy minerals. It is usually referred to as a "Gold pan", but is more properly called a "Miners' pan". Pans are made in a variety of sizes, but the size generally referred to as "standard" has a diameter of 16 inches at the top, 10 inches at the bottom, and a depth of 2½ inches. Pans made of copper, or provided with a copper bottom are sometimes used for amalgamating gold. 2. (verb) To wash earth, gravel, or other material in a pan to recover gold or other heavy minerals.

**PAN FACTOR.** The number of pans of gravel equivalent to a cubic yard in place. Pan factors vary according to the size and shape of the pan, the amount of heaping when filling the pan, the swell of ground when excavated, and other factors. In practice, factors for a 16-inch pan range from 150 to 200; a factor of 180 is widely used.

**PANNING.** Washing gravel or other material in a Miners' pan to recover gold or other heavy minerals.

**PATENT.** A document by which the Federal Government conveys title to a mining claim to a private individual or company.

**PAY DIRT.** Auriferous gravel rich enough to pay for washing or working.

**PAY LEAD.** (pronounced lead) Where gravel is found rich enough to work, and if there is a well-defined bed of it, it is often termed the "pay lead" or, "lead". Compare with Pay streak.

**PAY STREAK.** A limited horizon within a placer deposit, containing a concentration of values or made up of material rich enough to mine. Pay streaks in gold placers are commonly found as more or less well-defined areas on or near bedrock and are commonly narrow, sinuous, and discontinuous. Compare with Pay lead.

**PELTON WHEEL.** A high speed water wheel.

**PENNYWEIGHT.** A unit of weight equal to 24 grains, 0.05 troy ounce or 1.5552 grams. A pennyweight of fine gold has a value of \$1.03, with gold at \$20.67 per ounce. A pennyweight of fine gold has a value of \$1.75, with gold at \$35.00 per ounce.

**PEPITA.** (Spanish) A nugget; usually a smaller size.

**PERMAFROST.** Permanently frozen ground in Alaska, up to 100 or more feet in thickness. See - Muck.

**PILOT SLUICE.** A small, auxiliary sluice operated intermittently aboard a dredge to determine the amount of gold being recovered by the dredge during a given interval of time, or from a particular gravel section. The ratio of pilot sluice recovery to dredge recovery is determined for each dredge by empirical means.

**PINCHED SLUICE.** A film-type gravity concentrator employing a wedge-shaped trough, tapering to a narrow vertical opening at its discharge end. In use, heavy-gravity minerals migrate toward the bottom and are removed from the stratified discharge stream by means of splitters. Pinched sluice-type concentrators are used to remove heavy minerals, such as rutile and ilmenite, from beach sands. The CANNON CONCENTRATOR and PANNING CONCENTRATOR are of this type.

PIPE CLAY. Miners' term for clays or clay-like materials found in finely-laminated beds within the Tertiary gravels of California's Sierra Nevada region. Some may consist of volcanic material which has fallen into water, in the form of ash, and taken on a stratified form resembling clay in appearance.

PIPE FACTOR. The depth to which a churn drill casing must be driven to take in a sample volume of 1 cubic yard. For example, a standard 6-inch drive pipe equipped with a new, 7½-inch drive shoe would be driven 88 feet to cut out a theoretical volume of 1 cubic yard. This is sometimes called the CASING FACTOR but it is most commonly known as the DRIVE SHOE FACTOR.

PITCH. Used in connection with the bedrock in the channel or rim to express descent.

PITTING. The act of digging or sinking a pit, as for sampling alluvial deposits.

PLACER. A place where gold is obtained by washing; an alluvial or glacial deposit, as of sand or gravel, containing particles of gold or other valuable mineral. In the United States mining law, mineral deposits, not veins in place, are treated as placers, so far as locating, holding, and patenting are concerned. The term "placer" applies to ancient (Tertiary) gravels as well as to recent deposits, and to underground (drift mines) as well as to surface deposits.

PLACER DEPOSIT. A mass of gravel, sand, or similar material resulting from the crumbling and erosion of solid rocks and containing particles or nuggets of gold, platinum, tin, or other valuable minerals, that have been derived from the rocks or veins.

PLACER MINING. That form of mining in which the surficial detritus is washed for gold or other valuable minerals. When water under pressure is employed to break down the gravel, the term HYDRAULIC MINING is generally employed. There are deposits of detrital material containing gold which lie too deep to be profitably extracted by surface mining, and which must be worked by drifting beneath the overlying barren material. To the operations necessary to extract such auriferous material the term DRIFT MINING is applied.

POOR BOX. The place where carbide is kept.

PORTAL. The surface opening. "Any entrance to a mine. The retaining wall, masonry arch, etc., erected at the opening of a drift, tunnel or adit." See - adit illustration.

PROSPECTING. 1. Used to qualify work merely intended to discover a pay lead in a drift mine, or to locate the channel. 2. (generally) Searching for new deposits. 3. Drilling a known placer deposit to determine its value or delineate a minable area.

**QUATERNARY GRAVELS.** Gravels deposited from the end of the Tertiary, to and including the present time.

**QUICKSILVER** (or "Quick"). See - Mercury.

**RAISE or WINZE.** A subsidiary shaft which starts underground. It is usually a connection between two levels. A winze is sunk underhand and a raise is put up overhand. When the connection is completed, and one is standing at the top, the opening is referred to as a winze, and when at the bottom, as a raise. A raise or winze is usually in ore, but may be in waste rock. See - adit illustration.

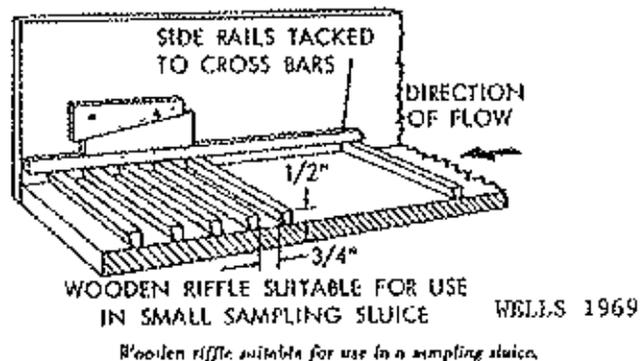
**RAKE.** The inclination of a vein from the vertical.

**RECOVERY.** 1. The amount or value of mineral recovered from a unit volume; in the case of gold placers, expressed as cents per cubic yard. 2. The amount of mineral extracted, expressed as a percentage of the total mineral content. 3. In gold dredging, the expression "R over E" (designated R/E) is used to compare actual recovery to expected recovery where R represents the actual returns and E represents the estimated recoverable value, after allowing for known or expected mining and metallurgical losses, etc. When recovery exceeds the initial estimate, the R/E will be shown as something greater than 100%, such as 105%, 110%, etc.

**RESIDUAL PLACER.** Essentially, an in situ enrichment of gold or other heavy mineral, caused by weathering and subsequent removal of the lode or other parent material, leaving the heavier, valuable mineral in a somewhat concentrated state. In some cases, a residual placer may be essentially an area of bedrock, containing numerous gold-bearing veinlets that have disintegrated by weathering to produce a detrital mantle rich enough to mine. In some parts of California, such areas are known as SEAM DIGGINGS.

**RETORT.** A vessel with a long neck used for distilling the quicksilver from amalgam.

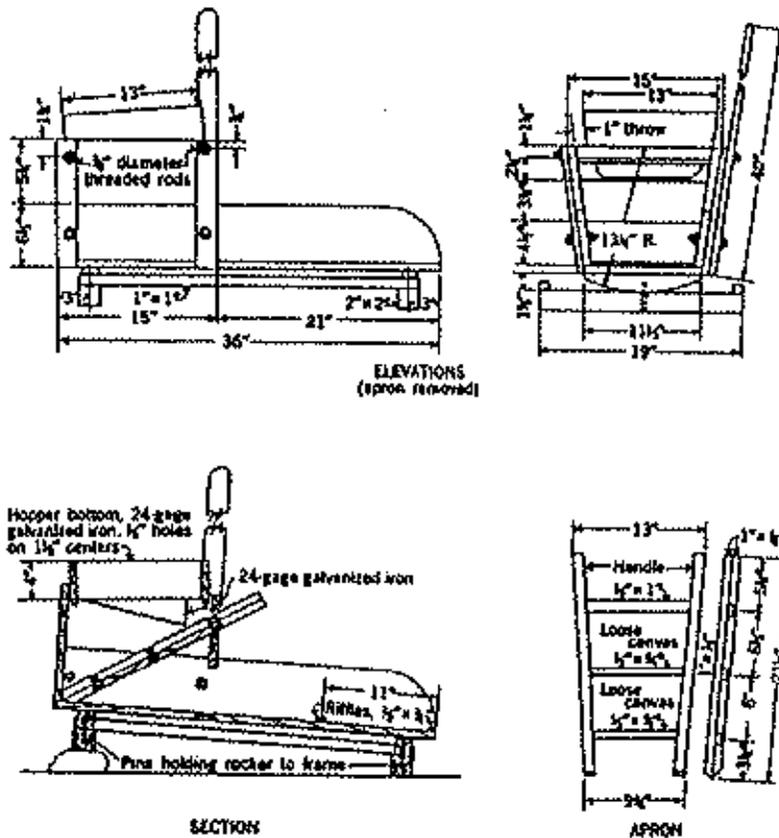
**RIFPLE.** 1. The lining of a bottom of a sluice, made of blocks or slats of wood, or stones, arranged in such a manner that chinks are left between them. The whole arrangement at the bottom of the sluice is usually called THE RIFFLES. In smaller gold-saving machines, as the rocker, the slats of wood nailed across the bottom are called RIFPLE-BARS, or simply RIFFLES. 2. A groove in the bottom of an inclined trough or sluice, for arresting gold contained in sands or gravels. 3. A shallow extending across the bed of a stream; a rapid of comparatively little fall.



**RIVER-BAR PLACERS.** Placers on gravel flats in or adjacent to the beds of large streams.

**RIVER MINING.** The mining of part or all of a river bed after by-passing the stream by means of flumes or tunnels; or by use of wing dams to divert the river from the working area.

**ROCKER.** A short, sluice-like trough fitted with transverse curved supports, permitting it to be rocked from side to side, and provided with a shallow hopper at its upper end. The hopper bottom consists of a punched-metal plate containing holes about  $\frac{1}{4}$ -inch or  $\frac{1}{2}$ -inch diameter. This is for the purpose of holding back the larger rocks which when washed, are discarded. A flow of water, aided by the rocking motion, carries the fine material down the trough where the gold or other heavy minerals are caught by riffles. Rockers are generally operated by hand but large, power-driven rockers are sometimes employed. When washing churn drill samples, rockers are often used without riffles, the recovery being made on the smooth wooden bottom much in the manner of panning. **CRADLE** is an obsolete term for rocker.



Prospector's Rocker Peter 1979

**ROCKING.** The process of washing sand or gravel in a rocker.

**ROUGH GOLD.** Gold that has not been appreciably worn or smoothed by movement and abrasion. It may be more angular than rounded and may have included or attached quartz particles. As a rule, rough gold is found near its place of origin.

**RUBEL ELEVATOR.** (pronounced Roo-bull) A form of elevator used in hydraulic mines, particularly those having insufficient bedrock grade for effective tailings disposal. It is essentially a large, inclined flume, through which gravel or tailings are driven by a strong water jet furnished by a hydraulic giant. A grizzly arrangement removes the fines for treatment in conventional sluices while the rocks are discharged from the upper end.

**RUSTY GOLD.** Free gold, that does not readily amalgamate, the particles being covered with a silicious film, thin coating of oxide of iron, etc.

**SALTING.** 1. Intentional salting. The surreptitious placing of gold or other valuable material in a working place or in a sample to make it appear rich in mineral. It is done with intent to defraud. 2. Unintentional or innocent salting. The unintentional or accidental enrichment of a sample through erroneous procedure or carelessness, without intent to defraud.

**SAMPLE.** A portion of the ore systematically taken, by which its quality is to be judged.

**SAMPLING.** Cutting a representative part of an ore deposit, which should truly represent its average value. Honest sampling requires good judgment and practical experience. Parenthetically, it should be noted that in the case of gold placers, the high unit-value of gold, its extreme dilution within the gravel mass and its typically erratic distribution are factors which individually or combined, make it virtually impossible to obtain a truly representative sample. To this extent, the usual definitions of sampling do not apply to gold placers.

**SEA-BEACH PLACERS.** Placers reconcentrated from the coastal-plain gravels by the waves along the seashore.

**SEAM DIGGINGS.** Residual deposits consisting of decomposed bedrock filled with irregular swarms of quartz containing gold. In California, seam diggings have been worked by the hydraulic method.

**SECOND-FOOT.** A unit of water measurement equivalent to one cubic foot per second or 448.83 gallons per minute. Commonly used to report the flow of streams.

**SELF-SHOOTER.** See - Booming.

**SHAFT.** An excavation made for finding or mining ore or coal, raising water, ore, rock or coal, hoisting and lowering men and material, or ventilating underground workings. The term is applied to approximately vertical shafts, as distinguished from an **INCLINED SHAFT** which is not vertical but slopes to one side. A shaft generally starts at the surface and drops vertically, allowing the adits to be built off of it to access the ore body. See - adit illustration.

**SHINGLE.** 1. The flatter pebbles and cobbles in a stream deposit will often come to rest with their uppermost edge leaning slightly downstream. This "shingling" effect is used by placer miners to determine the direction of flow of ancient streams and it can be particularly useful when working drift mines. 2. Beach gravel, especially if consisting of flat or flattish pebbles.

**SKIM BAR.** An area near the upstream end of an accretion bar from which superficial concentrations of flood gold are mined by "skimming" off a thin layer of gravel. They are sometimes known as POINT BARS, probably because of their proximity to the upper point of the accretion bar. See -Flood gold.

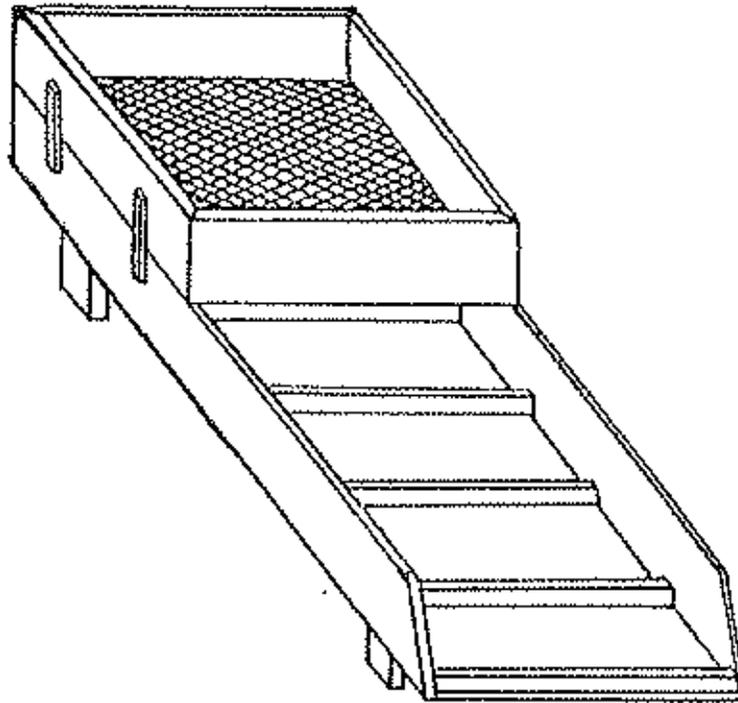
**SKIN DIVING.** The use of wet-type diving suits, with or without self-contained underwater breathing apparatus. Skin diving gear is generally used by the operators of small hydraulic dredges and by divers who search for underwater bedrock crevices from which gold-bearing materials may be retrieved. See - Jet dredge.

**SLACKLINE SCRAPER.** Consists essentially of a head tower and a movable tail tower or tail block, supporting a track cable. A bucket or scraper running along the track cable can be raised and lowered by tightening or slackening the track cable. The digging bucket or scraper runs out by gravity and is pulled in by a drag cable. The hoisting machinery and in some cases a screening or washing plant are incorporated in the head tower. This arrangement is also known as a CABLEWAY SCRAPER. The SAUERMAN EXCAVATOR is of this type.

**SLICKENS.** A word sometimes used to designate the finer-size tailings, or mud, discharged from a placer mine. Sometimes synonymous with Slime.

**SLUDGE.** The fluid mixture of chopped up core and water that results from the drilling action in a churn drill hole. When the sludge is pumped from the hole, it becomes the sample for the particular section of hole that produced it.

**SLUICE BOX.** An elongated wooden or metal trough, equipped with riffles, through which alluvial material is washed to recover its gold or other heavy minerals. Small sluice boxes are commonly, but erroneously, called "Long Toms".



Sluice Box

Gravel and water enter the screened part of the box. Riffles trap gold and other heavy minerals as the mud washes down to the lower end of the box. Make with drop of one inch per foot. Riffles 1"x1" along bottom.

PETERS 1979

SLUICEPLATE. A shallow, flat-bottomed steel hopper arrangement at the head-end of a sluice box. A bulldozer is generally used to push gold-bearing gravel onto the sluiceplate, from where it is washed into the sluice by water issuing from a large pipe or by means of a small hydraulic giant.

**SNIPER.** An individual miner, usually a transient, who gleans a living from gravel remnants not worth working except by someone content with very modest gains. He usually works with simple hand tools and washes his gravel in a short sluice or dip box. Being transient and generally innocuous, he seldom owns or leases the land he works.

**SPECIFIC GRAVITY.** The specific gravity of a substance is its weight as compared with the weight of an equal bulk of pure water. For example, placer gold with a specific gravity of about 19 is 19 times heavier than water. The specific gravity of a mineral largely determines its susceptibility to recovery in simple gravity concentrators such as sluice boxes.

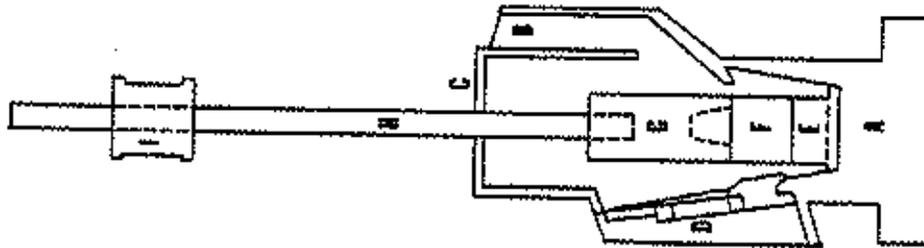
**SPECIMEN GOLD.** Nuggety gold or other forms suitable for the manufacture of natural-gold jewelry or for display purposes.

**SPONGE.** The somewhat porous mass of gold remaining after the mercury has been removed from a gold amalgam by heating.

**SPOON.** A shallow, oblong vessel, at one time made from a section of ox horn but now made of metal. Used to test small samples of gold-bearing material by washing, in a manner similar to panning. More properly called a **MINERS' SPOON** or, **HORN SPOON**.

**SPOTTED GRAVEL.** Where gold is erratically distributed through a deposit, the term "spotted" or, "spotty" gravel is sometimes applied to it.

**STAMP MILL.** Stamps were heavy iron blocks and could be from five to twenty-five, in banks of five. They were raised about twenty inches on a cog wheel and dropped and their weight crushed the ore. They were operated by water through a Pelton wheel.



STUMPF 1979

Cross-section (side view) of a stamp mill showing motor (A), chute (B), splash cover (C), screen (D), die (E), shoe (F), base (G), stem (H), and tappot (I).

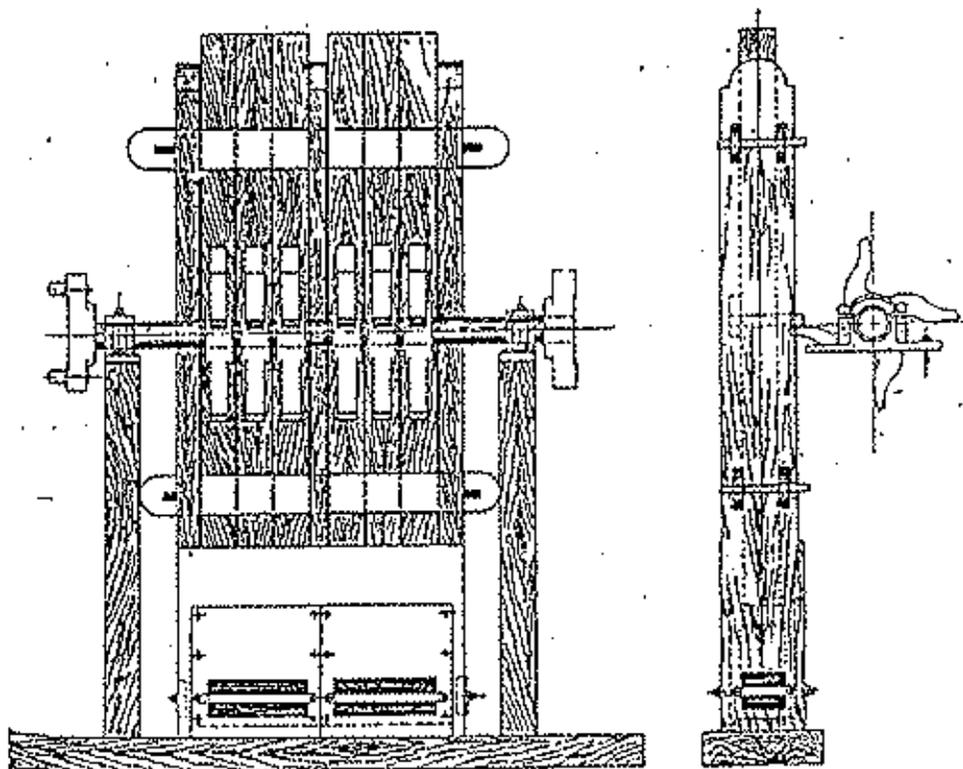
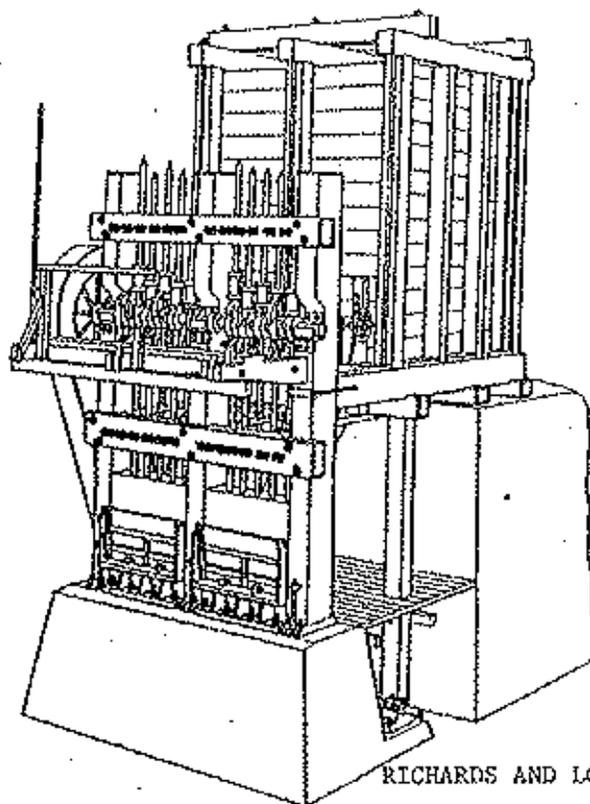


illustration taken from Mining & Scientific Press, Vol. LXXVI, No. 5, January 29, 1898.



RICHARDS AND LOCKE 1940

**STATION.** If work is undertaken underground from the shaft, a station is cut as a landing for men and equipment, and horizontal work from the station is by drifting or crosscutting.

**STOPE.** An excavation from which ore has been excavated in a series of steps. Usually applied to highly inclined or vertical veins. The term stoping is loosely applied to any subterranean extraction of ore except that which is incidentally performed in sinking shafts, driving levels, etc., for the purpose of opening the mine. See - adit illustration.

**STRIKE.** The horizontal course or bearing of a vein.

**STRIP.** To remove the overlying earth, low-grade, or barren material from a placer deposit.

**STRUCK CAPACITY.** Level-full, that is, the capacity of a container filled even with its rim or top.

**SUBMARINE PLACER.** See - Marine placer.

**SUCKER.** 1. A syringe used to remove material from underwater crevices in the bedrock. 2. A small, hand-held jet dredge of the type carried underwater.

**SUCTION DREDGE.** See - Hydraulic dredge; or Jet dredge.

**SUCTION LIFT.** The vertical distance from the level of the water supply to the center of a pump, to which must be added the loss due to friction of the water in the suction pipe.

**SUMP.** That portion of the shaft below the normal winding level which is used for the collection of water for pumping. See - adit illustration.

**SURF WASHER.** A small sluice, somewhat similar to a long tom; used to recover gold from beach sands. The surf washer is placed so the incoming surf rushes up the sluice, washing material from a hopper and upon retreating carries it over the riffles.

**SWELL.** The expansion or increase in volume of earth or gravel upon loosening or removal from the ground. The average swell of gravel is around 25% and sometimes as high as 50%.

**TAIL.** (verb) Manipulating the concentrate product in a gold pan in such a way that the heavier minerals and in particular the gold colors string out in the bottom of the pan in a long, narrow "tail", where they can be readily inspected or counted. This is referred to as "tailing a pan."

**TAILINGS.** Those portions of washed ore that are regarded as too poor to be treated further; the debris from stamp mills or other ore-dressing machinery, as distinguished from material (concentrates) that is to be smelted. Tailings are the piles of sand, gravel and cobble found at a millsite after the ore has been extracted. Tailings are also the (often huge) piles found outside portals and collars, and are the waste rock removed in excavating shafts, adits, etc. These tailings often stand out from their surroundings and can be very useful in locating mining sites.

**TERRACE.** A relatively flat, and sometimes long and narrow surface, commonly bounded by steep up-slopes and down-slopes on opposite sides. Gravel terraces may be stepped, and they are commonly dissected by transverse drainage patterns.

**TERTIARY CHANNELS.** Ancient gravel deposits, often auriferous, composed of Tertiary stream alluvium. Tertiary gravels are abundant in the Sierra Nevada gold belt of California where many have been covered by extensive volcanic eruptions and subsequently elevated by mountain uplifts, and are now found as deeply-buried channels, high above the present stream beds.

**TIGHT GRAVEL or CEMENTED GRAVEL.** A hard, or compact gravel that is not cemented, but requires something more than normal effort to excavate.

**TILL.** Nonsorted, nonstratified sediment carried or deposited by a glacier.

**TOP WASH.** A deposit of gravel, not in a channel on the bedrock, but resting on cement overlying the bottom deposit.

**TRACE.** A very small quantity of gold; usually a speck too small to weigh. In reporting samples it is abbreviated tr.

**TRESTLE SLUICE.** A moveable steel sluice constructed on a skid or track-mounted trestle; usually provided with a hopper, grizzly and wash water system, and fed by a dragline or similar excavator. Also called an **ELEVATED SLUICE.**

**TROMMEL.** A heavy-duty revolving screen used for washing and removing the rocks or cobbles from placer material prior to treatment in the sluices, gold-saving tables, or other recovery equipment.

**TROY OUNCE.** The one-twelfth part of a pound of 5760 grains; that is 480 grains. It equals 20 pennyweights, 1.09714 avoirdupois ounces, 31.1035 grams, or 31,103 milligrams. This is the ounce designated in all assay returns for gold, silver or other precious metals.

**TUNNEL.** A horizontal or nearly horizontal underground passage that is open to the atmosphere at both ends. The term is often used to describe what is actually an adit, and the term "tunneling" is used for the action of excavation, whether or not a tunnel will be the end product. Actual tunnels are seldom found at mine sites. See ~ adit illustration.

**TUNNEL.** The nearly horizontal excavated opening from the surface into the mine. See ~ adit illustration.

**UNDERCURRENT.** A large, flat, broad, branch sluice, placed beside and a little lower than the main sluice. This apparatus is riffled like the sluice, but being much wider than the latter, allows the water to spread out in a thin sheet over its surface, thereby so abating the velocity of the current that the very fine gold, including the rusty particles, is more apt to be caught here than in the sluice. Undercurrents are usually fed with fine-size material taken from the main sluice by means of a grizzly placed in the sluice bottom, near the discharge end.

**UPPER LEAD.** (pronounced lead) A pay lead in a top wash or in the gravel deposit considerably above the bedrock.

**VALUES.** The valuable ingredients to be obtained, by treatment, from any mass or compound; specifically, the precious metals contained in rock, gravel, or the like.

**VEIN.** A fissure (or crack) in the rock formation filled by quartz or other vein matter containing more or less metallic mineral. If filled with eruptive material, it is called a DYKE.

**WASH.** 1. A Western miners' term for any loose, surface deposits of sand, gravel, boulders, etc. 2. The dry bed of an intermittent stream, sometimes at the bottom of a canyon. Also called Dry wash. 3. To subject gravel, etc., to the action of water to separate the valuable material from the worthless or less valuable; as to wash gold. In California drift mining the term "Wash" is used indifferently in describing channel gravel, volcanic mud flows, or masses of lava boulders.

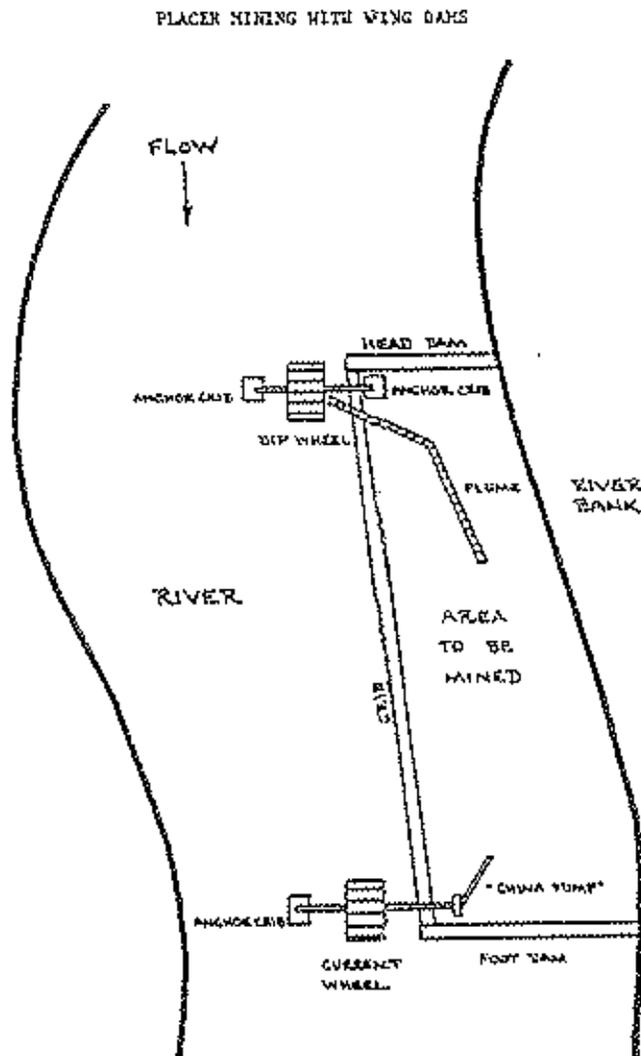
**WASTE.** Valueless material such as barren gravel or overburden. Material too poor to pay for washing.

**WATER TABLE.** The upper limit of the portion of the ground wholly saturated with water. This may be very near the surface or many feet below it.

**WEATHERING.** The group of processes, such as the chemical action of air and rain water and of plants and bacteria and the mechanical action of changes of temperature, whereby rocks on exposure to the weather change in character, decay, and finally crumble into soil.

WING. A shaft sunk from a level, not necessarily connecting two levels.

WING DAM. A dam built partially across a river to deflect the water from its course. (Fay) See - River mining.



THIS DRAWING WAS MADE FROM A SKETCH AND DESCRIPTION PROVIDED BY CHESTER BARTON OF HORSE CREEK DURING A TAPED INTERVIEW ON 4-12-77 AND 4-13-77. THE TRANSCRIPT OF THIS INTERVIEW, ON FILE WITH THE Klamath NATIONAL FOREST IN YREKA, SHOULD BE REFERRED TO. THIS DRAWING IS A VERY ROUGH REPRESENTATION OF THE PROCESS INVOLVED AND SHOULD NOT BE CONSIDERED COMPLETE, PROPORTIONALLY ACCURATE, OR TO SCALE.

WING FENCE. A V-shaped wall, usually made of heavy timber and attached to the head of a sluice and arranged to guide gravel into the sluice as it is swept from the pit by a hydraulic giant.

WINZE. A shaft sunk from a point underground, either from an adit, drift or cross-cut. See - adit illustration.

YARDAGE. 1. The number of cubic yards of gravel mined or put through a washing plant in a shift or a day. 2. A measured block of gravel.

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### Planters Peanut a Brief History

In 1889, Amedeo Obici (1877-1947), moved from his homeland in Oderzo, Italy to New York City, New York, he was 11 years old. In his early teens, Amedeo worked as a bellhop, and operated a fruitstand after his family relocated to Scranton, Pennsylvania. After moving to Wilkes-Barre, Pennsylvania, Amedeo purchased his first peanut roaster with the money he earned from opening his own fruit stand, and the rest is history (<http://www.ideafinder.com/history/inventions/plantnuts.html>, Lindenberger 1995). Calling himself "The Peanut Specialist", Amedeo began using a horse and wagon to deliver his product over a larger area. In 1906, Obici went into partnership with Mario Peruzzi, who had developed his own method of "blanching whole roasted peanuts", which effectively removed the hulls and skins off the peanut, "and so with six employees" and "two large roasters... Planters was founded." In 1908, after showing that quality and brand name were important for success, the firm was incorporated as Planters Nut and Chocolate Company (<http://www.ideafinder.com/history/inventions/plantnuts.html>).

In 1913, in an effort to move closer to where peanuts were grown, Planters Nut and Chocolate Company moved to Suffolk, Virginia, and built its own processing and packaging factory. By 1921 a plant had opened up in San Francisco and in 1925 another plant opened in Toronto, Canada (Lindenberger 1995). After 55 years of being a family owned business, Planters Nut and Chocolate Company was acquired by Standard Brands, a subsidiary of Nabisco Brands in 1961. "In the years that followed, Nabisco Brands merged with R.J. Reynolds Tobacco Company to form R.J.R. Nabisco. In 1988 three business men, Kravis, Kohlberg and Roberts, exercised a leveraged buy-out to acquire R.J.R. Nabisco. Both the Toronto, Canada and San Francisco Plants are now closed and the original Suffolk, Virginia factory was replaced in 1994 with a new, totally modern facility. Except for the Peanut Store in Suffolk, Virginia, all of the peanut stores are either closed or are privately owned" (Lindenberger 1995).

"Mr. Peanut, Planters mascot... was introduced in 1916 to help advertise the sales of the country's first roasted peanut company" (<http://www.ideafinder.com/history/inventions/plantnuts.html>). The logo "was the brainchild of a 14 year old Virginia boy who entered a Planters sponsored trademark contest. The boys winning drawing - a peanut with arms and legs and labeled 'Mr. Peanut' - was later enhanced by Planters to include a top hat, a monocle and a cane" (<http://www.kraft.com/100/innovations/planters.html>). "In recent years, the company has used various logo's, some with and some without 'Mr. Peanut'. The PLS (Planters-Lifesaver) forklift design was not as popular as the Heritage logo where Mr. Peanut stands in front of a large red lifesaver. The Heritage logo" however "was discontinued at the end of 1991.

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Planters Peanuts from 1918 to the Present



1918



1919



1920



1922



1923



1925



1926



1927 to 1945



1948 into the 1950's



1957



1962 into the 1980's



1990



1991 to 1994



1995 to Present



**Can't Bust 'Em: The Worker's Clothing and Footwear from the 1912 Alabama Gates Work Camp,** by Sunshine Paota, Anthropological Studies Center, Sonoma State University, Rohnert Park, California. Illustrations by Kendall Schinke, Department of Transportation, Sacramento, California. Paper presented as part of the Communities Defined by Work: Life in Western Work Camps and Towns Symposium at the Society of Historical Archaeology's annual meeting in Salt Lake City, Utah, January 1999.

## HISTORY OF WORK-CLOTHING COMPANIES OR BRAND NAMES (dates focus on work-clothing production)

**Ben F. Davis Manufacturing Co., San Francisco, California** 1935—Present  
Started by Simon Davis, son of the inventor of the rivet. Trademark includes a gorilla. Sometime in the 1950s-1960s Ben Davis purchased the Can't Bust 'Em's bulldog trademark from Eloesser-Heynemann Co.

**Boss of the Road/Boss/Can't Bust 'Em/Heynemann & Co./Eloesser-Heynemann Co., San Francisco, California** 1878—1960s



In 1878 Heynemann Co. created Can't Bust 'Em line of work clothes. Created Boss of the Road line sometime after 1878. Rivets embossed "B of R". Unclear whether "The Boss" and "Boss" are part of this company or similarly named brand names from

other companies (Boss overalls were made by the Cohn, Goldwater Manufacturing Co. of Los Angeles between 1930-1941). Firm renamed the Eloesser-Heynemann Co., Inc. in 1910. Boss of the Road and Can't Bust 'Em sold to Lee Apparel in 1960s.

**Browstein, Newmark, & Louis Co./Brownstein-Louis Co./Stronghold, Los Angeles, California** 1906—beyond 1942



Established 1895 as a wholesaler of men's furnishings, started manufacturing men's clothing (Stronghold) in 1906. In 1911 company renamed Brownstein-Louis Co. Rivets embossed "B L/Co."

**Cohn, Goldwater & Co., Los Angeles, California** 1900—before 1942  
Modest company. Between 1930 and 1941, the company manufactured "Boss" overalls as well as other lines. In 1942 the company was listed solely as a shirt manufacturer. Rivets were marked "C.G. & Co."

**Goldstone Bros., J.P. Goldstone Co., San Francisco, California** ca. 1900—early 1930s  
J.P. Goldstone Co. established in the early 1880s selling dry goods. Name changed to J.P. Goldstone & Sons in 1892, and a year later changed to Goldstone Bros. Manufactured pants and overalls. By 1920 produced union-made work clothes.



**Hamilton Carhartt & Co., Detroit, Illinois and Dearborn Michigan** 1889—Present  
In 1884 Hamilton Carhartt started a wholesale furnishing company. Five years later the business focused solely on manufacturing duck and denim overalls for railroad workers. The Carhartt name in script was a trademark used from 1889-1964. Bought Crown Headlight Co., W.M. Fink & Co., and E.R. Partridge Co. in 1960s, then for five years renamed "Carhartt Headlight & Finck." Name changed back to Hamilton Carhartt & Co.



**Can't Bust 'Em: The Worker's Clothing and Footwear from the 1912 Alabama Gates Work Camp.**  
 by Sunshine Paota, Anthropological Studies Center, Sonoma State University, Rohnert Park, California. Illustrations by  
 Kendall Schinke, Department of Transportation, Sacramento, California. Paper presented as part of the Communities  
 Defined by Work: Life in Western Work Camps and Towns Symposium at the Society of Historical Archaeology's annual  
 meeting in Salt Lake City, Utah, January 1999.

**Head Light/Crown Headlight Co., Cincinnati, Ohio** ca. 1905—1960  
 Began sometime after 1905. Headlight work clothes were sold by Levi Strauss from 1920  
 to the beginning of World War II. In 1960 the company acquired by Hamilton Carhartt & Co.



**Lee Apparel,** 1911—Present  
 In 1889 Henry David Lee started a wholesale grocery business in Salina, Kansas. Lee opened his first  
 garment factory in 1911, producing overalls, jackets, and work pants. Two years later coveralls (tradename  
 Unionalls) were introduced. In 1926 produced first jean-style pants with a zipper fly. In 1946 Lee Apparel  
 purchased Boss of the Road or Boss from the Eloesser-Heynemann Co.

**Levi Strauss & Co., San Francisco, California** 1873—Present  
 Began in 1850 selling dry goods. With Jacob Davis and Levi Strauss & Co.  
 patented riveted clothing in 1873, and started manufacturing them. Levi Strauss &  
 Co. held the patent for riveted clothing from 1873 until about 1908; rivets  
 marked "L.S. & CO." (During that time all other companies' rivets were  
 unembossed.) 1920-1945 also operated as a wholesaler with brands such as Head-  
 light. Inexpensive 201-style pants with all tin button.



**OshKosh B'Gosh, Inc., Oshkosh, Wisconsin** 1896—Present  
 In 1895 began as Grove Manufacturing Co. By the following year the firm incorporated, went public,  
 and changed its name to OshKosh Clothing Manufacturing Co. Buttons from this time are embossed  
 "OSHKOSH/J & C/BRAND". The firm also used another embossed button ("OSHKOSH/[train]/..."). Never  
 merged or absorbed another company.

**Sweet Orr & Co., Wappingers Fall and Newburgh, New York** 1871—beyond 1905  
 In 1871 Sweet Orr & Co. started producing a work-clothing business. By 1880 their company  
 name was embossed on their buttons. This business used a variety of designs on their buttons,  
 sometimes with the name "S.O. & Co."



**William M. Finck & Co., Detroit, Illinois** ca. 1905—1960  
 Manufactured overalls and work pants. Purchased by Carhartt in 1960.



**Williams & Dickie Manufacturing Co., Fort Worth, Texas** 1922—Present  
 Manufactured pants and overalls.

**Wrangler Jeans/Blue Bell Overall Co./Hudson Overall Co., Greenboro, North Carolina**  
 1919—post 1943 (Blue Bell Overall Co.) 1943—Present (Wrangler)  
 In 1904 established Hudson Overall Company in Greenboro, North Carolina. Changed its name to  
 Blue Bell Overall Company in 1919. Blue Bell Overalls acquired by Big Ben Manufacturing of Kentucky in  
 1926, but the name was not changed. In 1943 Blue Bell purchased another work-clothing company, Casey  
 Jones, as well as the rights to use one of their rarely used brand names—Wrangler.

## Button Typology

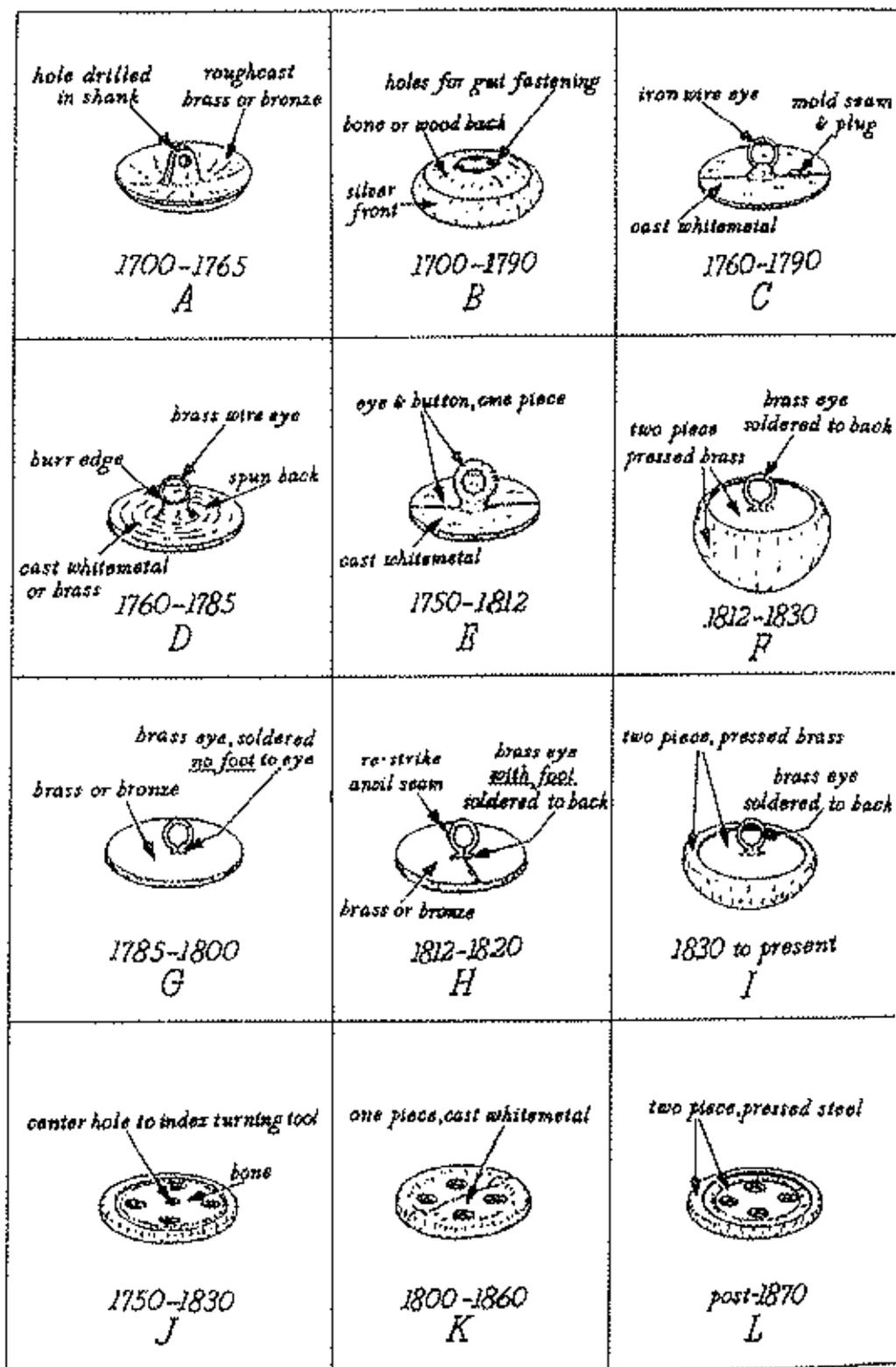


FIG. 1. [OLSEN].

# General Electric & Hotpoint Electric Toasters

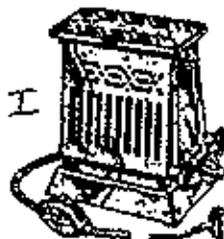
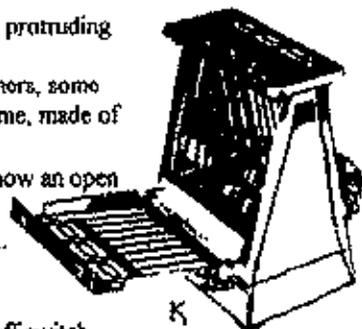
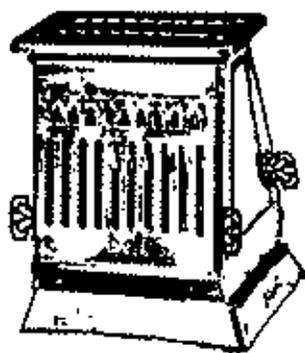
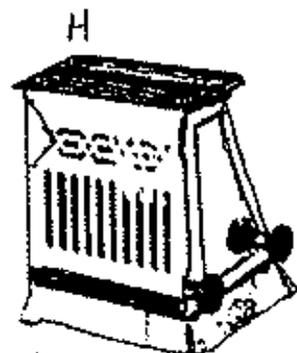
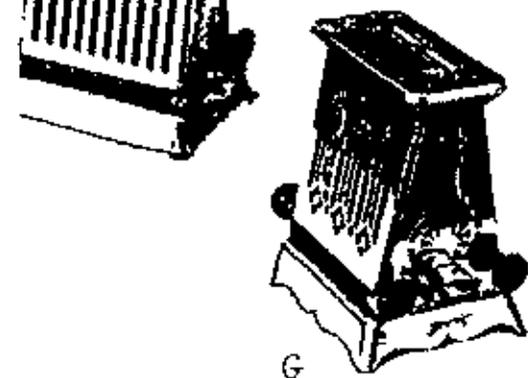
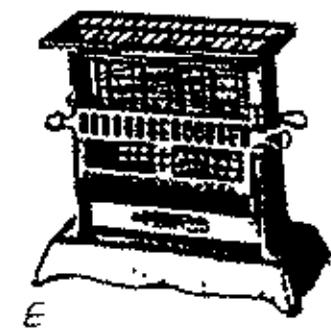
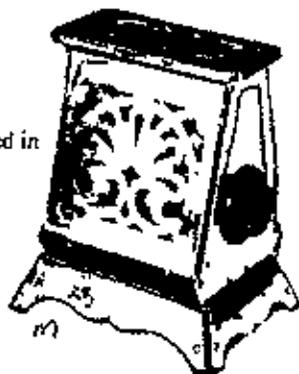
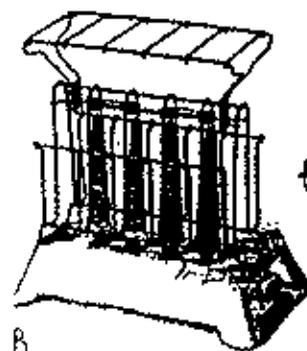
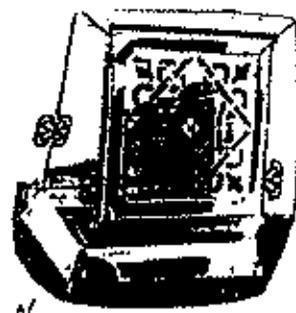
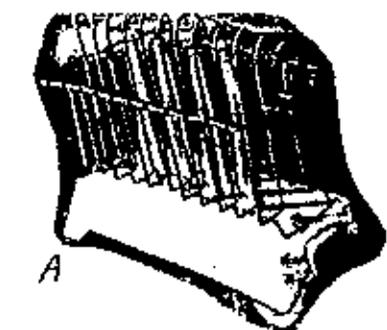
Manufactured 1909 - 1932

## General rules for dating toasters:

The patent date Feb. 6, 1906 refers only to the resistance wire used in the toaster

All toasters made of nickel are from 1906-1931  
All toasters made of chrome are from 1928 - to present

Any toaster with the LMP logo was made 1915-1923.  
LMP continues to appear until the manfs. change label molds.



- A. GE D-12, July 1909, porcelain base.  
 B. GE D-12 version II, approx. 1910, porcelain base plain or with floral decals, open ended basket, removable warming rack  
 C. GE D-12 version III, approx. 1912, Heating element labeled as Calorite but was probably the same as in version II.  
 D. GE X-2, Nov. 1915, all wire construction, prototype Calrod element (now used in ranges), possibly never manufactured after patent approved.  
 E. Hotpoint 115T1, 1919-1923, drawn metal base with solid corners, marked "Royal Rochester".  
 F. Hotpoint 115T9, 1919-1923, some with fiber feet and some with protruding metal feet.  
 G. Hotpoint 115T17, 1923-1929, drawn metal base with solid corners, some have LMP and some have a 1910 D-12 patent. Hotpoint 117T17 same, made of chrome.  
 H. Hotpoint 125T22, 1924-1928, larger version of 115T9, element now an open coil.  
 I. Hotpoint 116T24, 1926-1929, open spring coil element.  
 J. Hotpoint 117T23, approx. 1927, open coil element.  
 K. Hotpoint 156T25, late 1920's.  
 L. Hotpoint 127T23, 1927-1930 and after, open coil element, on/off switch. 126T33 same with deeper base and adjustable timer.  
 M. Hotpoint 159T33, 1930-1931, shut-off timer in base, chrome plate.  
 N. Hotpoint 169T26, 1931-1932, chrome plate, mica panel elements.

# Phillips Milk of Magnesia Originated by The Charles H. Phillips Chemical Co. of New York, N.Y.

## Comments

Aqua glass was the normative design feature of most of the tens of magnesium formulas available in the 19th and early 20th centuries. The now characteristic Phillips cobalt color was not introduced until sometime after 1906, likely only as machine made variety. The present manufacturer, Sterling Drug Inc., was uncooperative when asked to provide exact dates of production. Therefore, dating with certainty can only be through use of patent dates as terminus post quem; one could also use bottles with no embossed patent date as prima facie evidence of a terminus ante quem of 1873. For further research, consult the Griffenhagen article referenced herein.

## Known variants

	color	neck	base profile	side panels	embossing scheme	dimensions inches
1	Aqua	A	A	plain	horizontal	2.25 x 1.44 x 1.06
2	Aqua	B	B	plain	horizontal	unknown
3	Aqua	B	B	plain	horizontal	6.63 x ?
4	L. Blue	B	B	plain	horizontal	5 x 2.38 x 1.75
5	Cobalt	B	B	plain	horizontal	unknown 3oz., 6oz., & 12oz. sizes
6	Cobalt	threaded	B	plain	horizontal	unknown 3oz., 6oz., & 12oz. sizes

• manufactured by machine

May 15, 1906..... Trademark patent #52,772 awarded. Registered in N. Y., N. Y.

August 21, 1906 .... Trademark patent #55,598 awarded. Registered in N. Y., N. Y.

1923 ..... Sterling Drug Co. acquired C. H. Phillips Co. The name 'Phillips Milk of Magnesia' maintained and still in use today.

1924 ..... First known threaded finish bottle introduced.

Presently bottles are plastic, pigmented cobalt blue and marked with adhesive labels.

## References

- Denver. Kay (1968) Patent Medicine Elixir. Tombstone: Tombstone Press.
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## Timeline

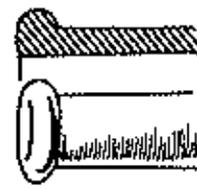
1849 ..... Company founded in 1849. (Denver 1968) suggests Milk of Magnesia may have been introduced in 1849, but there is neither documentation nor corroboration from other sources. The company makes several other proprietary formulas, likely each with their own bottles.

April 26, 1873 ..... First known U. S. patent was awarded. Appears to be C. H. Phillips Co.'s first product, though the period between 1849 and 1873 is uncertain. #138,282 [see below]. Registered in N. Y., N. Y.

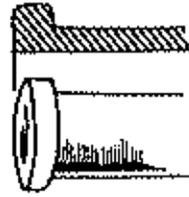
July 22, 1873 ..... U. S. patent awarded, apparently for a modification in the manufacturing process. #141,167. Registered in N. Y., N. Y.



Bottle #4



Neck A



Neck B



Base A



Base B

## Embossing

- 1 PHILLIPS/MILK OF/IN circle/ TRADE MARK/MAGNESIA
- 2 PHILLIPS/MILK OF/IN circle/ TRADE MARK/MAGNESIA/PATENTED/APRIL 29th & JULY 22nd 1873
- 3 PHILLIPS/MILK OF/IN circle/ TRADE MARK/MAGNESIA/REGISTERED
- 4 PHILLIPS/MILK OF/IN circle/ TRADE MARK/MAGNESIA/REGD IN U.S. PAT. OFFICE/AUG. 21, 1906
- 5 MILK OF/IN circle/ TRADE MARK/MAGNESIA/REGD IN U.S. PATENT OFFICE/AUG. 21, 1906/THE CHAS. H. PHILLIPS/CHEMICAL COMPANY/GLENN BROOK, CONN.
- 6 MILK OF/IN circle/ TRADE MARK/MAGNESIA/REGD IN U.S. PATENT OFFICE/AUG. 21, 1906/THE CHAS. H. PHILLIPS/CHEMICAL COMPANY/GLENN BROOK, CONN.

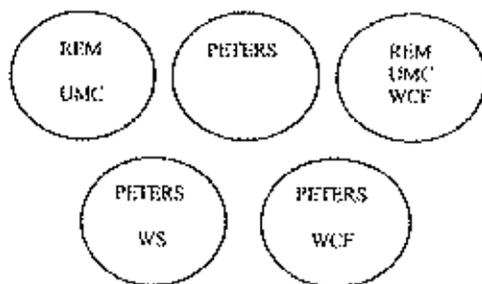
Information in brackets [ ] does not appear on bottle. Single slashes (/) represent line changes. Adapted from File 1287-6-12, 141.

# OBSOLETE WINCHESTER CENTERFIRE CARTRIDGES BETWEEN 1873 TO 1945

Centerfire cartridges were developed in the early 1870's. They are very distinct when compared to the other style of cartridge's. The centerfire has a primer in the center of the base of the cartridge which is impacted by the firing pin. The rimfire is designed to have the firing pin strike the rim of the cartridge and lacks a visual primer. The earlier still muzzle loaders used paper cartridges, which will not leave any archeological evidence.

## BASE MARKINGS

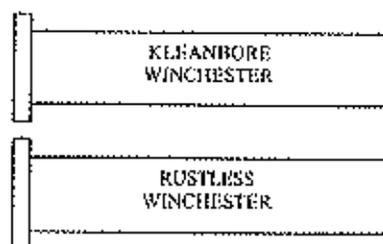
- The base will include the following letters, along with the caliber size.



## CARTRIDGE CASE MARKINGS

- The cartridge case may or may not have these words on them.

1. Kleanbore / Winchester
2. Rustless / Winchester



## CALIBER'S ALONG WITH DATES OF PRODUCTION

.25 - .35 1895 - 1945	.25 - .20 1893 - 1940	.38 - 40 1874 - 1937	.38 - 40 1874 - 1937
.38 - 55 1884 - 1940	.44 - 40 1873 - 1942	.38 - 56 1887 - 1936	.32 - 40 1884 - 1940
.40 - 82 1885 - 1935	.40 - 60 1880 - 1935		

**BIBLIOGRAPHY:** Barnes, Frank C.  
1965 Cartridges of the World. Follett Publishing Co, Chicago Illinois.

By: Richard Tustin

# *A BRIEF HISTORY of BARBED WIRE*



## **BEFORE BARBED WIRE**

Since the beginning of time, man has constructed his barriers from natural materials adjacent to the barrier site. These materials were mostly wood from trees, stone, thorny brush, and mud. When settlers arrived on the Great Plains of America, they found these materials in short supply, thus creating a demand for a more economical type of fencing.

## **SMOOTH WIRE DEVELOPMENT**

Dating back to 400 A.D., the process of pulling hot, bloom iron through dies in a drawing plate produced short lengths of various sizes of smooth wire. By 1870, good quality smooth wire was readily available in all sizes and lengths. Stockmen used the smooth wire in fencing but found it was not a dependable deterrent to livestock passage.

## **THE INVENTION OF WIRE WITH POINTS**

In 1867, two inventors tried adding points to the smooth wire in an effort to make a more effective deterrent. One example was not practical to manufacture, the other experienced financial problems. In 1868, Michael Kelly invented a practical wire with points which was used in quantity until 1874.

## **THE INVENTION OF BARBED WIRE**

Joseph F. Glidden of Dekalb, Illinois attended a county fair where he observed a demonstration of a wooden rail with sharp nails protruding along its sides, hanging inside a smooth wire fence. This inspired him to invent and patent a successful barbed wire in the form we recognize today. Glidden fashioned barbs on an improvised coffee bean grinder, placed them at intervals along a smooth wire, and twisted another wire around the first to hold the barbs in a fixed position.



## THE BARBED WIRE BOOM

The advent of Glidden's successful invention set off a creative frenzy that eventually produced over 570 barbed wire patents. It also set the stage for a three-year legal battle over the rights to these patents.

## THE FATHER OF BARBED WIRE

When the legal battles were over, Joseph Glidden was declared the winner and the Father of Barbed Wire. The aftermath forced many companies to merge facilities or sell their patent rights to the large wire and steel companies.

## ACCEPTING THE DEVIL'S ROPE

When livestock encountered barbed wire for the first time, it was usually a painful experience. The injuries provided sufficient reason for the public to protest its use. Religious groups called it "the work of the devil," or "The Devil's Rope" and demanded removal.

Free range grazers became alarmed the economical new barrier would mean the end of their livelihood. Trail Drivers were concerned their herds would be blocked from the Kansas markets by settler fences. Barbed wire fence development stalled.

## THE FENCE CUTTER WARS

With landowners building fences to protect crops and livestock, and those opposed fighting to keep their independence, violence occurred requiring laws to be passed making wire cutting a felony. After many deaths, and uncountable financial losses, the Fence Cutter Wars ended.

## NEED AND PROMOTION TRIUMPH OVER OPPOSITION

A demonstration in the Military Plaza in San Antonio by John "Bet a Million" Gates, proved beyond a doubt barbed wire was durable and successful in controlling livestock. With his expertise in salesmanship, he eventually became the largest stockholder in American Steel & Wire Company and a legend in barbed wire history.

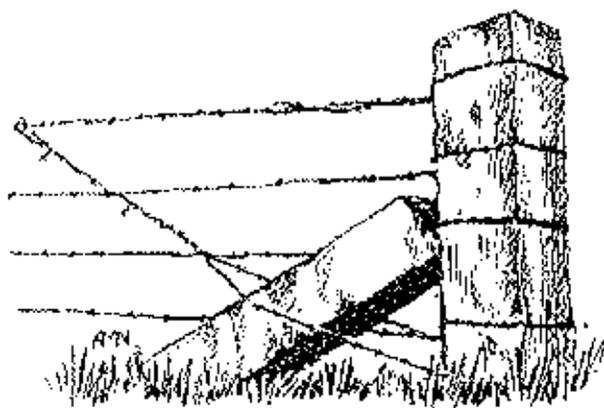
## THE LAST STRAW

The last opposition fell when the large ranches in Texas began fencing their boundaries and cross fencing within. Among the first to fence were The Frying Pan Ranch, The XIT, and the JA Ranch, all located in the Texas Panhandle.

## PRESERVATION OF, AND COLLECTING BARBED WIRE

There are over 530 patented barbed wires, approximately 2,000 variations and over 2,000 patented barbed wire tools to collect as well as advertising, salesman samples, wire cut medicine bottles, and other wire related items.





### **"HOOKED ON BARBED WIRE"**

Since you are still with us, we assume you are "hooked on barbed wire," as we say in the hobby. Read on to learn some of the fascinating facts and unique history of The Devil's Rope.

#### **BARBED WIRE FACTS**

- There are over 570 patented wires to search for in acquiring a collection.
- Over 2,000 variations of these patented wires have been found and cataloged to date.
- Less than 50% of the patented wires were manufactured commercially because of difficulty in producing the wire with automated machinery, or other excessive costs in manufacturing.
- Less than 10% of all patented wires proved to be practical in actual use.
- Those wires not produced in quantity, become rare and sought after by collectors.
- In the final analysis, the Glidden patent #157,124 issued in 1874, and the Baker patent #273,219 issued in 1883, were the most practical and successful.

#### **COLLECTING BARBED WIRE**

Usually barbed wire specimens are collected in 18" lengths to show the spacing between the barbs. Due to space limitations, some collectors acquire specimens in 4" to 6" lengths to show the barb design only. Most collections are mounted on display boards with patent information shown in neat labels as well as occasional comments about the wire.

#### **THE MYSTIQUE OF BARBED WIRE IDENTIFICATION**

Some confusion may occur in wire identification for several reasons.

- Early day patent office procedures allowed wire patents to be filed in several different categories making the patent information and design detail difficult to find.
- Raw stock smooth wire purchased from the steel mills often varied in uniformity both in size and shape because of die wear and wire content ingredients.
- Wires made by blacksmiths, small co-op groups, and non-licensed manufacturers were often intentionally made slightly different in design to circumvent patent infringement.
- When the crude automated manufacturing equipment of the time began to wear, odd marked barbs and line wire appeared. Machinery malfunction created odd varieties of original design.

#### A TYPICAL BARBED WIRE IDENTIFICATION BOOK & DISPLAY LABEL



**730B. G-818, A-414, ()**  
**Hodge Spur Rowel on Large & Small Strands Variation**

Twisted large and small strands with ten point sheet metal spur rowel barb. Variation of Patent #367,398, Aug. 2, 1887 by Chester A. Hodge of Beloit, Wisc.

1. A detailed illustration of the barbed wire specimen is shown
2. Next is the author's ID number, depending on the book being used. The other numbers following, are a cross index of other author's ID numbers.
3. The barbed wire name follows with some distinguishing characteristics.
4. A more detailed description is shown helping to identify the wire.
5. Last, comes the patent number, date issued, the patentee's name and residence.

Once you are familiar with the label, identification is easy with whatever ID book you use.



### WHAT IS PLANTER WIRE?

Planter Wire is a smooth wire, cable, or small rope with unique obstructions placed at intervals to activate a planter mechanism. Basically, it is the first device used in precision planting.

### COLLECTING PLANTER WIRE

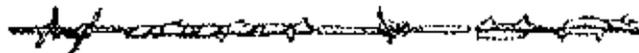
Collectors acquire 4" to 6" lengths of wire containing the obstruction device. Like barbed wire, the specimens are mounted on display boards with proper labeling. Identification of planter wire specimens is easy with ID books showing design details, patent number, date issued, and the inventor's name and residence.

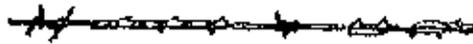
### COLLECTING WIRE WORKING TOOLS AND DEVICES

Over 2,000 tools were patented before 1935 to work barbed wire. Hundreds of blacksmith made tools not patented are also collectible. There are many larger machines that make picket fences, net wire fences, and snow fence. Most tools and other devices were made in the 1875 to 1900 time period. Collectors mount the smaller tools on display boards with proper labeling. Several books are available for assistance in identification.

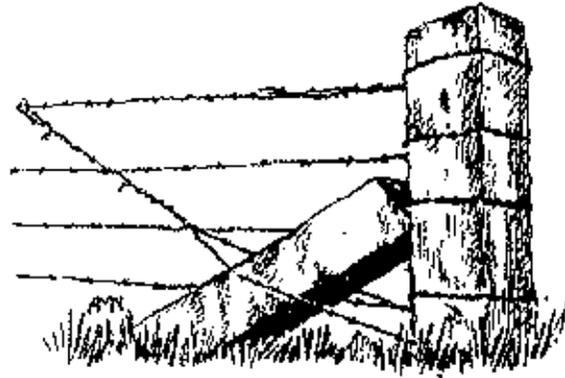
### COLLECTING WIRE CUT MEDICINE CONTAINERS AND ADVERTISING

Wire related items are also collectible. Among these are medicine containers, fence advertising, salesman samples, decorative wrought iron fencing and patent models of wire and tools.





## Collector's Guide to Barbed Wire



691B. C-543, G-127, B-77, A-559, J48, ( )  
Scutt Single Clip "H" Plate

Two twisted strand wire with four point "H" barb. Barb is fastened to one strand with a metal clip. Patent #205,000, June 18, 1878 by Hiram B Scutt of Joliet, Ill.



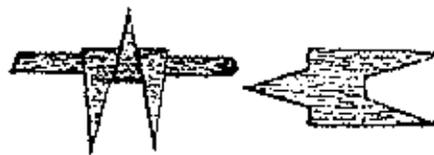
204B. C-235, G-340, B141, A-180, ( )  
Dodge Six Point Star Barb

Single strand wire with six point sheet metal star barb. Strand is enlarged on each side of barb to prevent movement. Barbs may or may not rotate. Patent #250,219, Nov. 29, 1881 by Thomas H. Dodge of Worcester, Mass.



693B. C-573, G-129, A-562, ( )  
Scutt Arrow Plate

Two twisted strand wire with four point sheet metal arrow plate barb. Barb is split and shaped like an arrowhead. Variation of Patent #205,000 as per wire #691B



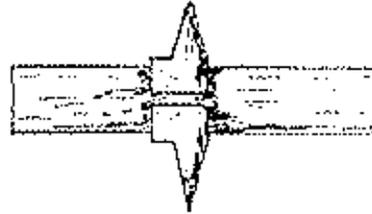
194B. C-213, G-140, B-49, A-442, J-50, ( )  
Knickerbocker Applied Three Point Barb

Single strand wire with a three point hand applied barb. Barbs could be bought by the pound and hand applied. Patent #185,333, Dec. 12 1876 by Millis Knickerbocker of New Lenox, Ill.



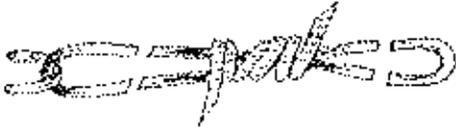
730B. G-818, A-414, ( )  
Hodge Spur Rowel on Large & Small Strands

Twisted large and small strands with ten point sheet metal spur rowel barb. Variation of Patent #367,398, Aug 2., 1887 by Chester A. Hodge of Beloit, Wisc.



920B. C-811, G-236, B-123, A-78, J-126, ( )  
Brinkerhoff Face Clamp Barb

Flat sheet metal ribbon with two point sheet metal clamp-on barb. Barb plate is cut so that barb can be bent around ribbon. Patent #241,601, May 17, 1881 by Jacob & Warren M. Brinkerhoff of Auburn, N.Y.



860B. C-704\*, ( )  
Cady Barbed Link, Double Wrap

Folded single strand link with ends joined in center of link by double wrap to form two point barb. Variation of Machine Patent #292,408, Jan. 22, 1884 by Frank P. Cady of Chicago, Ill.



155B. C-148, G-110, B-50, A-464, J-51, ( )  
Merrill Four Point Twirl

Single strand wire with four point barb. Patent #185,688, Dec. 26, 1876 by John C. Merrill of Turkey River Station, Iowa



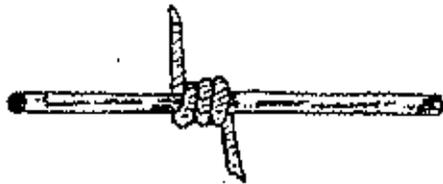
34B. C-72, A-355, ( )  
Glidden Hanging Barb

Single strand wire with two point hanging barb. Variation of Patent #RE 6913, Feb. 18, 1876 by Joseph F. Glidden of De Kalb, Ill.



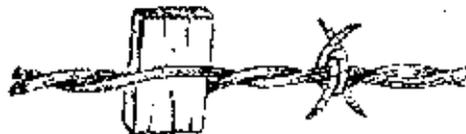
138B. C-144, G-7, A-367, ( )  
Glidden Square Strand

Single square strand wire with four point coil barb. Patent # RE 6914, Feb. 18, 1876 by Joseph F. Glidden of De Kalb, Ill.



35B. G-596, B-8, A-351, ( )  
Glidden Round Single Strand

Round single strand wire with coiled two point barb. Patent #RE 6913, Feb. 18, 1876 by Joseph F. Glidden of De Kalb, Ill.



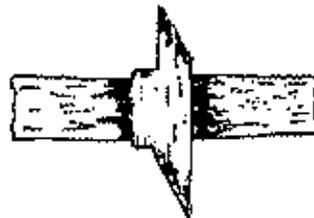
570B. G-216, A-424, ( )  
Jayne & Hill Locked Staples & Wood Block

Two twisted strand wire with wooden block warning device and four point barb around both strands. Patent #176,120, April 11, 1876 by William H. Jayne & James H. Hill of Boone, Iowa



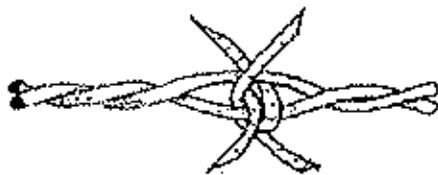
408B. G-1032, ( )  
Glidden Large Square Strands

Two large square twisted strands with two point barb on one strand. Patent #157,125, Nov. 24, 1874 by Joseph F. Glidden of De Kalb, Ill.



814B. G-83, A-75, ( )  
Brinkerhoff Opposed Lugs Lance Point

Flat ribbon wire with two point lance point applied barb. Patent #214,095, April 8, 1879 by Jacob Brinkerhoff of Auburn, N.Y.



567B. C-481, G-349, A-422, ( )  
Jayne & Hill Locked Staples Around One

Two twisted strand wire with four point barb on one strand. One leg of barb straddles other strand. Variation of Patent #176,120, April 11, 1876 by William H. Jayne & James H. Hill of Boone, Iowa



638B. C-506, C-98, A-428, ( )  
Kelly Thorny Common

Two twisted wire strands with two point sheet metal thorny barb. Patent #74,379, Feb 11, 1868 by Michael Kelly of New York, N.Y.

QUICK REFERENCE: N.M. HISTORICAL ARTIFACTS

Item	Date
<i>Glass: General</i>	
Dark brown, green, black and/or bubbly, generally thick, (rare in NM)	Pre 1880
Sun-colored amethyst glass (production ceases in U.S. ca. 1915)	1880-1920
Aque glass	1880-1920
Clear glass (can be 70-80 yrs older; clear leaded glass fluoresces under UV light)	1830+
Selenium glass (yellow or honey colored from sun exposure)	~1915-1930
Cobalt glass	1880+
Brown glass (thin, mostly beer bottles post WWII)	1873+
Carnival Glass	1905-1940
<i>Glass: Containers, General</i>	
Embossed patent medicine bottles (pre-Food and Drug Act)	1867-1906
Mason jars (common after 1880)	1858+
2 piece canning jar lid	~1910/15+
Semi-automatic bottle machines (side seams do not extend to lip)	1880-1920s
Automatic bottle machines (side seams extend to lip)	1904+
Continuous thread screw cap bottles	1924+
Crown caps for bottles (common after 1907)	1892+
"FEDERAL LAW PROHIBITS SALE OR REUSE OF THIS BOTTLE"	1933-1964
No deposit no return beer bottles (uncommon until after WW II)	1938+
Slipping on bottle base	~1940s+
<i>Glass: Coke bottles (ca. 1900+)</i>	
Coca-Cola "contour" or "hobbleskin" bottle	1916+
Contour bottles: "BOTTLE PATD. DEC 25 1923"	1923-1937
Contour bottles: "BOTTLE PAT. D-105529"	1937-1951
Contour bottles: "US PATENT OFFICEMIN CONTENTS 6 FL OZ"	1951-1958
Contour bottles: "US PATENT OFFICEMIN CONTENTS 6 1/2 FL OZ"	1958-1965
<i>Glass: Containers, Owens-Illinois Corporate Lineage</i>	
Note: Owens Illinois became Owens-Illinois Inc. in 1966	

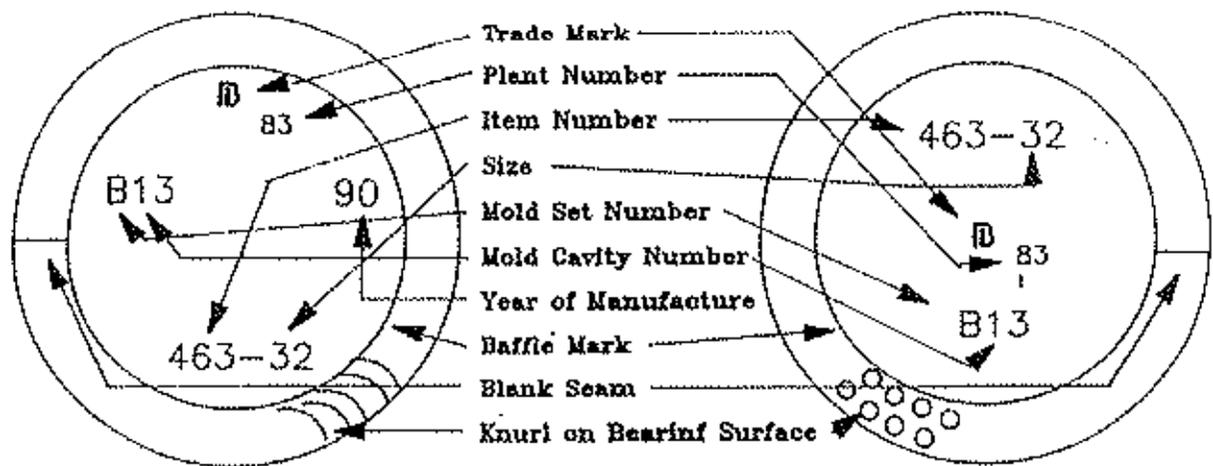
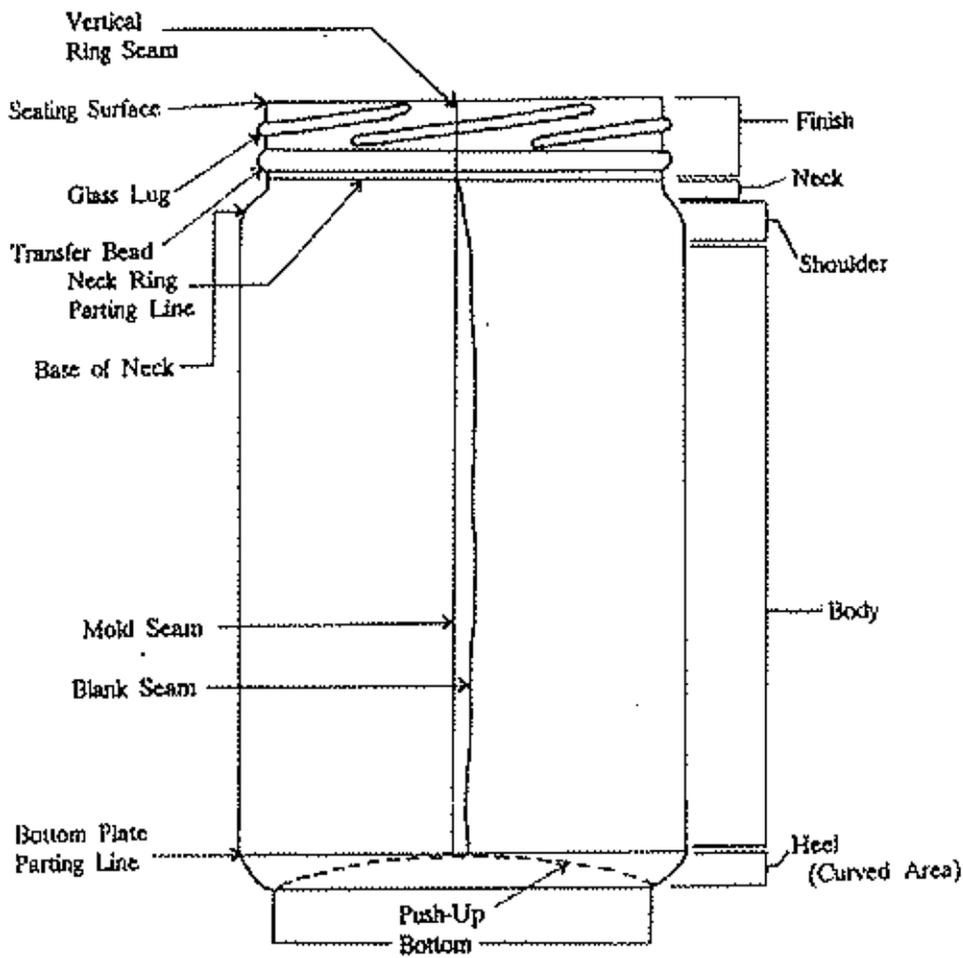
Item	Date
"I" inside wide diamond (for Illinois Glass Company)	1916-1929
"1" inside wide diamond and oval (for Owens Illinois)	1929-1954
"I" inside oval (for Owens Illinois)	1954-
"Owens-Ill"	1941-1963
"DURAGLAS"	1963-1971+
<i>Glass: Soda Pop Bottles, General</i>	
Applied color label (ACL) on soda bottles (not used by Coca-Cola until 1956)	1934-
"NO DEPOSIT NO RETURN"	1960s-
A few brands: Coca-Cola, 1884-; Canada Dry, 1906-; Dr. Pepper, 1888-; Pepsi-Cola, 1903-; Orange Crush, 1916-; Nehi, 1924-; 7-UP, 1928-; Royal Crown Cola, 1934-; Squirt, 1938-; Grape-Nuts, 1940-; Fanta, 1958-; Tab, 1963-	
<i>Glass: Insulators and Other Items</i>	
"PATENT DEC. 19 1871" (Hemingray); 1870s-1880s; "H.G.CO." (Huntingray), 1880s-1890s; double petticoat design, 1883-; drip points or "teats" on base of petticoat, 1893-; "HEMINGRAY," 1890s-1900s; "MADE IN U.S.A.," 1919-; Hemingray switches to semi-clear (see blue) glass, 1931-1936; Hemingray switches to truly clear glass, 1936-1967; screw-on insulators, ca. 1930s+.	
Light bulbs, machine made	1895+
Kerosene lamp burners and chimneys	~1863+
Marbles, machine made	1901
<i>Ceramics</i>	
Detachable wares	ca. 1900+
Fiesta Ware	ca. 1934-1964
Foreign country of origin stamped/labeled on base "MADE IN ..."	1891+
Liquid gold gilding, "bright gold"	~1880+
Japanese style patterns, transfer printed	~1870+
<i>Metal: Cans</i>	
Openings: Yankee bayonet type can opener, 1906-; geared rotary opener, 1925-; "church key" (triangular punch) opener, 1935-ca. 1960s	
Roll-in-cap cans (rare after 1905)	1820s-1920
Roll-in-top cans (sealed with one drop of solder)	1900-
Sanitary cans (no solder; all crimped seams; stamped SANITARY 1904-1906; common after 1920)	1904+

Item	Date
Milk Cans: soldered seams 1875-1903, crimped seams 1903+, top with center cap 1875-1914, matchstick filler hole 1915-1985, "PUNCH HERE" on top 1930-1975, multiple rings on top 1935+	1875+
Log cabin-shaped syrup cans	1897-ca.1949
Pocket tobacco cans, 3 or 5 pin hinge (roted hinge introduced 1948)	1907-1970s
"ESTAB" on meat cans	1907-1950s
Log (tab-sided lids) covered pails	1913+
Baking Powder: KC Baking Powder ("SAME HEIGHT..." 1925+; "SUPERIOR QUALITY FOR OVER..." post WWI; "TRUE HEIGHT CAN" 1925-1950); Clabber Girl (1906-present); Morey's OK (1907-1930); Dr. Price's Baking Powder (1850-1920); Calumet (1890-present; "MADE IN USA post 1928)	1890+
U.S. Tobacco Co. snuff can lids (COPENHAGEN SAFETIES 1937-1977)	1922+
Paint cans	1906+
Quart-sized, all-metal motor oil can (metal-cardboard oil cans post-WW II)	1933-WW II?
Flat pocket size aspirin tins	1917+
Church-key opened steel beer cans (production halted during WW II)	1935-1960s
Conc-top steel beer cans	1935-1955
Cylindrical all steel beer cans ("IKTP" impression 1935-1950; 1942-1947 hiatus for WWI; notched side seam 1960s)	1930-ca. 1970
Pressurized spray cans with Abrasalp valve (one in use today)	1953+
Sardine Cans (modern key wind top)	1919+
Coffee (key wind strip with resealable top)	ca. 1920s+
<i>Metal: Cartridges</i>	
Percussion caps	1825-1875
Metallic cartridges	1855+
22 caliber cartridges: "HP" 1916-; "♦" 1898s-1931; "F" 1916-; "U" 1885-; "C" 1960s; "PETERS"/"HV" 1887-1934; "H" very recent; "P" 1887-1934; "IS" 1869-1936; 22 short 1860+; 22 long 1871+; .32 short 1860-1940	
"U.M.C." (Union Metallic Cartridge Co.)	1873-1902 (1911)
"Rem UMC" (Remington-Union Metallic Cartr. Co.)	1917+
"R-P" (Remington-Peters)	1934+

Item	Date
"W.R.A. Co." (Winchester Repeating Arms Co.)	-1940
"W.R.A." without "Co." (Winchester)	1940+
<i>Metal: Age of Aluminum</i>	
Aluminum a common consumer item, late 1940s-; three-piece all-aluminum cans, 1957- (for beer, 1958-); bimetal (Fe-Al) cans, 1960-; two-piece all-aluminum cans, 1963-; ring-pull detachable "pop tops," 1963-1983; stay-on tabs on cans, 1972-; Coors two-button can tops, 1972-1977.	
<i>Metal: Enamelware</i>	
Mottled (light & dark gray, blue & white, brown and white), pre-1900-; white with blue, black, or red trim, 1900+; blue, 1915+; tan with green trim, 1927-1940; red, 1927+	
<i>Metal: Other</i>	
Wire nails (machine-made; round shanks; common after 1900; look for RR tie date nails with last 2 digits of year on head)	1880+
Cut nails	~1800-1900
Phillips head screws	1936+
Modern zipper	1917+
Barbed wire	1876+
Cable (wire rope)	1880s+
Bobby pins	1916+
Aerometer Windmills	1888+
Modern Safety Razor	1904+
<i>Miscellaneous and Plastics (Including early varieties)</i>	
Carbon battery cores	1912-
Plastic screw caps (phenolic caps introduced 1922-26)	1940s--
Asphalt roofing shingles	1917+
Bakelite (hard black plastic)	1907+
Plastics become a common consumer item	Late 1940s--
Soft drinks in plastic bottles (PET bottles are late 1970s-)	1970-

Version 4.0, February 2005 Harding Pelt II and David A. Phillips, Jr.

# Jar and Bottle Identification Chart



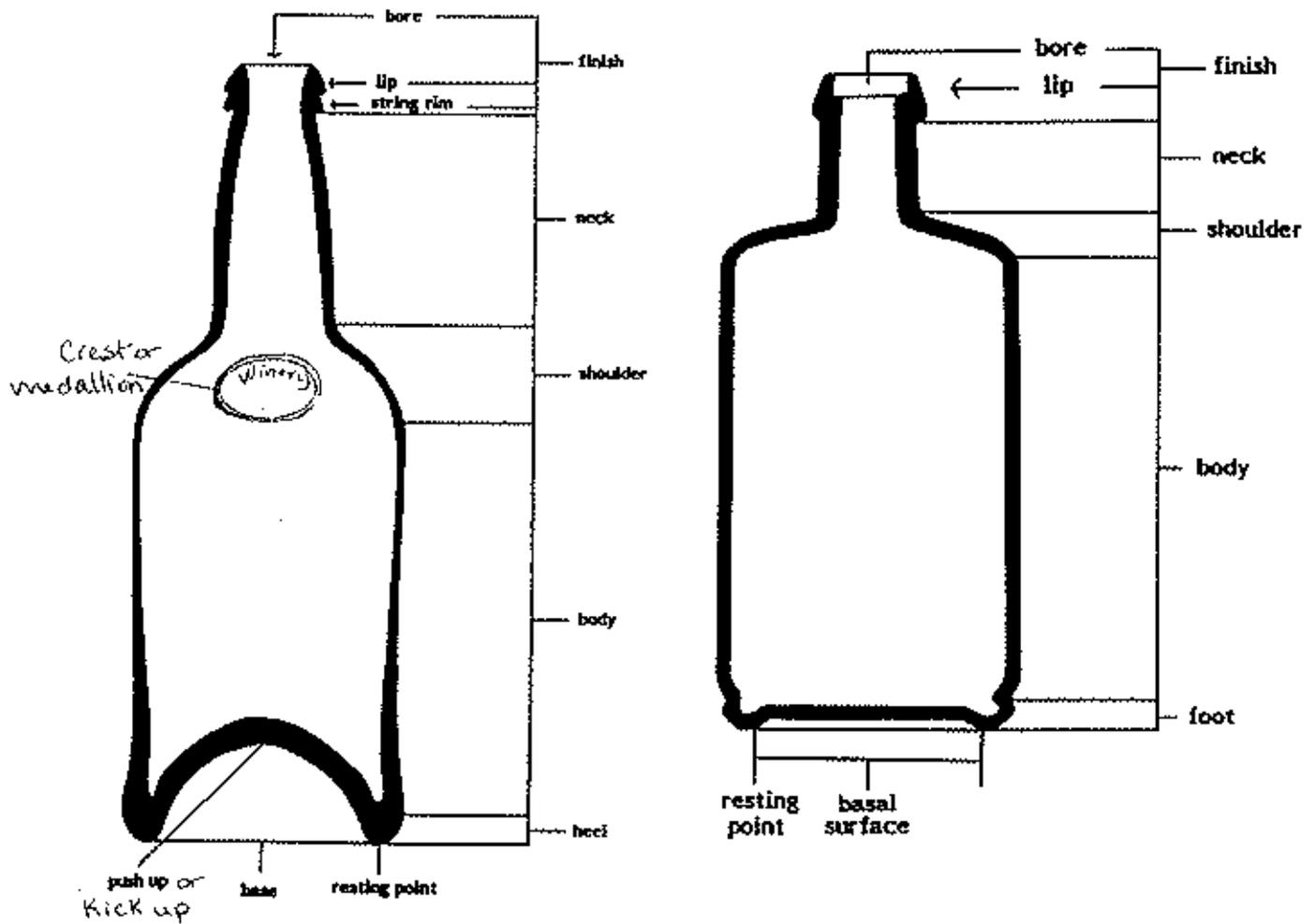
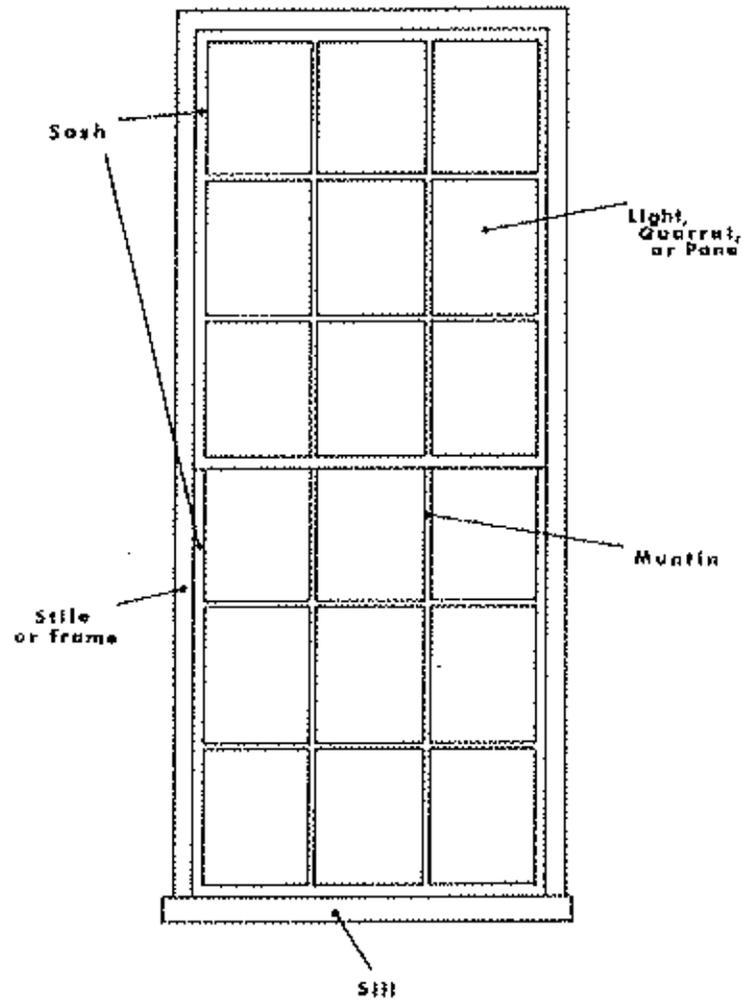


Table 1. Category: Container

Subcategory	Article examples	Popular name
Food	Milk, essence of coffee, lime juice concentrate, extract, cheese jar, mustard, fruit jar, condiment, salt, sauce, olive oil, pickles, vacuum bottle, etc.	Thermos
Household	Blacking, furniture polish, wax, gluing, bleach, silver polish, machine oil, glue, etc.	
Inks/Mucilage	Ink well, ink bottle, master ink, mucilage (not glue), etc.	Umbrella ink
Liquor	Gin, beer, etc, wine, whiskey, brandy, etc.	"Wine," flask, case bottle
Medicine	Druggists' shapes, poison, patent or proprietary medicine, specimen jar, etc.	Vial, ampule
Nursing	Probably no further division	
Soft Drink/Mineral water	Seltzer water, ginger ale, spa water, etc.	Egg, etc.
Toiletries	Perfume, cologne, cold cream, flower essence, hair oil, tooth powder, bath salts, hand lotion, barbers' bottles, etc.	
Miscellaneous	Snuff, imitation wood, etc.	
Indefinite	French blue-green bubbled, jug, demijohn, base of an octagonal bottle, etc.	French blue-green, bubbled, jug, demijohn
Undiagnostic		
Unidentified		

## Flat Glass: Its Use as a Dating Tool



SUGGESTED AGE RANGES FOR PRIMARY MODES OF WINDOW GLASS THICKNESS IN USE IN THE PACIFIC NORTHWEST DURING THE 1800s.

Dates (ca.)	Approximate Primary Mode in Use (in.)
1810-1825	0.055
1820-1835	0.055
1830-1840	0.045
1835-1845	0.045-0.055
1845-1855	0.065
1850-1865	0.075
1855-1885	0.085
1870-1900	0.095
1900-1915	0.105

Karl Roenke  
1978

Flat Glass: Its Use As a Dating Tool for Nineteenth Century Archaeological Sites in the Pacific Northwest and Elsewhere. *Northwest Anthropological Research Notes, Memoir No. 4.*

## CAPS USED ON MILK BOTTLES



This is a pressed paper disc which snaps into the capseat of the bottle. Invented by the Thatcher Manufacturing Company on September 17, 1889. This cap was in existence for years and was used by almost all dairies. Most of the hood closures that covered the top and outside of the milk bottle required a cap for sealing purposes.

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SEAL HOOD - Made by American Seal-Kap Corporation, Long Island City, New York - This cap covered the whole roll of the finish and made the bottle tamper-proof. It could not be opened without breaking the seal. The cap snapped into the capseat and covered the top of the finish. The skirt of the hood was then crimped (by machine) under the finish and sealed with wax. It was generally made in the 48 mm size.

---



SEAL-KAP - Made by various manufacturers - The Seal-Kap had corrugations on the top which made the cap a little more rigid. These were made to just cover the pouring lip first. They were rounded off a little more later. This cap snapped into the capseat and covered the top of the roll. Approximately 1918.

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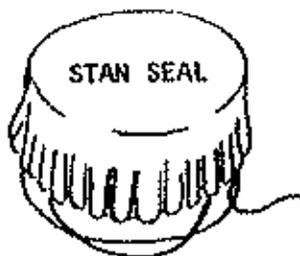
SEALON HOOD - Made by Sealright Company, Fulton, New York - The Sealon Hood stretched tight over the top of the bottle and then lapped around under the outside of the roll and was sealed with wax. It required a plug cap under the hood. In other words, the cap was inserted into the capseat and then the hood was put over the top of the finish.

---



CELLOPHANE HOOD - Made by Smith-Lee Company, Oneida, New York - This hood cover was pulled down over the top of the bottle and fastened with a narrow cellophane band directly under the finish. It required a plug cap for sealing the bottle.

## CAPS (CONT'D)



STANDARD SEAL HOOD - Made by Standard Cap and Seal Company, Chicago, Illinois - This was a pressed paper hood which was pulled down over the top of the finish, then crimped under under the lobes and fastened by a very fine wire. The hood required a plug cap under the hood to seal the bottle. It was considered an expensive closure.

---



ALUMINUM HOOD - Made by Aluminum Seal Co., New Kensington, Pa. - Made of laminated aluminum and paper. There were a number of different kinds made starting in about 1932. Plain aluminum was also used. It was crimped in between the lobes and was considered tamper-proof.

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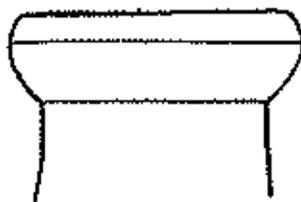


DACRO ALUMINUM CAP - Made by Crown Cork and Seal Company, Baltimore, Maryland - At first the Dacro Cap was made entirely of steel and that made it very hard to apply to the bottle. They were eventually replaced by aluminum.

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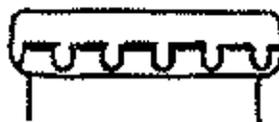


## MILK BOTTLE FINISHES



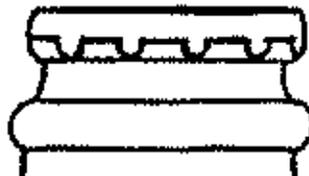
COMMON SENSE FINISH (56mm) - This was one of the oldest bottle finishes in existence (1889). The following caps were used with the Common Sense bottle: Plug Cap; Seal-Kap; Sealon Hood; Cellophane Hood and the Standard Seal Hood.

## MILK BOTTLE FINISHES (CONT'D)



**ECONOPOR FINISH** - The 48mm Econopor finish was very popular, particularly on T-square and round 17 3/4 ounce weight milk bottles. It was also made in the 51mm and 56mm sizes and was made with or without capseat. The following caps were used with this bottle: Plug Cap; American Seal Hood; Seal-Kap; Sealon Hood; Cellophane Hood; Standard Seal Hood; and Aluminum Hood.

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**ECONOPOR FINISH (43 mm)** - The 43 mm Econopor Finish was designed for the Borden Company, New York. In 1951 it was standard and available to any dairy. However, its use was limited. It was made with or without capseat. The following caps could be used with it: Plug Cap; Seal-Kap; Sealon Hood and the Aluminum Hood.

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**MULTICAP FINISH** - The 45 mm Multicap finish was made with or without capseat. The 38 mm Multicap finish was made without capseat. This finish did not lend itself to hood closures but did use the following caps: Plug Cap; Seal-Kap; and the Aluminum .

---



**DACRO FINISH** - This finish was originally patented by the Crown Cork & Seal Company. It usually came in the 45mm and 38 mm sizes. It had become standardized and was widely used in 1951. The Dacro finish (1951) was made almost entirely without capseat. It used the Dacro cap.



Quick Reference to Glass Maker Marks, Glass  
Color and Tin Cans

Glass: Common Glass Maker's marks (Toulouse)

Duraglas (post Sept 1940) *Duraglas* (DURAGLAS post Oct 1963)

Glass Containers Inc./Corp. (since 1945)  (© 1935-1940  
GC 1935-1940)

Hazel-Atlas Glass Co. (1920-1964)  (HAZEL-ATLAS 1902-1964)

Illinois Glass Co. (1916-1929) 

Illinois Pacific Co. (1902-1932) I PG 

Kerr Glass Manufacturing Co., Sands Springs, Ok. (1912-1946) *Kerr* 1912 date

Maywood Glass Co. (1940-1961) <sup>tilted →</sup> MG (MG 1930; <sup>← tilted</sup> MG 1958)

Northwestern Glass Co. (ca. 1931-present) *NW*

Owens Bottle Co. (1911-1929) 

Owens Illinois Glass Co. (1929-1954)  (Ⓡ since 1954)

Pierce Glass Co. (1905-1917)  (P since 1917)

Thatcher Glass Manufacturing Co. (since 1946) *MTC* (1900 to date)

Rock 1990

color - Black (deep olive green)	1840-1880
Amethyst	1880-1916
Amber	post 1916
Clear	1920 to present

Gilio et. al. 1980

color - Black (deep olive green)	1815-1885
Amethyst	1880-1915
Amber	1873 to present
Clear	1930. to present
Honey	1914-1930's
Agua	1880-1920

1933-1964 ~ "Federal Law Prohibits the Refill  
or Reuse of This Bottle"

post 1940 ~ "No Deposit - No Return"

Southern Glass Company (1917 - 1931)



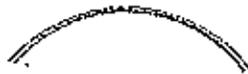
Cans/Metal:

Zinc threaded canning lid	1858-ca. 1941
WCRM 1993	
Hole and cap machine seam	ca.1810-1900's 1880-1920 (Gillio 1980)
Hole in cap	1810-1940
Evaporated milk venthole	ca.1914-ca.1985
Sanitary	1904 to present
Cone top	1935-1970's
beer	1935-1970's
other	1935-to present
soft drink	1953-1984
Beer (Gillio 1980)	1935 to present (Rock 1990)
cone top	1935-1955
steel	1960 to present
steel body aluminum top	ca.1955-ca.1963 (WCRM 1993)
all aluminum	1963 to present (WCRM 1993,
Aerosol	1947 to present (Rock 1990)
Pull tab	
removable	1963-ca.1976 (WCRM 1993)
nonremovable	ca.1972 (WCRM 1993)
button down	1975 (Gillio 1980)
Church key opener	1935-1970's (WCRM 1993)
Geared rotating opener	1925 to present (Gillio 1980)
"Punch Here" on milk cans	1935-1945 (Rock 1989)
Milk cans over 4"	pre 1930/31

SEAMS

Tin Can Cheat Sheet

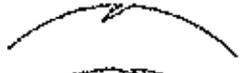
From Jim Rock 1988



Plumb



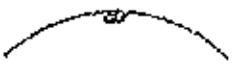
Overlap



Lock Side or Folded



External Rolled

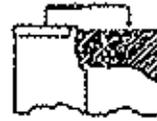


Internal Rolled

Hole & cap  
Giebee



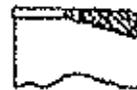
Hole & cap  
McDonald



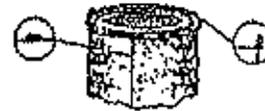
Hole-in-cap



Stamped  
End



Vent hole



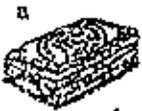
Sanitary



Hinged Lid  
Tobacco



a



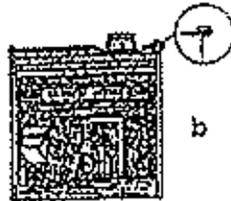
b



c



d



b

Log Cabin

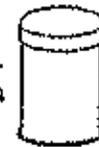


Key-wind/side strip  
reclosable



Key-wind/top strip  
drawn

External  
Friction



Pressure  
Seal/  
Multiple  
Friction



Tobacco:

- a. Lunch box
- b. Flat pocket
- c. Flat fifties
- d. Upright pocket/  
striker plate

Log Cabin:

- a. ca.1909
- b. post-1945



OPENING METHODS

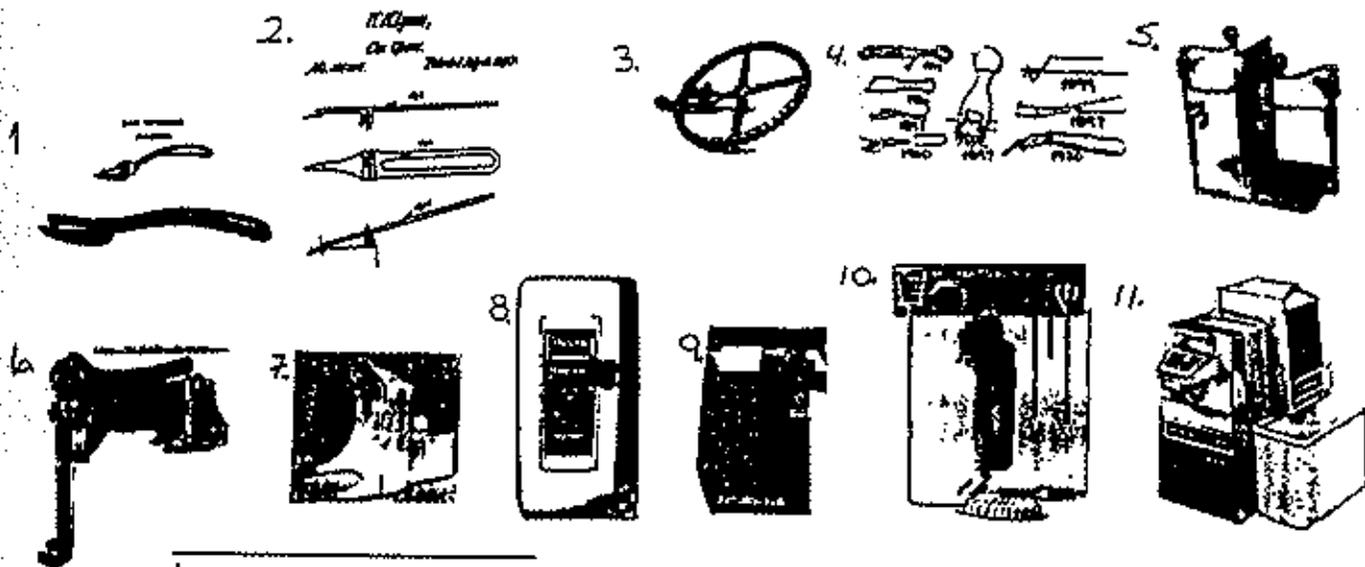
- a. "T" - knife
- b. Slash - knife
- c. Puncture - Ice pick
- d. Hopper
- e. "X" - knife
- f. Knife cut/folded back

Other  
Hinged  
Lid tins



## HOUSEHOLD CAN OPENERS

- 1858 - First U. S. patent, No. 19,063. Bel-like can openers. See example 1.<sup>1</sup>
- 1870 - First cutting wheel patent by William W. Lyman. Example 2.
- 1886 - The Hopper can opener. A round wheel with a center pin used to pierce the center of the can; then used as the cutting blade after being adjusted to the edge of the can. Example 3.
- 1870 - 1920 - There was little change in the design of can openers during this time. Example 4.
- 1925 - First can opener with a serrated or toothed can feed wheel or gear to rotate the can against the cutting wheel.
- 1930 - First wall mounted can opener. De Sey Corporation, St. Louis, Missouri.
- 1931 - The Bunker is the first can opener to use the concept of pliers. Pivoted handles hold the can in one hand while a key handle geared to a cutting wheel turned by the other hand. Bunker-Cincoy Company, Kansas City, Missouri.
- 1935 - The Smoothbox - a compound-angled cutting wheel principle which shears cans of different diameter and shapes more uniformly.
- 1936 - The Swing-A-Way - a regular table top opener could be fastened to a wall. It is attached to a hinge that allowed the user to swing the opener away from the wall to be used or back against the wall to not take up room.
- 1939 - First hand-cranked can opener with no separate can piercing lever (positive single-action).
- 1942 - First wall type with a gear driven mechanism.
- 1946 - First hand-cranked positive single-action to have its mechanism enclosed in an attractive casing.
- 1948 - First with magnetic lift-lifter. Introduced on a Swingmaster, Swing-A-Way. By Stiel Products.
- 1949 - First with a cutting wheel that can readily be removed for cleaning and replaced without tools.
- 1952 - First with a vacuum suction cup base. Operated by manipulating a cam lever, used on a vertical or horizontal surface.
- 1956 - First electric wall-mounted model. Klassen Enterprises, Centerville. Patent No. 2,789,345. Example 7.
- Combination can-opener and knife sharpener. Union Corp., Santa Monica. Patent No. 2,697,589. Example 8.
- 1957 - First combination can opener, food grinder, and ice crusher. John Oster Manufacturing Co.
- 1962 - First electric can opener with specialized push-button controls. Equipped with three buttons, one for each size can. When one was pushed the opener started and then stopped automatically when the top of the can was opened. Dazzy Corporation.
- 1964 - The Can Do, the first hand-held, portable electric combination can opener and food mixer. It opens cans, sharpens knives, whisks, mashes blends, mixes, etc. Rosco Corporation, Woodbridge, New Jersey. Example 10.
- 1966 - First combination can opener and ice crusher. Oster.
- 1968 - First combination can opener and juicer. Oster.
- 1969 - First electric with a one-piercing lever that could be removed for cleaning and replacement without tools. Sansonite Corporation. Patent No. 3,423,825.
- First combination can opener and salad maker. Oster.
- 1971 - First electric designed to cut through the side of a can rather than through the lid, thus the lid could be re-used as a cover.
- 1972 - Example 11 - a combination can opener and ice crusher - Sunbeam CS 40.
- 1972 - Present -<sup>2</sup>



<sup>1</sup> Early can openers were equipped with a curved blade that was attached to a wooden or metal handle. The blade ends in a sharp point used to puncture the can, the curve blade is then used to open the can.

<sup>2</sup> Today can openers have had virtually no change since the early 1970's. Many of the electric can openers found will resemble the 1972 Sunbeam (ex. 11) without the ice maker, or the traditional "Bunker" style.

### Bibliography

Libbey, Earl. *The Housewares Story*. National Housewares Manufacturers Association, Chicago. 1973.

# Clorox Bottles: A Key to Their Identification and Date of Manufacture

By

Linda C. Sandelin

Associate State Archaeologist  
California Department of Forestry and Fire Protection

June 11, 1998

This paper was written to be used by foresters and other resource professionals as part of CDF's Archaeological Training Program. Information on the dating of Clorox bottles may prove to be a valuable tool during the evaluation of historical sites since these items are frequently found in historic trash dumps. These bottles have distinctive markings allowing for a precise way to date the bottle; therefore one can fairly accurately date a site containing Clorox bottles. Information on dates and characteristics about Clorox Bottles was obtained for this paper from communication with The Clorox Company.

Established in Oakland, California, the Electro-Alkaline Company in 1913 began manufacturing liquid bleach for industrial purposes in 5-gallon crockery containers. The label with the diamond shaped design and word "Clorox" in the center originated at this time. Clorox bleach was used primarily in Oakland's laundries, breweries, walnut processing sheds, and local municipal water companies. These five-gallon containers were the company's only form of manufacture until 1918 when, in order to save the company from foreclosure, Electro-Alkaline expanded into the individual household market by manufacturing 15-ounce amber glass "pint" containers with rubber stoppers. This new household version quickly gained popularity and the company distributed their product throughout the country. From 1918 through 1928 the amber glass containers were used by many other companies, which bottled a variety of liquid products. Therefore, unless the paper label is on the bottle or the stopper that has the Clorox name on it is still attached, one can not determine if it is indeed a Clorox bottle.

In 1928 the company went public and became the Clorox Chemical Company. From 1929 on, "Clorox" glass bottles with rubber stoppers became distinguishable by numerous characteristics. From 1929 through 1930 the Clorox diamond trademark was found on the bottom of the bottle. The rubber stoppers had the word "Clorox" on the top. In 1931, "Clorox" was added in solid lettering to the neck and shoulder and in 1932 to the heel as well. Starting in 1933 the contents were identified and four years later a fill line was included under the content identification. The neck area was widened to 3 1/4" circumference in 1938. The following year saw the advent of their half-gallon jug with a finger-ring. A major bottle design change occurred in 1940 when the threaded neck appeared and screw caps replaced rubber stoppers. No other changes occurred to the bottles over the next five years. A grained texture was included on the shoulder and heel in 1945. The one-gallon container with a finger ring handle was introduced during this time. In 1951 outline lettering replaced the solid lettering which had been used for twenty years. The grained texture extended down the label panel. In 1955 the raised fill line replaced the side content identification. A two-fingered handle replaced the finger-ring for both the gallon and half-gallon bottles. In 1958 the grained texture was removed from the side of the label panel and remained only on the shoulder and heel. In 1959 the neck area on pints and quarts became more streamlined and bulb shaped. The four-finger handle on gallon and half-gallon jugs made its debut. Conversion to white, polyethylene plastic bottles began in 1960 and completely phased out glass Clorox bottles by 1962.

#### *Reference:*

*Letter report to CDF Archaeologist Linda Sandelin from Kedron C. Miller, Product Specialist, Clorox Company 5/20/98, on file at the CDF Archaeology Office, Fresno*



1938-39  
Rubber stopper  
Neck area 3 1/4"  
Fill line below lettering  
Solid lettering at neck, shoulder, and base



1940-44  
Threaded neck  
Solid lettering  
Half-gallon with finger ring



1951-54  
Threaded neck  
Outline lettering on neck  
Grained texture down label panel



1958-59  
Threaded neck  
Solid lettering  
Raised fill line  
Grained texture on should and heel



1958-1959

Grained texture on shoulder and base only. Neck size changes.



1943-1944

Pint and quart sizes modified to 4 1/2" x 10" 2-7/16" around.



1939

Neck title change. Introduction of half-gallon size with finger ring handle.



1933-1936

Content identification added.



1931

Solid lettering on neck and shoulder.



1938

Position of 1/2 line raised without content identification.



1932

Additional solid lettering on shoulder and neck.



1938

Neck area widened to 3 1/16" around.



Clear diamond leadmark on bottom.



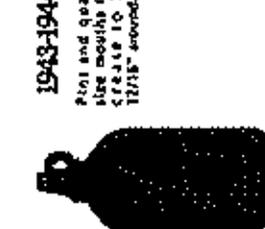
1951-1954

Solid lettering replaced by outline lettering. Grained texture extends down last panel.



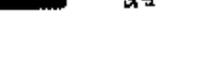
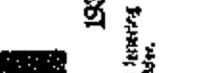
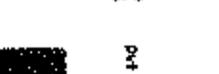
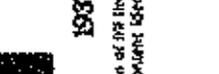
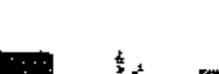
1955-1959

Side capless identification replaced by raised full line. Two-finger handle appears on gallon and half-gallon.



1940-1942

Content identification moves to side. Threaded neck appears. Pint and quart sizes modified to same 2-7/16" around.



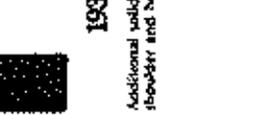
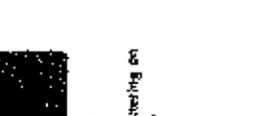
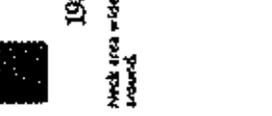
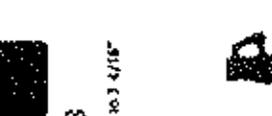
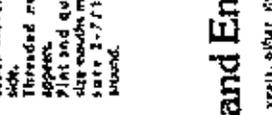
1959-1962

More streamlined bulb tapered neck area on pint and quart. Four finger handle on gallon and half-gallon.



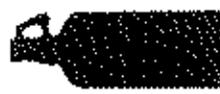
1945-1950

Grained texture added on shoulder and neck. Introduction of gallon size with finger ring handle.



## Odds and Ends

Through the years, other styles of Clorox bleach bottles were considered by the Clorox Company. None of them ever reached big national distribution because they failed to meet Clorox's exacting packaging standards. However, some were distributed as test markets or sample bottles. Consequently, collectors may occasionally come across a Clorox bottle not included in this guide. Two of the most common odd Clorox bottles are shown below.



1957

Quart



1960

Half pint

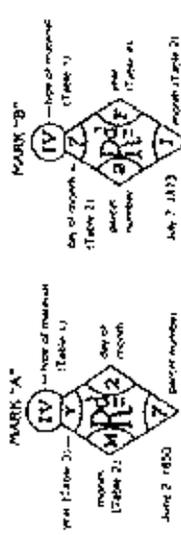
### ENGLISH REGISTRY MARKS

English registry marks are perhaps the most comprehensive and useful marks for dating any piece of English pottery and porcelain. Since 1842, English decorative art designs (including wood, glass, metal, and ceramic designs) were registered at the British Patent Office, but not every registered piece is marked.

To obtain more detailed information, write to one of the following addresses:

For pieces registered before 1909 For pieces registered after 1909  
Public Record Office Designs Registry  
Aldrich Avenue Patent Office  
New, Richmond Chancery Lane  
Surrey, England London WC2A 1LR England

The Public Record Office or Patent Office may charge a small fee. Here are some notes to help date any piece that bears an English registry mark.



A diamond-shaped registry mark was used between 1842 and 1867.

"B" represents the mark used between 1842 and 1867; mark "A" represents the mark between 1868 and 1883. After 1883, the diamond-shaped marks were replaced by the letters R, No. (for registry number) —, and numbers indicating the year the piece was registered (see Mark "C").

In Mark "A," the various letters and numbers indicate the following: the large "Rd" means "registered"; the Roman numeral in the circle at the top of the mark represents the type of material from which the piece is made (see Table 1); the Roman numeral in the top inside section of the diamond represents the year the piece was registered.

(see Table 3); the Arabic numeral on the right-hand section represents the day of the month the piece was registered; the Arabic numeral in the section at the bottom represents the patent number, which is a code indicating the person or company who registered the piece; and the letter in the left-hand section represents the month the piece was registered (see Table 2). In other words, Mark "A" appeared on a piece of ceramics registered on June 2, 1850.

In Mark "B," the various letters and numbers reflect the following: the large "Rd" means "registered"; the Roman numeral in the circle at the top of the mark represents the type of material from which the piece was made (see Table 1); the Arabic numeral in the top inside section of the diamond represents the day of the month; the letter at the right-hand section represents the year the piece was registered (see Table 4); the letter in the bottom segment represents the month the piece was registered (see Table 2); and the Arabic numeral at the left-hand side represents the patent number. In other words, this mark appeared on a piece of ceramics registered on July 7, 1873.

Type of material or class	Year of Manufacture
I—metal	1842—X
II—wood	1843—R
III—ceramics	1844—C
	1845—A
	1846—L
	1847—F
	1848—D
	1849—S
	1850—Y

Month of the Year of Manufacture	Year of Manufacture
C—January	1851—P
G—February	1852—D
H—March	1853—Y
R—April	1854—A
D—May	1855—E
K—June	1856—L
N—July	1857—R
S—August	1858—Q
O—September	1859—B
B—October	1860—V
F—November	1861—J
A—December	1862—M

Year of Manufacture	Year of Manufacture
1863—N	1874—H
1864—J	1875—S
1865—E	1876—Y
1866—L	1877—A
1867—R	1878—D
1868—Q	1879—F

After 1883, the diamond marks were discontinued and a simpler marking system, consisting of the letters "Rd No." followed by a number, was instituted. This mark appears on decorative art (china, glass, metal, or wood) manufactured in England since 1884.

### MARK "C"

Table 5: Design Registry Numbers—1884—1981 lists the English registry numbers by year. (For example, if a piece is marked with the number Rd. No. B21265, it was registered sometime in 1937.)

TABLE 5  
Design Registry Numbers 1884—1981

Year	Design Registry Numbers
1884	1
1885	1884—451321
1886	1885—20000
1887	1886—40800
1888	1887—66700
1889	1888—91800
1890	1889—117800
1891	1890—142000
1892	1891—164000
1893	1892—186400
1894	1893—208100
1895	1894—225000
1896	1895—248700
1897	1896—268800
1898	1897—281400
1899	1898—299914
1900	1899—31677
1901	1900—332000
1902	1901—351600
1903	1902—368186
1904	1903—385100
1905	1904—402300
1906	1905—424400
1907	1906—447800
1908	1907—471800
1909	1908—493900
1910	1909—518640
1911	1910—535170
1912	1911—548919
1913	1912—548920
1914	1913—575817
1915	1914—594195
1916	1915—612431
1917	1916—630190
1918	1917—648435
1919	1918—667260
1920	1919—686500
1921	1920—706243
1922	1921—726330
1923	1922—746770
1924	1923—767670
1925	1924—789019
1926	1925—810879
1927	1926—833200
1928	1927—856070
1929	1928—879483
1930	1929—903364
1931	1930—927725
1932	1931—952570
1933	1932—977922
1934	1933—1003700
1935	1934—1029200
1936	1935—1054700
1937	1936—1080200
1938	1937—1105700
1939	1938—1131200
1940	1939—1156700
1941	1940—1182200
1942	1941—1207700
1943	1942—1233200
1944	1943—1258700
1945	1944—1284200
1946	1945—1309700
1947	1946—1335200
1948	1947—1360700
1949	1948—1386200
1950	1949—1411700
1951	1950—1437200
1952	1951—1462700
1953	1952—1488200
1954	1953—1513700
1955	1954—1539200
1956	1955—1564700
1957	1956—1590200
1958	1957—1615700
1959	1958—1641200
1960	1959—1666700
1961	1960—1692200
1962	1961—1717700
1963	1962—1743200
1964	1963—1768700
1965	1964—1794200
1966	1965—1819700
1967	1966—1845200
1968	1967—1870700
1969	1968—1896200
1970	1969—1921700
1971	1970—1947200
1972	1971—1972700
1973	1972—1998200
1974	1973—2023700
1975	1974—2049200
1976	1975—2074700
1977	1976—2100200
1978	1977—2125700
1979	1978—2151200
1980	1979—2176700
1981	1980—2202200
1982	1981—2227700
1983	1982—2253200
1984	1983—2278700
1985	1984—2304200
1986	1985—2329700
1987	1986—2355200
1988	1987—2380700
1989	1988—2406200
1990	1989—2431700
1991	1990—2457200
1992	1991—2482700
1993	1992—2508200
1994	1993—2533700
1995	1994—2559200
1996	1995—2584700
1997	1996—2610200
1998	1997—2635700
1999	1998—2661200
2000	1999—2686700
2001	2000—2712200
2002	2001—2737700
2003	2002—2763200
2004	2003—2788700
2005	2004—2814200
2006	2005—2839700
2007	2006—2865200
2008	2007—2890700
2009	2008—2916200
2010	2009—2941700
2011	2010—2967200
2012	2011—2992700
2013	2012—3018200
2014	2013—3043700
2015	2014—3069200
2016	2015—3094700
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2023	2022—3273200
2024	2023—3298700
2025	2024—3324200
2026	2025—3349700
2027	2026—3375200
2028	2027—3400700
2029	2028—3426200
2030	2029—3451700
2031	2030—3477200
2032	2031—3502700
2033	2032—3528200
2034	2033—3553700
2035	2034—3579200
2036	2035—3604700
2037	2036—3630200
2038	2037—3655700
2039	2038—3681200
2040	2039—3706700
2041	2040—3732200
2042	2041—3757700
2043	2042—3783200
2044	2043—3808700
2045	2044—3834200
2046	2045—3859700
2047	2046—3885200
2048	2047—3910700
2049	2048—3936200
2050	2049—3961700
2051	2050—3987200
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2053	2052—4038200
2054	2053—4063700
2055	2054—4089200
2056	2055—4114700
2057	2056—4140200
2058	2057—4165700
2059	2058—4191200
2060	2059—4216700
2061	2060—4242200
2062	2061—4267700
2063	2062—4293200
2064	2063—4318700
2065	2064—4344200
2066	2065—4369700
2067	2066—4395200
2068	2067—4420700
2069	2068—4446200
2070	2069—4471700
2071	2070—4497200
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2074	2073—4573700
2075	2074—4599200
2076	2075—4624700
2077	2076—4650200
2078	2077—4675700
2079	2078—4701200
2080	2079—4726700
2081	2080—4752200
2082	2081—4777700
2083	2082—4803200
2084	2083—4828700
2085	2084—4854200
2086	2085—4879700
2087	2086—4905200
2088	2087—4930700
2089	2088—4956200
2090	2089—4981700
2091	2090—5007200
2092	2091—5032700
2093	2092—5058200
2094	2093—5083700
2095	2094—5109200
2096	2095—5134700
2097	2096—5160200
2098	2097—5185700
2099	2098—5211200
2100	2099—5236700

Based on information supplied by the Patent Office, Charney Lane, London.

1986 Kovel, Ralph and Terry  
Kovels' New Dictionary of Marks Pottery and  
Porcelain - 1850 to the Present  
Crown Publishers, Inc. New York, New York

# Introduction to Pop

## Part 1: The History of Pop Timeline



By Mary Bellis

To understand this timeline and the terms described here, please read our [Introduction to Pop](#), where you will find background information on the history of soft drinks. Several of the entries below also have expanded information available, use the hyperlinks.

1798 The term "soda water" first coined.

1810 First U.S. patent issued for the manufacture of imitation mineral waters.

1819 The "soda fountain" patented by Samuel Fahnestock.

1835 The first bottled soda water in the U.S.

1850 A manual hand & foot operated filling & corking device, first used for bottling soda water.

1851 Ginger ale created in Ireland.

1861 The term "pop" first coined.

1874 The first ice-cream soda sold.

1876 Root beer mass produced for public sale.

1881 The first cola-flavored beverage introduced.

1885 Charles Aderton invented "Dr Pepper" in Waco, Texas.

1886 Dr. John S. Pemberton invented "Coca-Cola" in Atlanta, Georgia.

1892 William Painter invented the crown bottle cap.

1898 "Pepsi-Cola" is invented by Caleb Bradham.

1899 The first patent issued for a glass blowing machine, used to produce glass bottles.

1913 Gas motored trucks replaced horse drawn carriages as delivery vehicles.

1919 The American Bottlers of Carbonated Beverages Formed.

### More of this Soft Drink Feature

- [Part 1: Soft Drink Timeline](#)
- [Part 2: Introduction to Pop: The History of Soft Drinks](#)
- [History of Pepsi-Cola](#)
- [History of Coca-Cola](#)
- [History of 7-Up](#)
- [History of Dr. Pepper](#)
- [The History of Ginger Ale](#)
- [The History of Root Beer](#)
- [John Matthews: "Father of American Soda Water"](#)

### Soft Drinks on the Web

- [The History of the Soft Drink Industry](#)
- [Soda Bottle History](#)
- [Soda Bottle Cans Display](#)
- [History of the Beverage Can](#)
- [Museum of Beverage Containers & Advertisins](#)
- [The National Soft Drink Association](#)
- [Ingredients in Soft Drinks](#)
- [Glossary of Soft Drink Terms](#)
- [Soft Drink Brand Index](#)
- [Coke Vs. Pepsi](#)

### Related Innovations

- [The Soda Fountain](#)
- [Joseph Bramah](#)
- [Vending Machines](#)

1920 The U.S. Census reported that more than 5,000 bottlers now exist.

Early 1920's The first automatic vending machines dispensed sodas into cups.

1923 Six-pack soft drink cartons called "Hom-Paks" created.

1929 The Howdy Company debuted its new drink "Bib-Label Lithiated Lemon-Lime Sodas" later called "7-Up". Invented by Charles Leiper Grigg.

1934 Applied color labels first used on soft drink bottles, the coloring was baked on the face of the bottle.

1952 The first diet soft drink sold called the "No-Cal Beverage" a gingerale sold by Kirsch.

1957 The first aluminum cans used.

1959 The first diet cola sold.

1962 The pull-ring tab first marketed by the Pittsburgh Brewing Company of Pittsburgh, PA. The pull-ring tab was invented by Alcoa.

1963 The Schlitz Brewing company introduced the "Pop Top" beer can to the nation in March, invented by Ermal Fraze of Kettering, Ohio.

1965 Soft drinks in cans dispensed from vending machines.

1965 The resealable top invented.

1966 The American Bottlers of Carbonated Beverages renamed The National Soft Drink Association.

1970 Plastic bottles are used for soft drinks.

1973 The PET (Polyethylene Terephthalate) bottle created.

1974 The stay-on tab Invented. Introduced by the Falls City Brewing Company of Louisville, KY.

1979 Mello Yello soft drink is introduced by the Coca Cola company as competition against Mountain Dew.

1981 The "talking" vending machine invented.

# Dr Pepper Product Changes

## Bottle Logos 1885-1979

1885

*Dr. Pepper*

*Dr Pepper*

DRINK

*Dr. Pepper*  
KING OF BEVERAGES

1905

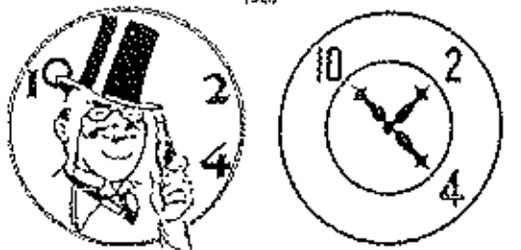
*Dr. Pepper*  
GOOD FOR LIFE

1923



First Cans 1954

1926



First Crown Top Logo 1950



1934



1962



First Colored Label 1955

*Dr Pepper*

1950

Diet



1963

1958



1979



1960



First Diet Bottle Design 1963

## Sources

Ellis, Harry E. *Dr Pepper: King of Beverages*. Taylor Publishing Company. Dallas. 1979.  
Old Corner Drug Store Museum located in Dr Pepper international headquarters in Dallas, Texas.

## Coca-Cola Bottle Typology

This sheet chronologically examines the differences in Coca-Cola bottle design from 1894 through 1975.

2) This is the first type of bottle Coca-Cola was bottled in. This is referred to as a Hutchinson-style bottle, named after the creator of the type of stopper used to seal these bottles. These were first bottled in 1894 by Joseph A. Biedenharn of Vicksburg, Mississippi. The owner of a soda-fountain store, Biedenharn became the first (though unofficial) bottler of Coca-Cola when he became angered that distributors couldn't supply him with enough of the beverage to fill an order for workers at a nearby plantation. Note that this bottle has Biedenharn's store insignia and not the trademark Coca-Cola emblem.

1) Hutchinson-style bottle used by Coca-Cola manufacturers starting in November of 1899. This bottle went out of use at the end of 1902. Note the smaller size compared with Biedenharn's bottles and also note the official use of the company logo. These were bottled in Chattanooga.

C) Straight sided bottles used from 1900-1916. Both flint and amber colored glass were used by bottlers in this period. Note that these bottles included the embossed trademark Coca-Cola emblem in the glass. These were the first bottles to use the crown closure (similar to what is used today). This closure went into full use by 1903.

D) Nov. 16, 1915, the first Coca-Cola bottle with the classic contour design is introduced. In December 1916 the Kool Glass Company of Terre Haute, Indiana goes into full production of this curved design.

E) Two successive designs (1923 & 1937). Bottles were used from 1923 through 1951 when the patent revisions between the two of them expired. The 1923 bottle was patented on Dec. 25, 1923 while the 1937 bottle had the patent number D-105529 on it. Note that these two bottles have a slightly more rounded lower lip compared with the original 1915 contour bottle. The contours also undergo a slight smoothing. The body of the 1937 bottle is less bulbous in appearance than previous contour bottles.

F) This 1957 contour bottle design was the first to feature the applied color label on the glass. This white painted label became the company's trademark and continued thereafter.

G) This bottle design was introduced in June of 1961 in Glasgow, Montana. This was a "one-way" bottle that had no deposit. Note the different lip that used a screw cap. The curvature of the body contour is noticeably smoother when compared to the original contour bottle.

H) This one-way plastic bottle was a ten-ounce package that retained the familiar contour design. This bottle also used the screw cap and had a limited test distribution from 1970-1975.

### Sources:

Oliver, Thomas (1966) *The Real Coke, The Real Story*. New York: Penguin Books.

Matters, Pat (1976) *Coca-Cola: An Illustrated History*. New York: Doubleday & Co.



1894  
A

1899-1902  
B

1900-1916  
C

1915  
D

1923-1937  
E

1957  
F

1961  
G



site NON officiel  
www.cocacolaweb.com

## Slogans for Coca-Cola

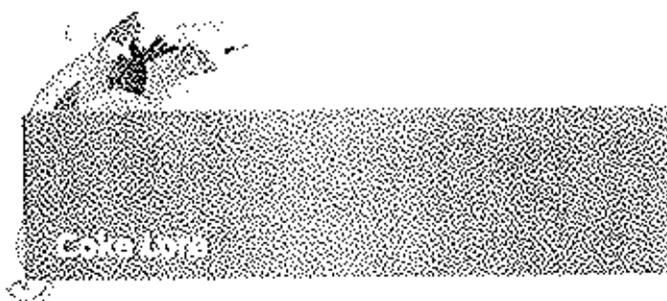
(Il s'agit des versions internationales en anglais)

- 1886 - Drink Coca-Cola
- 1904 - Delicious and Refreshing
- 1905 - Coca-Cola Revives and Sustains
- 1906 - The Great National Temperance Beverage
- 1917 - Three Million a Day
- 1922 - Thirst Knows No Season
- 1923 - Enjoy Thirst
- 1924 - Refresh Yourself
- 1925 - Six Million a Day
- 1926 - It Had to Be Good to Get Where It Is
- 1927 - Pure as Sunlight
- 1927 - Around the Corner from Everywhere
- 1929 - The Pause that Refreshes
- 1932 - Ice Cold Sunshine
- 1938 - The Best Friend Thirst Ever Had
- 1939 - Thirst Asks Nothing More
- 1939 - Whoever You Are, Whatever You Do, Wherever You May Be, When You Think of Refreshment Think of Ice Cold Coca-Cola
- 1942 - The Only Thing Like Coca-Cola is Coca-Cola Itself
- 1948 - Where There's Coke There's Hospitality
- 1949 - Along the Highway to Anywhere
- 1952 - What You Want is a Coke
- 1956 - Coca-Cola... Makes Good Things Taste Better
- 1957 - Sign of Good Taste
- 1958 - The Cold, Crisp Taste of Coke
- 1959 - Be Really Refreshed
- 1963 - Things Go Better with Coke
- 1969 - It's the Real Thing
- 1971 - I'd Like to Buy the World a Coke (part of the "It's the Real Thing" campaign)
- 1975 - Look Up America
- 1976 - Coke Adds Life
- 1979 - Have a Coke and a Smile
- 1982 - Coke Is It!
- 1985 - We've Got a Taste for You (for both Coca-Cola & Coca-Cola classic)
- 1985 - America's Real Choice (for both Coca-Cola & Coca-Cola classic)
- 1986 - Red, White & You (for Coca-Cola classic)
- 1986 - Catch the Wave (for Coca-Cola)
- 1987 - When Coca-Cola is a Part of Your life, You Can't Beat the Feeling
- 1988 - You Can't Beat the Feeling
- 1989 - Official Soft Drink of Summer
- 1990 - You Can't Beat the Real Thing
- 1993 - Always Coca-Cola
- 2000 - Coca-Cola. Enjoy
- 2001 - Life Tastes Good

## Slogans for Coca-Cola :: Coca-Cola Web

- 2003 - Coca-Cola... Real
- 2005 - Make It Real
- 2006 - The Coke Side of Life

[www.cocacolaweb.com](http://www.cocacolaweb.com)



#### Trademark Chronology

*Coca-Cola*

When John S. Pemberton created the formula for his new drink in 1886, his partner and bookkeeper, Frank J. Robinson, suggested the name "Coca-Cola," thinking that "the two Cs would look well in advertising."

*Qoca-Qola*

Mr. Robinson wanted his name for the new product to have an effective and dramatic style of its own. He experimented in writing out an adaptation of the elaborate Spencerian script, a form of penmanship characteristic of that day. He wrote out the name: Coca-Cola and, after consultation, the other working at Pemberton's company adapted the script by unanimous consent.

*Coca-Cola*

The trademark Coca-Cola, even in flowing handwriting, became through the years just what Mr. Robinson wanted it to be -- a distinctive and unique trademark for the drink first sold at an Atlanta pharmacy. The famous script has seen slight changes in more than a century, and some of these adaptations appear below.

*Coca-Cola*

1887-1890s -- The words "Trade mark" are written in the tail of the "C" in Coca.

*Qoca-Qola*

1890-1893 -- The crisscross of the script showed the greatest departure from Robinson's original.

*Coca-Cola*

1893-1901 -- The words "Trade mark" are again written in the tail of the "C" in Coca.

*Coca-Cola*

1903-1921 -- The words "Trade mark Registered" are written in the tail of the "C" in Coca.

*Coca-Cola*

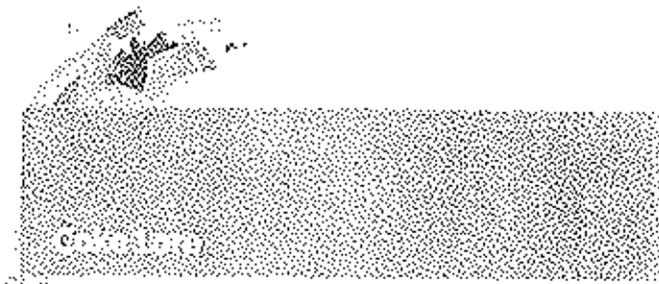
1930-1941 -- The words "Trade mark Registered" appear in the tail of the "C" in Coca.

*Coca-Cola*

1941-1960s -- In this version, the words "Trade mark Registered" moved out of the tail of the "C" and were noted as "Reg. U.S. Pat. Off." below the Coca-Cola name.

<http://www.cocacolaweb.com/dynamic/histoires.php?id=17>

*The Coca-Cola Company*



1956-1969 - This period saw the introduction of the first form of "ribbed" logo



1969 - The Arden Square with the Dynamic Ribbon Device (commonly called the "wave") was introduced



1990s - We see a modified Dynamic Ribbon Device with the ribbon integrated within the "Coca-Cola" name. Note the missing lower loop in the "l" of Cola. It was only missing in its treatment with the Dynamic Ribbon. When the trademark stood alone, the loop was present.



2003 - With the introduction of the "Coca-Cola" First Campaign, the Dynamic Ribbon Device was enhanced in the logo

<http://www.cocacolaweb.com/dynamic/histoires.php?id=17>

*The Coca-Cola Company*

## A Primer on Fruit Jars

by Dave Hinson. (Originally published in the December 1996 edition of *Bottles and Extras*.)

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### HOW IT ALL BEGAN

The discovery that fed our troops became the discovery that helped pioneer our nation!

The hermetic preserving of food... This revolutionary invention allowed families to prepare for the winter by "putting up" what they had in abundance in the fall. Families often traded a jar of this for a jar of that, preparing for the lean season with relative abundance. The invention of the fruit jar, or mason jar as it was called, made life a little easier; best of all it made Winter meals far more nutritional and palatable.

Imagine that you live in a different place. This place has none of the modern essentials to which you are accustomed. There are no fast food restaurants, there are no grocery stores, there are no super-highways and there is no electricity. Everyone works hard.



In this mythical place you save and use everything. Nothing goes to waste. Life is simple, but the problems you face are varied and challenging. In many parts of the nation winters are often harsh and bitter cold; there is no forced-air heating to keep your family warm. In order to survive the winter, you must prepare for it beforehand.

You aren't rich, so the few material goods that you own are used over and over again. The tools you own are few and therefore have many uses. Every container, every scrap of metal, every bit of wire has a purpose.

This is the household of the 1800s. Someday, life will be better, easier - but not today. Despite the hardships of the time, most still look to the future with great optimism. Men and women are learning how to master their environment through the invention of machines. Many have made their fortunes by using their creative ingenuity and inventing something new.

Some of the greatest advancements in science have come about as a result of the necessities that wars and hardships create. One of the greatest challenges that armies faced in the early nineteenth century was feeding troops. It was through this need, generated by war, that the hermetic preserving of food came about.

In order to give French troops the competitive edge, Napoleon, in 1809, offered 10,000 francs to the man who could come up with an idea to assure delivery of wholesome food to soldiers. Nicholas Appert - a French chef of the time - is generally credited as the father of hermetic preserving. Appert won Napoleon's challenge by introducing the concept of preserving food hermetically. In 1810, Appert published his discovery in a book entitled *L' Art de Conserver les Substances Animales et Vegetables*.

Despite a great need, however, home canning didn't become commonplace until the latter half of the nineteenth century. Until someone invented better containers, fifty years later, around the time of the civil war, homemakers used crude glass and earthen-

were vessels sealed with corks, plugs or parchment. This method didn't work well, but it was better than the alternative of the time — using tin cans and soldering them closed!

The term fruit jar may predate the invention of what we know today as the modern mason or canning jar. Colonial bottle maker Thomas Dyott is credited with coining the term - possibly referring to the vessels sealed with corks and parchment mentioned above.

In 1861, Louis Pasteur wrote that microorganisms in un-sterilized food were responsible for food spoilage. Up until this time, even though people boiled the vessels in which they canned their food, few understood why it worked. The common belief was that air caused spoilage and hermetic sealing of food and removal of air from vessels prevented spoilage. However, once Pasteur's discovery was understood, scientists, manufacturers and food preparers began developing more reliable means of food preservation by sterilizing the food as well as the container.

## THE INVENTORS

In 1855, pioneer Robert Arthur had an idea for a better vessel in which to preserve food. Originally produced in metal, his patent called for a wax, (commonly called cement,) which the manufacturer poured around the mouth of the container. All the food preparer had to do was heat the lid and press it into the cement. A few others patented similar techniques of sealing tin cans without soldering.



However, these metal cans didn't fare well with homemakers because one couldn't use the cans over and over again. They were big, heavy and bulky, and cost a lot of money. The acids in foods reacted with the metal, and the results were somewhat less than tasty. If you're lucky enough to find an original example of one of these containers today, however, it would be worth several hundred dollars.

Glass made the revolution in canning complete. Sealed with a tin lid and wax, the all-glass wax sealer, cement jar, or "standard" fruit jar remained popular throughout the remainder of the 19th century. The jar would seal fairly reliably when the user poured wax over a tin lid resting in a groove in the jar's lip. The "wax sealer" is a later variation of the first fruit jars which used corks covered with wax. Wax sealers were, of course, made of glass, (avoiding the problems with metal containers above) reusable and much more economical.

This jar was not without its drawbacks. Opening the wax sealer was difficult because you either had to chip the wax away or sock the wax off of the jar's top. The first wax sealers date back to the 1850s, and probably as early as the 1830s. Despite the imperfections, wax sealers enjoyed a long life - glassmakers produced the jars as late as 1912.

The familiar term mason jar came after its inventor Mr. John L. Mason, (26 years of age at the time he filed his famous patent,) a tin smith from New York city. Like the wax sealer, the mason jar is reusable. The improvement was in the sealing design, a glass container with a thread molded into its top and a zinc lid with a rubber ring, effecting a seal between the lid and the jar. This jar carries the familiar embossing: "Mason's Patent Nov. 30th, 1858."

The mason jar is historically important because it freed farm families from reliance on inferior containers, and from using

pickling, drying, and smoking food to prepare for the winter. The ease of use and affordability of Mason jars helped promote home canning across the nation. Urban families used Mason jars to put up garden food, especially tomatoes, fruits, relish, and pickles.

Collectors often find jars carrying the classic 1858 embossing, along with other monograms, numbers, letters, and styles. American manufacturers, and others world wide produced these jars with the characteristic 1858 embossing as late as about 1920. Historians believe Crowleytown's Atlantic Glass Works, Crowleytown, New Jersey made the first of this long series of mason jars.

In 1859, Mason sold five of his early patents, including the mason jar, to Lewis R. Boyd and Boyd's company - The Sheet Metal Screw Company. Boyd is most famous for patenting a white "milk-glass" insert for zinc screw lids to theoretically lessen the chances that food would come in contact with metal. In 1871, for a brief period of time, Mason became a partner with Boyd in the Consolidated Fruit Jar Company. Consolidated hired other glass makers to blow their jars, including the Clyde Glass Works, Clyde, New York, the Whitney Glass Works of Glassboro, New Jersey, and the A. & D. H. Chambers Company of Pittsburgh, Pennsylvania. Even after Mason's patents expired, the manufacture of these jars continued for well over half a century. The companies that produced the Mason jar between 1859 and 1910 are too numerous to mention.

## OTHER POPULAR 19TH CENTURY CLOSURES

Dating back to the time of the civil war, (patents related to this jar date from 1861,) manufacturers used a "thumb screw clamp" and glass-lid design on several different jars. The large yoke-shaped cast metal clamp holds down a glass lid which fits over a grooved mouth or into the jar neck. Around the lid the user laid an India rubber gasket which effected the seal. The Millville Atmospheric Fruit Jar, patented by John M. Whitall, Philadelphia, became popular after the Civil War. Again, this jar is significant in that metal never touches the food.

Patented in 1863, the Kline Stopper remained popular through the 1870s. A gasket sealed the jar between the solid glass stopper and the inside of the jar mouth. As the jar cooled a vacuum formed, pulling the stopper into the mouth of the jar. Needless to say, this system proved frustrating when it came to pulling out the stopper. Adam R. Samuel, at his Keystone Glass Works in Philadelphia, manufactured many of the jars employing the Kline patent.

On May 10, 1870, Mr. Mason was issued another patent (102,913) for a new kind of threaded-top jar. This time, the jar employed a glass lid and a screw band. As in the "thumb screw" jars above, the glass lid avoided the problem of food reacting with bare metal. Many of these jars were produced by the Consolidated Fruit Jar Company of New York and of New Brunswick, New Jersey.

In 1882, Henry William Putnam of Bennington, Vermont, invented a new kind of fruit jar by adopting a bottle stopper patent by Charles de Quilfeldt. The Lightning jars became popular because the glass lids prevented food contact with metal, the metal clamps were cheap to produce and the lids themselves were much easier to seal and remove. The name Lightning suggested that the jars were quick and easy to use. Variations of the glass lid and wire-bale scheme of the Lightning jar were produced for home canning into the 1960s and are still found on novelty jars today.

The earliest advertisements for the Lightning jar date back to the year 1885. Mr. Putnam was the man behind the marketing of the Lightning jars and making them popular. Mr. Putnam held exclusive ownership of the patents for many years.



## POPULAR CLOSURES OF THE 20TH CENTURY

In March of 1924, the University of California College of Agriculture put out a booklet on home canning. Figure 3 on page nine of that booklet included pictures of popular jars of the time including the following four jars below.

The Atlas E-Z Seal and Atlas Strong Shoulder jars: The Atlas E-Z Seal is a variation of the Lightning seal jar already described. The "Strong Shoulder" jar is a variation of the old shoulder seal mason jar. However, this jar sealed on a raised lip to help keep the jar from cracking - a common problem with shoulder seal jars. This concept led to the term "Strong Shoulder" as used by the Atlas company for their jars. The Hazel-Atlas Glass Company, makers of the E-Z Seal and Strong Shoulder jars, was in business from the late 1800s until 1964. These two jars date from the 1920s. The Hazel-Atlas company specialized in producing fruit jars.

One of the most significant advancements in the history of home preserving came with the invention of the Economy and Self Sealing jars. Alexander H. Kerr founded the Hermetic Fruit Jar Company in 1903. Mr. Kerr arranged for the production of the Economy jar utilizing patents, (two 1903 patents held by another man, Julius Landsberger of San Francisco,) calling for a metal lid with a permanently fastened composition gasket.



The lids were easy to use and inexpensive. The Economy jars had wide mouths and were easy to fill. In August of 1915, Mr. Kerr invented a smaller, flat metal disk with the same permanent composition gasket attached. The lid sealed on the top of a mason jar; a threaded metal ring held the lid down. Now the homemaker could re-use her old canning jars while taking advantage of the easy-to-use Kerr lids. (The Illinois-Pacific glass company made the early Economy jars from 1903 to 1909.)

### THE BALL COMPANY

A history of fruit jars wouldn't be complete without mentioning the Ball Company. Although the company did not necessarily advance the technology of home canning, per se, it did make a major contribution to the industry by becoming the most prolific producer of jars.

In the early 1880s, William Charles Ball, 35, and his brothers Lucius, Lorenzo, Frank C., Edmund Burke, and George Alexander began making wood jacketed tin cans at Buffalo, New York, for the storage of oil, lard and paints. In 1883 the brothers switched to glass oil "cans" and then, three years later, to fruit jars. After fire destroyed their plant in Buffalo, the brothers moved their operations to Muncie, Indiana, where natural gas had been discovered. The city offered free gas and a generous amount of land to rebuild the company.

The Ball Brothers seemed to possess all of the talents we associate with successful business people today.

They built a fruit-jar empire by mass producing and distributing train-loads of jars across the country. They aggressively took over several other smaller companies in order to maximize their hold on the industry. One good example was in 1909 when Ball took over the Greenfield Fruit Jar and Bottle Company in order to gain control of the Owens automatic bottle making machine license, a significant business opportunity they passed up some years before in favor of their own jar making machine. After all, factory automation significantly reduces labor costs, even back then. The Owens machine did just that by cutting labor costs and dramatically increasing production. (Refer also to the October 1996 Bottles and Extras article "The Three Rivers Glass Company.")

## WORLD WAR TWO AND THE EVENTUAL DECLINE OF HOME CANNING

As part of the war effort, home canning became vital during the Second World War. On the home front the government encouraged Americans to grow and can their own food. Home canning reduced the consumption of steel and tin, vital to the war effort. As the public became more self sufficient, government and industry could funnel more resources into winning the war.

Dr. Julian Toulouse was put in charge of allocation of all metal used in making lids for jars and bottles. Dr. Toulouse was at that time the chief chemist for the major Owens-Illinois glass Company of Toledo, Ohio. (He was also the producer of such famous fruit jars such as the Presto, Good House Keepers Mason and others.) Dr. Toulouse spent thirty-seven years as chief chemist for the corporation.

In an effort to cut down on the unnecessary use of metal, glass lids temporarily replaced the tin and zinc lids which had been used up until 1941. This era also saw the popularization of the smaller "63" closure which cut the size of the jar mouth, again conserving metal. The "63" lid also allowed homemakers to re-use coffee and other packing jars, further conserving resources to aid the allies in the war. The following illustration is from the Office of War Information, Farm Security Administration, showing stacks of home-canned food. The motto of the time: "be prepared."

The decline of home canning began after the end of the war. Home canning declined as large, more profitable farms began to replace the small farm in America. Fewer small farms meant fewer farmers and fewer people to work the farms. The 1950s and 1960s saw the rise of the supermarket, the fast food restaurant, and the frozen TV dinner. As we move into the final years of the 20th century we find that the art of home cooking itself, let alone the art of home canning, is quickly disappearing from the popular culture.

## TIPS ON COLLECTING

### *Dating Jars.*

There are several ways to date an antique jar or bottle. Probably the most important is the presence or absence of a pontil scar. The pontil scar - a ring of glass or a black and red iron-like indentation on the base of a bottle or jar - indicates that a glassblower held the item on a pontil rod (when the glass was hot) while the neck and/or lip was shaped and finished by hand. Typically, American pontil scarred bottles predate 1855 or so.

Another age determiner is the presence of mold seams. Many of the earliest bottles or jars were freeblown (that is, blown without the aid of a mold) therefore have no mold seams. Seams which stop short of the lip indicate that the bottle was blown into a mold then finished by hand by adding a top or tooling the lip into shape. Machine-made jars (dating after about 1915) have mold seams extending from the bottom up to and across the top of the jar.

Another way to tell the general age of a jar is to examine it from top to bottom. Is the top smooth to the touch or is it rough and ground off? Look at the base of your jar. If the base of your jar has a round ring in it and the lip is smooth, your jar was probably machine made sometime after the turn of the century but probably before the 1930s. If the jar has a large, rough and jagged ring on its base, it was probably made between 1900 and 1930 when the Owens machine was in popular use. Machine-made jars after the 1930s have a more modern look and frequently have small scars on



the bottom indicating they were made on more modern, sophisticated machines.

Most jars with rough ground tops were made before 1900. The ground lip resulted when the glassmaker ground the top to eliminate the "blow-over." The blow-over was a gob of glass at the top of a jar that the glassblower used to attach a blow pipe when the jar was blown by hand into a mold. The blow-overs were removed and the top was then ground flat.

### **Purple glass**

When manufacturers produce glass, chemicals (clarifying agents) must be added to clarify the batch in order to turn it from its original color of aqua-blue or green to clear. Prior to the start of the First World War, manufacturers used Manganese Dioxide as their chemical agent of choice to clarify glass. When a jar or bottle turns purple from sunlight, manganese dioxide is the substance in the glass that reacts with sunlight to cause the color change. Russia was the primary source of this chemical.

When the First World War broke out, our source of manganese dioxide was cut off by German blockades. This sudden loss left glass manufacturers in a quandary and forced them to use another chemical, selenium, to clarify glass. After the close of the war, manufacturers did not return to the use of manganese dioxide. Selenium does not cause glass to react to sunlight like manganese does, thus glass clarified with selenium does not turn purple. Knowing this fact and the history above, collectors have another way to date their glass collectibles. If your jar is purple, it is a pretty good bet it was made before W.W.I.



### **Buying damaged jars or jars with reproduction closures.**

When you are thinking about purchasing a jar, look at the jar carefully. Look at the lip of the jar and its base. Turn the jar around, preferably in the light, and look for any scratches, nicks, chips, or dings. Keep in mind that damage reduces the value of the jar.

Many jars have reproduction closures; reputable dealers will mark their jars so fitted. Sometimes, however, people selling jars (dealers and others) forget to indicate that a jar has a reproduction closure or simply don't realize that the wire bale or clamp is not original. Unless you are experienced, it may be difficult to tell if a clamp is original or not. Here are a few tips that may help:

Examine the clamps for unevenness or marks left from pliers or other implements. Does the clamp fit correctly or does it seem to fit awkwardly on top of the jar? Original clamps are usually made of heavy material and are frequently rusty or show marks from wear. Reproduction clamps or closures frequently look new. If in doubt, simply ask the dealer about the closure.

Usually, jars with reproduction clamps sell for less than those with original closures. There are a few exceptions, since some types of original clamps or lids sometimes simply don't exist. Generally, jars are best with original closures.

### **LOOK OUT FOR IRRADIATED JARS!**

One of the most regrettable things that has happened in recent years is the introduction of irradiated jars into the market. Altered artificially by modern technology, these jars come in dark browns and purples and are sometimes sold for large amounts of money. Some collectors have been fooled into buying these jars thinking the colors are genuine. Collectors are becoming hesitant to buy amber and other colored jars for fear someone has altered them.

In industrial facilities, radioactive substances are available that some people have used to expose old glass in an effort to change its color. Since the radiation in these substances can be especially potent, the change in color may be astonishingly deep.

If the jar contains manganese dioxide, when irradiated it will turn a deep (in some cases almost black) purple. If the jar contains selenium, it will turn an opaque brown color. Sometimes these deep brown jars are sold, either inadvertently or intentionally, as real amber jars. If you have any doubts, ask an experienced collector. One way you can tell if a jar has been irradiated is to bake it in an oven. A collector in Michigan set an irradiated jar in a 200° oven for 2½ hours and the color disappeared. (Placing your valuable old jars in an oven could cause them to crack, so be careful!)

## SUMMARY

Fruit-jar collecting can be interesting, fun, sometimes profitable, and always challenging. In this article you have read some of the basics of fruit jar history and noted some pointers which can make your collecting more interesting and successful. This is just the beginning; finding out the rest is up to you...

The Midwest Fruit Jar and Bottle Club puts on a bottle show twice a year featuring many great jars and usually a "fruit-jar get together" where collectors come to share jars, stories and information. There are several good books out on the pricing and history of fruit jars and Dick Roller of Paris, Illinois, edits a monthly Fruit Jar Newsletter.

Fruit-jar people are friendly, helpful and responsive. If you would like more information about fruit jars, the next time you are at a bottle show, look up a few - you will be glad that you did. You can also email this author at [glassman@qnet.com](mailto:glassman@qnet.com) or drop a note at Bottles and Extras.

### References:

Creswick, Alice: *The Fruit Jar Works*, Volumes I & II. Published by Douglas M. Leybourne, Jr. N. Muskegon, Mich., 1995.

Leybourne, Doug: *The Red Book of Fruit Jars No. 7*. Published by Douglas M. Leybourne, Jr. N. Muskegon, Mich., 1993.

Roller, Dick: *The Standard Fruit Jar Reference*. Acorn Press, Paris, Ill., 1984.

The Fruit Jar Newsletter. Page 617, April 1992.

The Midwest Glass Chatter. Midwest Antique Fruit Jar and Bottle Club. November 1994 & January 1995. Junne Barnett, editor.

Many thanks to Rick Reinking of the "Washington Area Collectibles" website, <http://www.halcyon.com/reinking/> for the photos in this article.

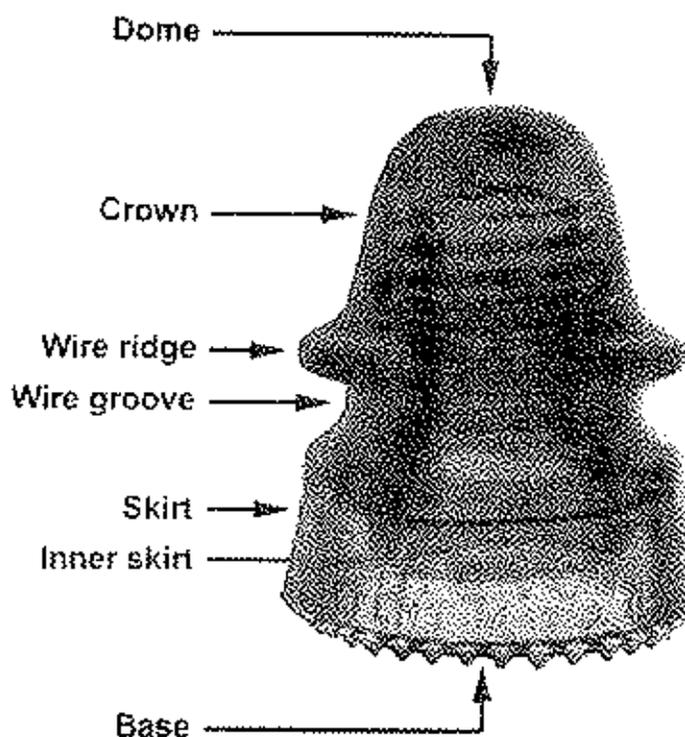
A special thank you to Mr. Doug Leybourne and Mr. Alex Kerr for their help and assistance in the review and preparation of this article.

For information on the Federation of Historical Bottle Collectors please write to Treasurer Kevin Sives, 1485 Buck Hill Drive, Southampton, PA 18966. <http://www.fohbc.com>

## Anatomy of an Insulator



Take a look at the profile of this threadless insulator.



For a more detailed description of these terms and many others, you will want to consult the [Glossary of Insulator Terms](#).



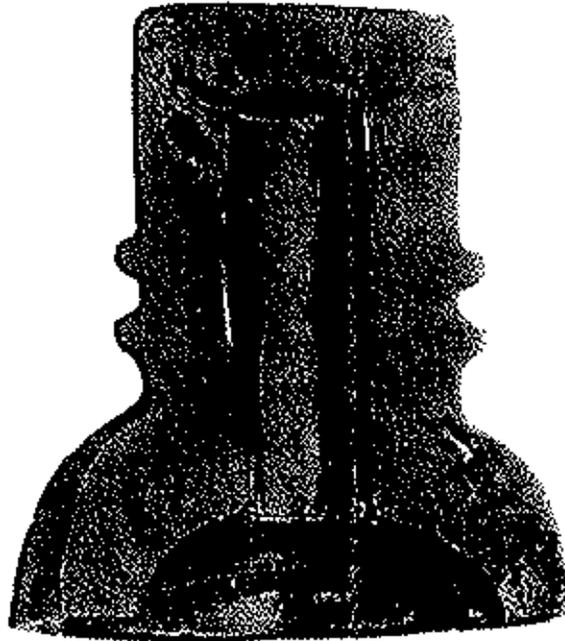
[Return to the Glass Insulators home page](#)

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If you have questions or comments, please use this [Feedback Form](#).

Last updated Monday, September 2, 2002

## Anatomy of a Threadless Insulator



This threadless insulator "popped" in half probably from water freezing in the pin hole when it was buried in the ground. The fracture lines are very clean, and the insulator is split almost perfectly in half. You can see the thick glass, and the threadless cylindrical pinhole. Also note how the dome is nearly flat compared to more modern insulators.



[Return to the Glass Insulators home page](#)

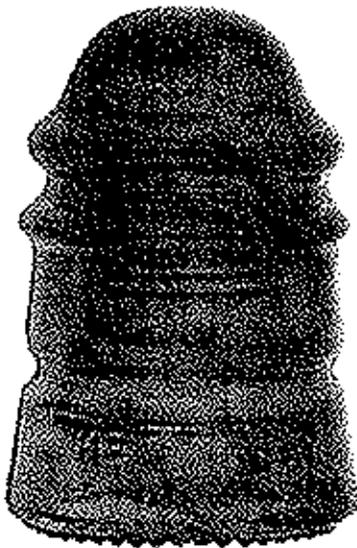
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If you have questions or comments, please use [this Feedback Form](#).

Last updated Monday, September 2, 2002

Insulator Profile:

# HEMINGRAY-12



<b>CD:</b>	113
<b>Manufacturer:</b>	Hemingray
<b>Style Number:</b>	12
<b>Trade Name:</b>	Double Groove Pony
<b>Size:</b>	2 3/8" W x 3 5/8" H
<b>Weight:</b>	11 oz.
<b>Production Date:</b>	Late 1890's - 1950's
<b>Usage:</b>	Telephone (exchange)

"Telephone exchange line construction requires frequent drop lines to residences and a two-groove insulator (one groove for the line, and one groove for the drop wire) is needed."

"This insulator was developed to meet this need for a double-grooved pony-type insulator"

### Common Variations:

<b>Colors:</b>	Hemingray Blue, Aqua, and Clear
<b>Bases:</b>	Round or Sharp drip points
<b>Embossings:</b>	(F-Skirt) HEMINGRAY/N <sup>o</sup> 12 (R-Skirt) PATENT/MAY 2 1893 (F-Skirt) HEMINGRAY (R-Skirt) N <sup>o</sup> 12 (F-Skirt) HEMINGRAY/MADE IN U.S.A. (R-Skirt) N <sup>o</sup> 12 (F-Skirt) HEMINGRAY-12 (R-Skirt) MADE IN U.S.A. (Numbers and dots may appear below the embossing on either or both the front and the back)

### Uncommon Variations:

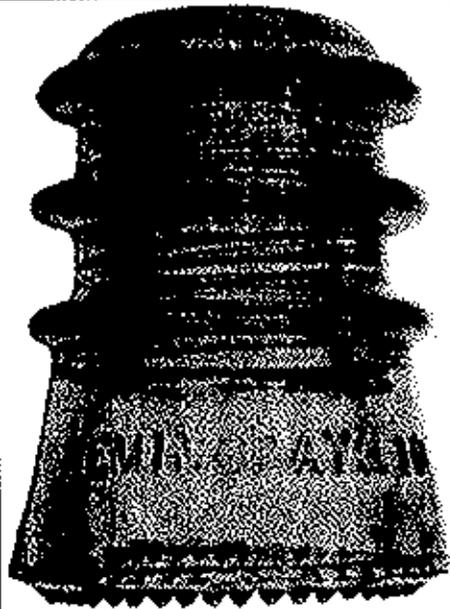
<b>Colors:</b>	Milky Aqua, Jade Green, Emerald Green, Purples
<b>Embossings:</b>	(F-Skirt) HEMINGRAY/N <sup>o</sup> 9 {Note 'N <sup>o</sup> 9'} (R-Skirt) PATENT/MAY 2 1893 Various blotted out embossings and spelling errors



Return to the Insulator Profiles page

Insulator Profile:

# HEMINGRAY-10



<b>CD:</b>	115
<b>Manufacturer:</b>	Hemingray
<b>Style Number:</b>	10
<b>Trade Name:</b>	Exchange Line
<b>Size:</b>	2 1/2" W x 3 1/4" H
<b>Weight:</b>	10 oz.
<b>Production Date:</b>	1914 - 1950's
<b>Usage:</b>	Telephone (exchange)

"The use of twisted pairs of wires instead of two drop-wires require a special insulator, and in 1914, the Hemingray No. 10 pony insulator was developed for this purpose."

"It is today accepted as standard for most telephone exchange systems. Its grooves are close together to accommodate the twisted pair of wires, and are square so as to hold both wires securely. Somewhat thicker glass sections make it much sturdier than early exchange system types."

### Common Variations:

<b>Colors:</b>	Hemingray Blue, Aqua, and Clear
<b>Bases:</b>	Smooth, Corrugated, Round or Sharp drip points
<b>Embossings:</b>	(F-Skirt) HEMINGRAY (R-Skirt) PATENTED/MAY 2 1893 (F-Skirt) HEMINGRAY (R-Skirt) N <sup>o</sup> 10 (F-Skirt) HEMINGRAY/MADE IN U.S.A. (R-Skirt) N <sup>o</sup> 10 (F-Skirt) HEMINGRAY-10 (R-Skirt) MADE IN U.S.A. (Numbers and dots may appear below the embossing on either or both the front and the back)

### Uncommon Variations:

<b>Colors:</b>	Green
<b>Embossings:</b>	(F-Skirt) HEMINGRAY-16 {Note '16'} (R-Skirt) MADE IN U.S.A./[Number] (F-Skirt) HEMINGRAY-10 (R-Skirt) [Numbers] (F-Skirt) HEMINGRAY-10 (R-Skirt) [Numbers and dots]/MADE IN U.S.A. Various blotted out embossings and spelling errors



[Return to the Insulator Profiles page](#)

Insulator Profile:

# IN-56



<b>CD:</b>	1032
<b>Manufacturer:</b>	Hemingray (Owens-Illinois)
<b>Style Number:</b>	IN-56
<b>Size:</b>	1 1/2" W x 2 3/8" H w/ 3" lag bolt
<b>Weight w/ pin:</b>	6 oz.
<b>Production Date:</b>	1945
<b>Usage:</b>	Telephone

"The IN-56 insulator is a military version of the CD.115. They were produced under government contract for the U. S. Army Signal Corps. A specification dated April 1, 1942 obtained from Lapp shows they were made in porcelain. A specification in August 21, 1941 also indicates the design of a porcelain version. The glass version was produced by Owens Illinois in 1945. Both were made with threaded steel pins with a detent for a wrench, for quick attachment to trees and poles. US Army field wire was strung from these insulators."

"The August 21, 1941 specifications indicate that a suitable cement compound should be used such as "Basolit, as made by the Nukem Products, Co, Buffalo, NY, Portland Cement, or equal" be used to secure the pin inside the insulator"

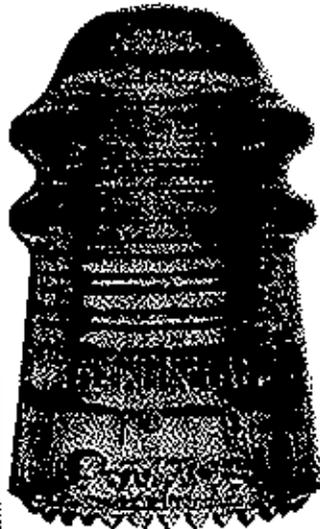
<b>Variations:</b>	
<b>Colors:</b>	Clear
<b>Bases:</b>	Smooth
<b>Embossings:</b>	(F-Skirt) [OI logo]/[Numbers and dots] (R-Skirt) IN-56



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Insulator Profile:

# HEMINGRAY-9



<b>CD:</b>	<b>106</b>
<b>Manufacturer:</b>	<b>Hemingray</b>
<b>Style Number:</b>	<b>9</b>
<b>Trade Name:</b>	<b>Pony</b>
<b>Size:</b>	<b>2 1/4" W x 3 3/4" H</b>
<b>Weight:</b>	<b>9 oz.</b>
<b>Production Date:</b>	<b>1890's - 1960's</b>
<b>Usage:</b>	<b>Telephone Rural Systems</b>

"This insulator has answered the needs of rural telephone line work for many years. Using only nine ounces of glass, it has a maximum leakage path which approaches standard long-distance insulator design. The long, inner surface of the skirt is not easily wet by rain splash from the cross-arm. The long skirt helps protect the pin itself from rain."

"Its design allows fast economical production; a smooth, flawless surface and a perfectly fitting thread in the glass."

<b>Common Variations:</b>	
<b>Colors:</b>	Hemingray Blue, Aqua, and Clear
<b>Bases:</b>	Round or Sharp drip points
<b>Embossings:</b>	(F-Skirt) HEMINGRAY/N <sup>o</sup> 9 (R-Skirt) PATENT/MAY 2 1893 (F-Skirt) HEMINGRAY (R-Skirt) N <sup>o</sup> 9 (F-Skirt) HEMINGRAY/MADE IN U.S.A. (R-Skirt) N <sup>o</sup> 9 (F-Skirt) HEMINGRAY-9 (R-Skirt) MADE IN U.S.A. (Numbers and dots may appear below the embossing on either or both the front and the back)

<b>Uncommon Variations:</b>	
<b>Colors:</b>	Milky Aqua, Jade Green, Emerald Green, Purples
<b>Bases:</b>	Smooth base
<b>Embossings:</b>	Various blotted out embossings and spelling errors

 [Return to the Insulator Profiles page](#)

Insulator Profile:  
**HEMINGRAY-14**



<b>CD:</b>	<b>160</b>
<b>Manufacturer:</b>	<b>Hemingray</b>
<b>Style Number:</b>	<b>14</b>
<b>Trade Name:</b>	<b>Deep Groove Double Petticoat Pony</b>
<b>Size:</b>	<b>2 3/4" W x 3 1/4" H</b>
<b>Weight:</b>	<b>14 oz.</b>
<b>Production Date:</b>	<b>1890's - 1950's</b>
<b>Usage:</b>	<b>Telephone Rural Systems</b>

"This Hemingray pony insulator meets the demand for a double petticoat insulator for rural lines. Its double petticoat feature makes it popular for rural lines where fog and high humidity prevail."

"It has an even longer leakage path than the No. 9; indeed, as long as that in many larger insulators. However, its lightness and the production economy of its design allow it to remain in the cost range desirable for rural telephone line construction."

**Common Variations:**

<b>Colors:</b>	Aqua, Ice Blue and Clear
<b>Bases:</b>	Round or Sharp drip points
<b>Embossings:</b>	(F-Skirt) HEMINGRAY (R-Skirt) N <sup>o</sup> 14 (F-Skirt) HEMINGRAY-14 (R-Skirt) MADE IN U.S.A. (Numbers and dots may appear below the embossing on either or both the front and the back)

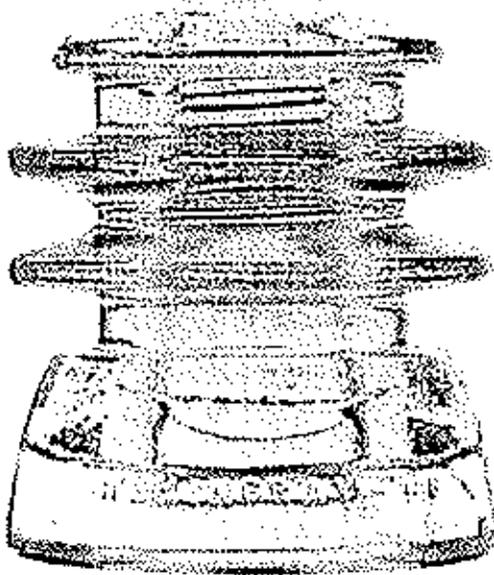
**Uncommon Variations:**

<b>Colors:</b>	Hemingray Blue
<b>Embossings:</b>	Various blotted out embossings and spelling errors

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Insulator Profile:

# HEMINGRAY-56



<b>CD:</b>	203
<b>Manufacturer:</b>	Hemingray
<b>Style Number:</b>	56
<b>Trade Name:</b>	TW
<b>Size:</b>	3 1/4" W x 3 7/8" H
<b>Weight:</b>	24 oz.
<b>Production Date:</b>	1950's - 1960's
<b>Usage:</b>	Telephone Rural Systems

"A one-piece insulator for point transposition on rural telephone circuits. It is smaller and lighter in weight, and is an improvement in design over the Hemingray-53. Designed for standard wooden pins, hence the TW (Transposition Wood) designation."

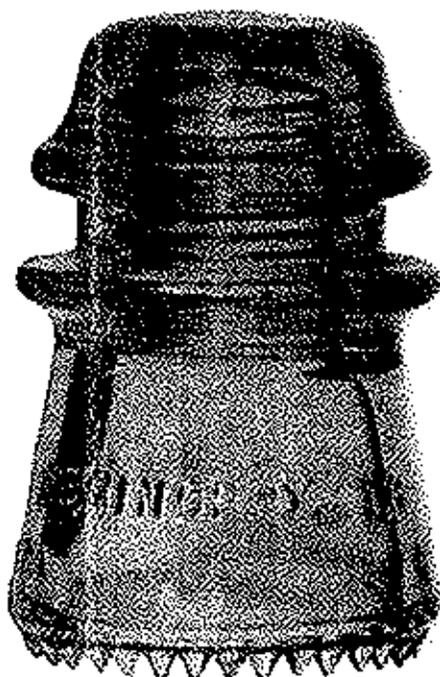
**Common Variations:**

<b>Colors:</b>	Clear, Blue Tint
<b>Bases:</b>	Corrugated
<b>Embossings:</b>	(F-Skirt) HEMINGRAY-53 (R-Skirt) MADE IN U.S.A./[Numbers and dots]

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Insulator Profile:

# HEMINGRAY-16 & 17



CD:	122
Manufacturer:	Hemingray
Style Number:	16 & 17
Trade Name:	Long Distance & Toll Line
Size:	2 3/4" W x 3 7/8" H
Weight:	15 oz.
Production Date:	1920's - 1960's
Usage:	Telephone (long distance)

"In the early days of the telephone, single petticoat insulators were standard for toll line construction. The Hemingray No. 16, with a single petticoat is still widely used for lines of medium length."

"The No. 16 has about the longest leakage path possible for a single petticoat type on a standard pin. It has a square wire groove."

"The No. 17 is exactly similar to the No. 16 except it has a somewhat wider groove for larger wire."

### Common Variations:

Colors:	Hemingray Blue, Aqua, and Clear
Bases:	Smooth, Corrugated, Round or Sharp drip points
Embossings:	(F-Skirt) HEMINGRAY-16 (R-Skirt) MADE IN U.S.A. (Numbers and dots may appear below the embossing on either or both the front and the back)

### Uncommon Variations:

Colors:	7-up Green, Clear/Blue Two Tone
Embossings:	(F-Skirt) HEMINGRAY-16 (R-Skirt) [Numbers] (F-Skirt) HEMINGRAY-16 (R-Skirt) [Numbers and dots]/MADE IN U.S.A. Various blotted out embossings and spelling errors

### Rare Variations:

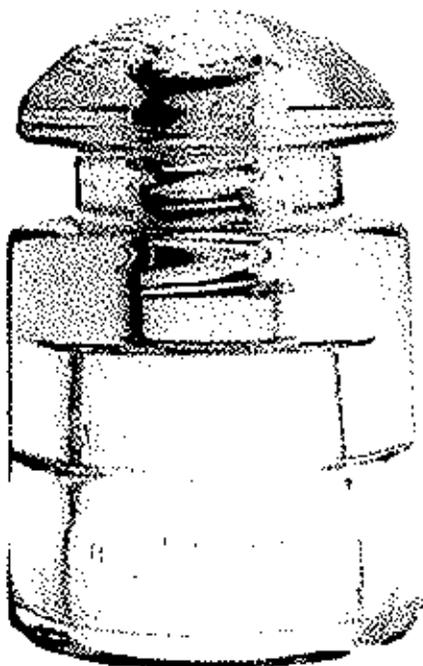
Colors:	Light Opalescent, Opalescent, White Milk
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Insulator Profile:

# HEMINGRAY CSA, CSC, CSO



<b>CD:</b>	128
<b>Manufacturer:</b>	Hemingray
<b>Style Number:</b>	22
<b>Trade Name:</b>	CSC
<b>Size:</b>	2 5/8" W x 4" H
<b>Weight:</b>	16 oz.
<b>Production Date:</b>	1940 - 1950's
<b>Usage:</b>	Telephone (long distance)

"Modern carrier circuits with their higher frequencies need this special insulator developed by Hemingray to meet carrier circuit needs, Its value has been proven by the many miles of telephone carrier circuits in which it is used today."

"It is mounted on a special steel pin, cushioned by a lead sleeve, which screws into the insulator."

"This insulator is well adapted for point transpositions in carrier circuits, with special brackets for supporting the insulators on the cross-arms."

### Common Variations:

<b>Colors:</b>	Clear
<b>Bases:</b>	Smooth or Corrugated
<b>Embossings:</b>	(F-Skirt) HEMINGRAY/[Numbers and dots] (R-Skirt) C.S.A. (F-Skirt) HEMINGRAY/[Numbers and dots] (R-Skirt) C.S.C.

### Uncommon Variations:

<b>Colors:</b>	Light Yellow
<b>Embossings:</b>	(F-Skirt) HEMINGRAY/[Numbers and dots] (R-Skirt) C.S.O.

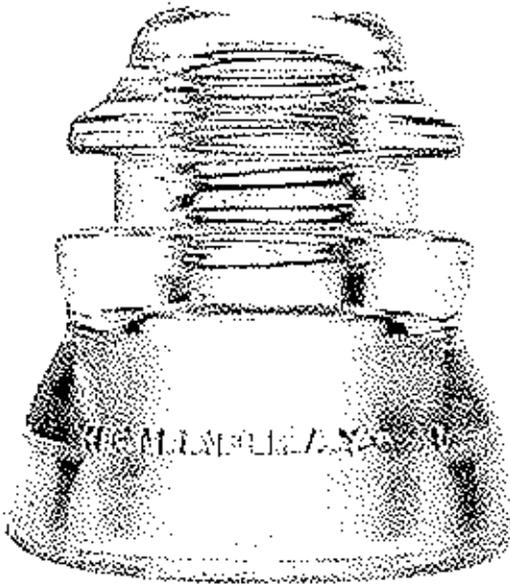
### Rare Variations:

<b>Colors:</b>	Lemon, Light Opalescent, Opalescent, White Milk
<b>Embossings:</b>	(F-Skirt) HEMINGRAY-CS/◆ (R-Skirt) E-14B (F-Skirt) HEMINGRAY-E.1. (R-Skirt) MADE IN U.S.A. (Inside of skirt is threaded)

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Insulator Profile:

# HEMINGRAY-45



<b>CD:</b>	<b>155</b>
<b>Manufacturer:</b>	<b>Hemingray</b>
<b>Style Number:</b>	<b>45</b>
<b>Trade Name:</b>	<b>Double Petticoat Western Union</b>
<b>Size:</b>	<b>3 1/2" W x 4" H</b>
<b>Weight:</b>	<b>24 oz.</b>
<b>Production Date:</b>	<b>1938 - 1950's</b>
<b>Usage:</b>	<b>Telephone (long distance)</b>

"This insulator embodies the result of many years of experience in long distance design. It has a long leakage path with straight, smooth sides on the inner surface of the petticoat; thus water dries quickly from its surfaces. The groove is square, with a flat shelf to support the line wire. The lower side of the groove is strengthened to support a very heavy sleet load."

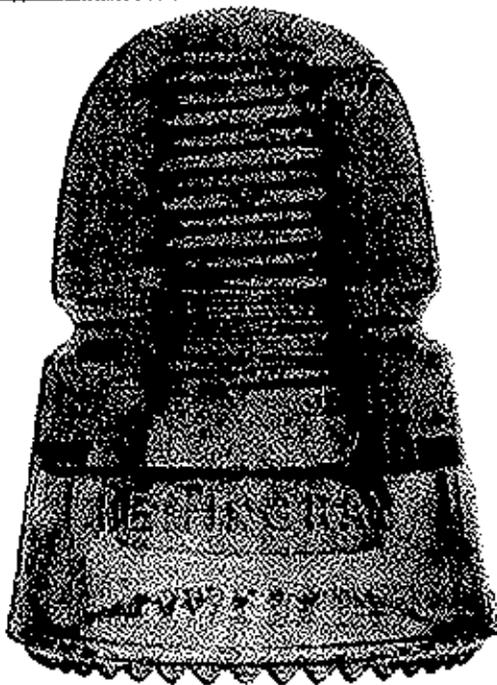
<b>Common Variations:</b>	
<b>Colors:</b>	Clear, Blue Tint
<b>Bases:</b>	Smooth or Corrugated
<b>Embossings:</b>	(F-Skirt) HEMINGRAY-45 (R-Skirt) MADE IN U.S.A./[Numbers and dots]

<b>Uncommon Variations:</b>	
<b>Embossings:</b>	(F-Skirt) HEMINGRAY {Note no '-45'}(R-Skirt) MADE IN U.S.A./[Numbers and dots] (F-Skirt) HEMINGRAY-45 (R-Skirt) [Numbers] (F-Skirt) HEMINGRAY-45 (R-Skirt) [Numbers and dots]/MADE IN U.S.A.

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Insulator Profile:

# HEMINGRAY-21



<b>CD:</b>	<b>145</b>
<b>Manufacturer:</b>	<b>Hemingray</b>
<b>Style Number:</b>	<b>21</b>
<b>Trade Name:</b>	<b>Western Union Standard</b>
<b>Size:</b>	<b>3 1/4" W x 4 3/8" H</b>
<b>Weight:</b>	<b>16 oz.</b>
<b>Production Date:</b>	<b>Late 1910's - 1940's</b>
<b>Usage:</b>	<b>Telegraph</b>

"This insulator replaced the old Compromise insulator which was an accepted telegraph standard. Probably ten million compromise insulators were in service in the years 1865-1881."

"By 1881, glass-making had progressed to a point where an economical double petticoat was possible, and the Hemingray No. 21 was the result. This insulator, also known as the "Standard DP" or "Western Union Standard" was widely used down to about 1900 and still is in limited use."

**Common Variations:**

<b>Colors:</b>	Hemingray Blue, Aqua, and Clear
<b>Bases:</b>	Smooth, Round or Sharp drip points
<b>Embossings:</b>	(F-Skirt) HEMINGRAY (R-Skirt) N <sup>o</sup> 21 (F-Skirt) HEMINGRAY/MADE IN U.S.A. (R-Skirt) N <sup>o</sup> 21 (F-Skirt) HEMINGRAY-21 (R-Skirt) MADE IN U.S.A. (Numbers and dots may appear below the embossing on either or both the front and the back)

**Uncommon Variations:**

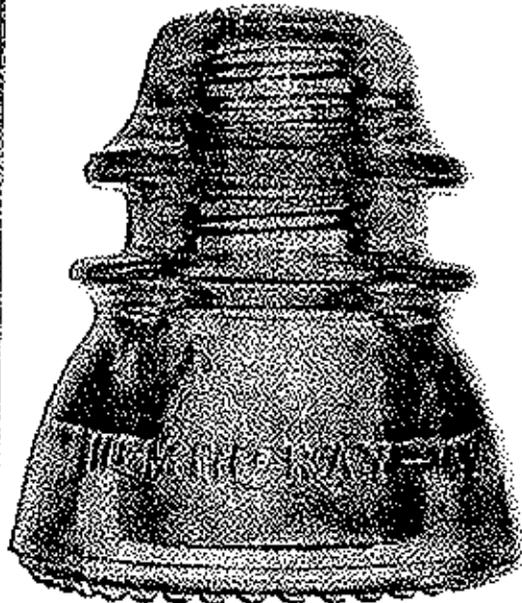
<b>Colors:</b>	Darker Greens
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Insulator Profile:

# HEMINGRAY-42



CD:	154
Manufacturer:	Hemingray
Style Number:	42
Trade Name:	Double Petticoat, 24 oz.
Size:	3 5/8" W x 4 1/8" H
Weight:	24 oz.
Production Date:	1921 - 1950's
Usage:	Telegraph

"The old Hemingray Number 40, widely used from its introduction in 1910, was replaced in 1921 by the Hemingray No. 42."

"The No. 42 is a double petticoat type, with a long, smooth leakage path on the inner petticoat. It sits close to the cross-arm, thus giving the pin protection against rain slash. Its threads are accurately formed for a tight grip on the pin. The wire groove is a modern square type shown in Spec. 1-A-33 of the Association of American Railroads, and is accepted as standard for most telephone construction."

### Common Variations:

Colors:	Hemingray Blue, Aqua, Ice Blue, Ice Green and Clear
Bases:	Round or Sharp drip points
Embossings:	(F-Skirt) HEMINGRAY-42 (R-Skirt) MADE IN U.S.A. (Numbers and dots may appear below the embossing on either or both the front and the back)

### Uncommon Variations:

Colors:	True Green, almost like a 7-Up Green; or two-tones such as Blue/Green or Clear/Blue
Bases:	Smooth Base

### Rare Variations:

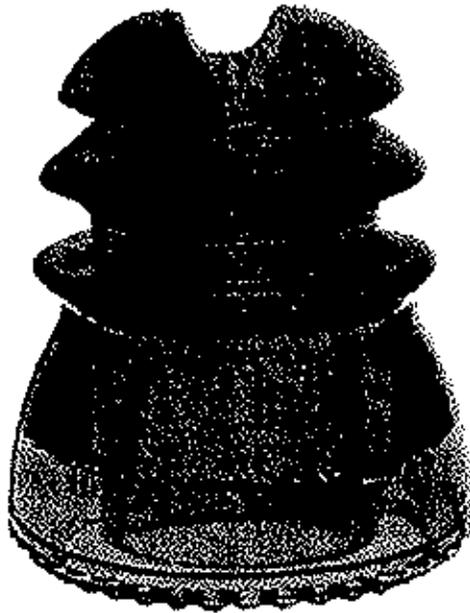
Colors:	Carnival coating, White Milkglass
Embossings:	large "MR" above the "HEMINGRAY-42" on the front skirt



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Insulator Profile:

# HEMINGRAY-43



CD:	214
Manufacturer:	Hemingray
Style Number:	43
Trade Name:	Top Groove Western Union
Size:	3 3/4" W x 4 1/4" H
Weight:	24 oz.
Production Date:	1920's - 1950's
Usage:	Telegraph

"In a hilly country where the line is often not at right angles to the pin, it is frequently difficult to make a good tie in the side groove of a standard insulator."

"To meet this condition, the Hemingray No. 43 is provided with a top groove added to accommodate a top tie where necessary. It is a double petticoat type exactly like the No. 42 Hemingray insulator, except for the top groove. Having also a side groove, it can be used for either top or side ties. Shown in Spec. 1-A-33, Association of American Railroads."

**Common Variations:**

Colors:	Aqua, Ice Blue, Clear, Straw
Bases:	Corrugated or Round drip points
Embossings:	(F-Skirt) HEMINGRAY-43 (R-Skirt) MADE IN U.S.A. (Numbers and dots may appear below the embossing on either or both the front and the back)

**Uncommon Variations:**

Colors:	7-up Green
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**Rare Variations:**

Colors:	Carnival
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## JEFF'S DATE NAIL PAGE

### What's new

[Introduction to date nails](#) - this page

[What is a date nail?](#)

[How date nails were used](#)

[Brief history of date nails](#)

[Frequently asked questions](#)

[Acquiring date nails](#)

### Resources page

[The book: Date Nails and Railroad Tie Preservation](#) [\(for errata, click here\)](#)

[The Booklet: Railroad Date Nails: Collecting for Fun](#)

[The Texas Date Nail Collectors' Association](#)

[The upcoming date nail show](#)

[The e-mail newsletter \*Nail Notes\*](#)

[The date nail discussion forum](#)

### Other pages

[Photo Album](#)

[Photos of nails](#)

[Links](#)

[History of railroad tie preservation](#)

[My article on screen doors](#)

[Book Review: The Wood Crusade](#)


**SITE METER**  
 2,524

Visits since April 2, 2001

## What is a date nail?

Briefly, a date nail is a nail with the date stamped in its head. For example, a nail with a '41' is from 1941. They are usually 2 1/2" long, with 1/4" shanks. Date nails were driven into railroad ties, bridge timbers, utility poles, mine props, and other wooden structures for record keeping purposes.

Most date nails are steel, though many are copper, aluminum, malleable iron, or brass. Lengths run from a paltry 3/4" up to 3", with shank diameters running from 1/8" up to 5/16". The nail heads can be round, square, diamond, pentagon, as well as other rarer shapes. Over 2,000 different date nails were used by North American railroads which show the year. Add to that the nails which tell wood, treatment, and other information, and toss in all date nails used in poles and other timbers, and the total number of different nails from this continent easily exceeds 3,500.



A typical date nail. This one was manufactured to be 2 1/2" long (it was cut a little short), and is made from steel wire 1/4" in diameter. The date 18 (1918) is stamped in the head. Note the crude, somewhat faint diamond on the shank to the left of the anchor markings. It might look more like a horizontal blob on this nail. It indicates that the nail was made by American Steel & Wire Co.

There is a standard notation to describe date nails. The 18 pictured above is: 2 1/2 x 1/4 rnd I sl (07) 18. It is 2 1/2" long, 1/4" in diameter, rnd = round head (& shank), I = indented figures, sl = steel, (07) = code for American Steel & Wire, 18 = the date. (These and all other photos of single nails on these pages were taken by Tom Meyer.)

For a photo of a date nail in a tie in the track, [click here](#). The date nail is outside the rail, at the bottom of the picture. It is a 62 (unreadable in the photo) from the Florida East Coast. Go to the [Photo Album](#) for more pics of nails in ties.

## How date nails were used

Date nails were manufactured by steel companies on high speed machines, even in the early years. If a railroad wanted to use date nails, they would order the kind of nails they wanted (for instance, a 2 1/2" x 3/16" steel nail, round with raised numerals "34"). Then the nails were driven into ties either at the treating plant, to indicate the year of treatment, or at the track, to indicate the year the tie was laid.

When a rotted or mechanically damaged tie was removed, the date on the nail was noted. Ties were never removed because of age, so date nails did not tell section foremen when to replace ties. In fact, some railroads found that dated ties lasted longer than usual because the men took special care of them.

In the first decade of the 20th century railroads which used date nails drove them into every treated tie. Some lines found the record obtained by this method to be a failure, so beginning 1909 some railroads concentrated their record in special test sections. For these companies keeping track of only a

few thousand ties was far more economical and accurate than tracking several million ties. By the early 1920s, however, most of these railroads had returned to the practice of placing nails in every treated tie.

Each railroad conducted its own experiments, so the nails used on one railroad will not be like those on other lines. For example, compare the Lehigh Valley with the New York Central:

- Lehigh Valley. Used date nails 1910-1917, 1919-1921, and 1940-1943.
- New York Central. Used date nails 1910-1932.

The LV 11 is the same style nail as the NYC 11: square head & shank, indented numbers. In other years the nails differ. The NYC stuck primarily with square nails while the LV used round nails. Neither company was loyal to a single steel company, either. The NYC bought its 1910-1913 nails from American Steel & Wire Co., its 1914-1915 nails from Jones & Laughlin, its 1916 nails from American Casting & Manufacturing, etc.

Some railroads never used date nails at all, like the Southern RR. Still others used them for a short time (Monon: 1908-1910) and others for a long time (Santa Fe: 1901-1969).

Often the shape of the nail head has some significance. For example, on the El Paso & Southwestern round nails were driven into zinc chloride treated ties while diamond nails were driven into creosoted ties.

## Brief history of date nails

Western Europe suffered a timber shortage much earlier than North America, which is why railroads in France, England, and Germany were chemically treating ties long before companies here. Date nails were in use in France by 1870, possibly as early as 1859. Wherever treated ties come into use, date nails are not far behind. Railroads need a way to monitor their investment in treating, and date nails became the most common method of this record keeping.

When North American railroads began to experiment with treated ties in the second half of the 1800s, it was not known which chemicals, treatment methods, or woods were most economical. They needed some method of keeping track of the lives of ties, so like their European counterparts, they decided to mark them. Early methods included:

- Stamping the date in the end of the tie (Central RR of New Jersey 1875, Santa Fe 1885, Southern Pacific 1887, Rock Island 1895, etc.)
- Brass tags (Santa Fe test sections, 1881-1882)
- Notching ties (Allegheny Valley 1883, other lines beginning ca. 1900)

By the late 1800s American railroads settled on the use of date nails. The oldest known North American date nail is #97 from the Mississippi River & Boone Terre. It was in 1899 that major railroads began using nails to date ties with nails, that year the Chicago & Eastern Illinois, the Great Northern, the Chicago, Burlington & Quincy, and the Pittsburgh & Lake Erie began nail use. Others soon followed.

By the 1920s nail use was the norm. It peaked in the early 1930s with over a hundred different railroads using date nails in 1931. The depression, then the second world war adversely affected nail use, and from 1950 to 1970 the number of railroads using date nails steadily declined so that for the past thirty years virtually no railroad has used them. The newest date nail in a tie in North America is an aluminum 01 (2001) from a U.S. Navy track in New Jersey (thanks to George Oliva for tracking this down). The decline in the use of date nails can be attributed mainly to two things: the perfection of treatment techniques, and to the reliance of stamps in the ends of the ties for records.

To properly understand the history of date nails, you have to become familiar with the history of railroad tie preservation. My book is devoted to both subjects. For some tie preservation tidbits, [click here](#).

## Frequently asked questions

- Did the nails hold anything down?

No. Date nails were used only to date the tie. The nail was driven in the upper face of the tie away from the rail. Date nails are much smaller than railroad spikes, which secure the rail to the tie.

- How can I tell what railroad used my nails?

The railroad name is NOT on the nail. No railroad put its name, initials, or monogram on a date nail. We know pretty much which nails were used by which railroads because collectors have walked the tracks for the past thirty years and have recorded their finds. This information is compiled in the book *Date Nail and Railroad Tie Preservation*, so given a handful of date nails you can compare them with the book to find out who used them.

- Does the nail always show the date?

No. By far most date nails show the date, but many railroads used nails to indicate the species of wood, the kind of treatment, the length of the tie (at switches), among other things. Nails from utility poles can show the class (diameter), height, or ownership.

Some nails have letters instead of numbers. A "B" from the Buffalo, Rochester & Pittsburgh, for example, was driven into a Beech tie. Another example: on the Santa Fe the nail "OZ" was used in oil-zinc chloride treated ties.

Beware of single digit nails: some are dates (i.e. a "4" is from 1904), but many are code nails. The Southern Pacific used code nails 0 through 9 to number bridge piling. The Louisville & Nashville used single digit code nails to number switches. Other railroads used code nails to number ties in test sections.

The Union Pacific and the treatment company Southern Wood Piedmont drove nails into the ends of overlength ties at switches to indicate tie length. On most UP nails these were clearly not used to date the ties: A nail will read 8FT over 6", or 12". But those used by SWP will have 9 over 6, 10, 10 over 6, 11, and so on. A 16 in this series will look like a 1916 date nail. See the photo of the SWP 17 on the [photo page](#). One seller on eBay thought his 9 over 6 was an 1896 date nail! It was driven into a 9 1/2 foot tie, and probably dates from the 1970s or 1980s!

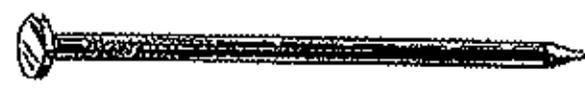


University of Vermont  
HISTORIC PRESERVATION PROGRAM  
 Historic Preservation Research

## Nails: Clues to a Building's History

Thomas D. Visser East Coast

West Coast

	Hand-wrought nail, before circa 1800.	1843 - 1844
	Type A cut nail, circa 1790-1830.	1843 - 1844
	Type B cut nail, circa 1820-1900.	
	Wire nail, circa 1890 to present.	

Nails provide one of the best clues to the age of historic buildings, especially those constructed during the nineteenth century, when nail-making technology advanced rapidly. Until the last decade of the 1700s and the early 1800s, hand-wrought nails typically fastened the sheathing and roof boards on building frames. These nails were made one by one by a blacksmith or nailor from square iron rod. After heating the rod in a forge, the nailor would hammer all four sides of the softened end to form a point. The pointed nail rod was reheated and cut off. Then the nail maker would insert the hot nail into a hole in a nail header or anvil and form a head with several glancing blows of the hammer. The most common shape was the rosehead; however, broad "butterfly" heads and narrow L-heads also were crafted. L-head nails were popular for finish work, trim boards, and flooring.

Between the 1790s and the early 1800s, various machines were invented for making nails from bars of iron. The earliest machines chopped nails off the iron bar like a guillotine, wiggling the bar from side to side with every stroke to produce a tapered shank. These are known as type A cut nails. At first, the heads were often made by hand, but soon machines were developed to pound a head on the end. This type of nail was made until the 1830s.

By the 1820s, however, an effective design for a nail making machine was developed: it flipped the iron bar over after each stroke. With the cutter set at an angle, every nail was chopped to a taper. Nails made by this method are known as type B nails. Cutting the nails leaves a small burr along the edge as the metal is torn apart. By carefully examining the edges for evidence of these burrs, it is possible to distinguish between the earlier type A nails and the later type B nails. Type A nails have burrs on the diagonally opposite edges, while the type B nails have both burrs on the same side. This kind of evidence can be used to establish the approximate period of construction or alteration of a building.

Type B cut nails continued to be the most common through most of the greater part of the nineteenth century. With the rapid development of the Bessemer process for producing inexpensive soft steel during the 1880s, however, the popularity of using iron for nail making quickly waned. By 1886, 10 percent of the nails produced in the United States were made of soft steel wire. Within six years, more steel-wire nails were being produced than iron-cut nails. By 1913, 90 percent were wire nails. Cut nails are still made today, however, with the type B method. These are commonly used for fastening hardwood flooring.

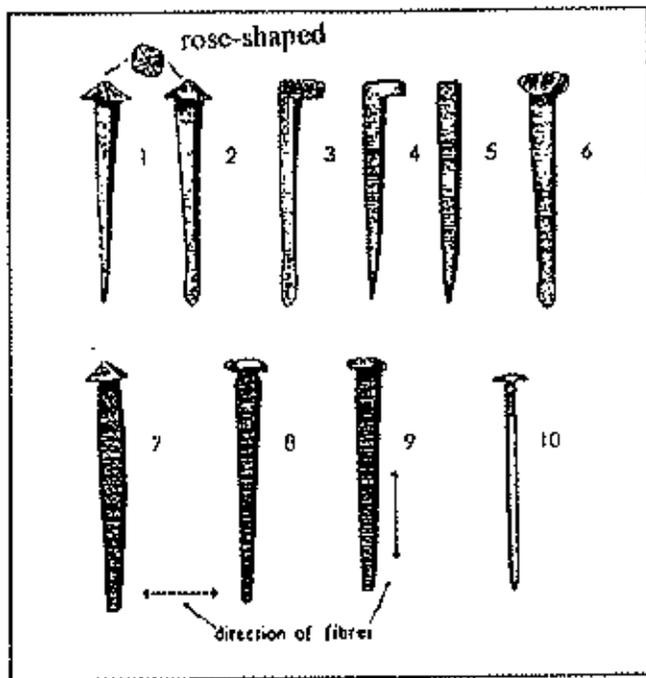
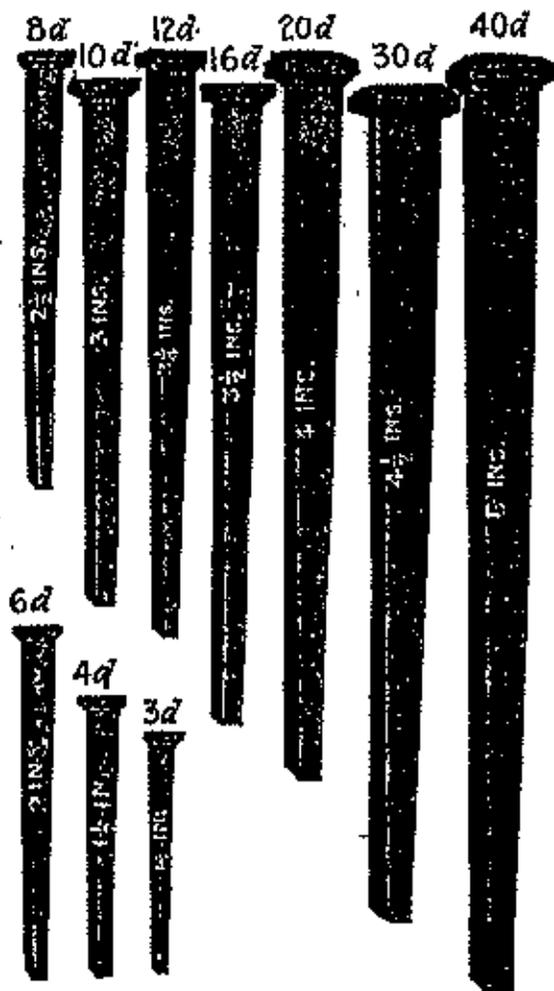


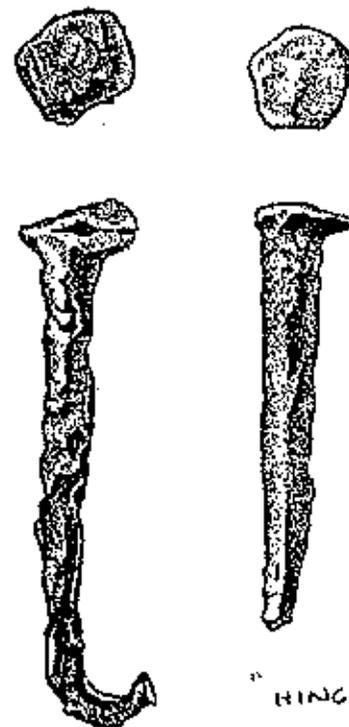
Fig. 81. Nails 1-6. Wrought. 7-9. Cut. 10. Wire. Nos. 1 and 2 have rose heads, with straight and expanded (or spatula) points; 3 and 4 are L-headed; 5, headless; 6, T-headed. Nos. 1-6 are colonial and later; 7, c. 1790-1820's; 8, c. 1815-1850's; 9, c. 1820 onward; 10, not before 1850's and probably much later.

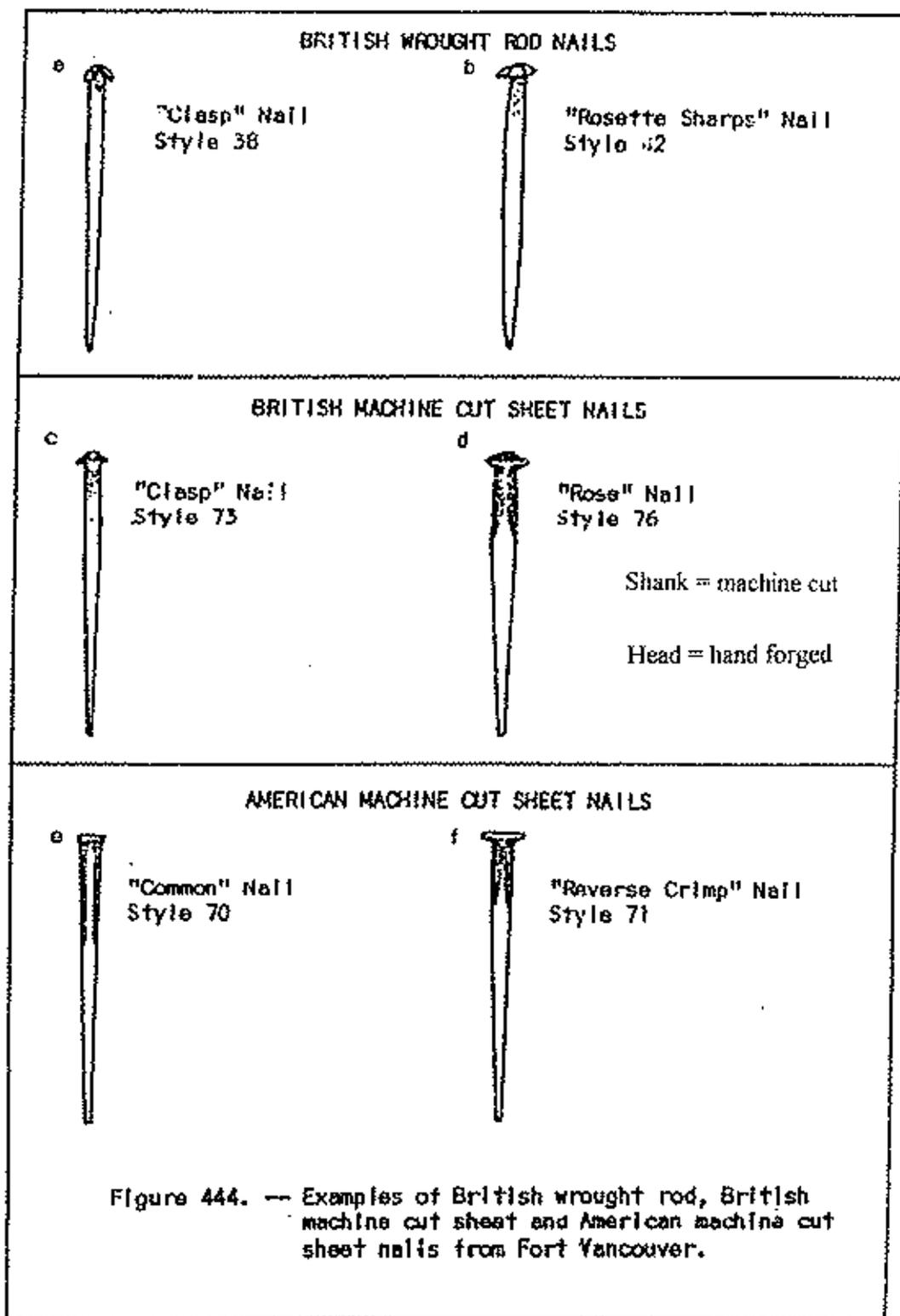


CLASP NAIL  
T-HEAD

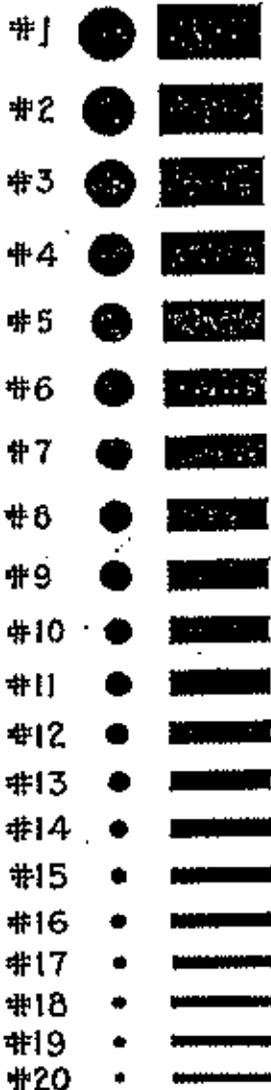


FIGS. 17 TO 26.—Cut nails showing actual sizes. Cut nails have considerably greater holding power than wire nails. Cut nails made from iron are generally preferred for use in exposed positions. There are three regular shapes of cut nails known as 1, common, 2, finish, and 3, casing. The common nails are used for rough work; finish nails for finished work, and casing nails for flooring, matched ceiling and sometimes for pine casing.





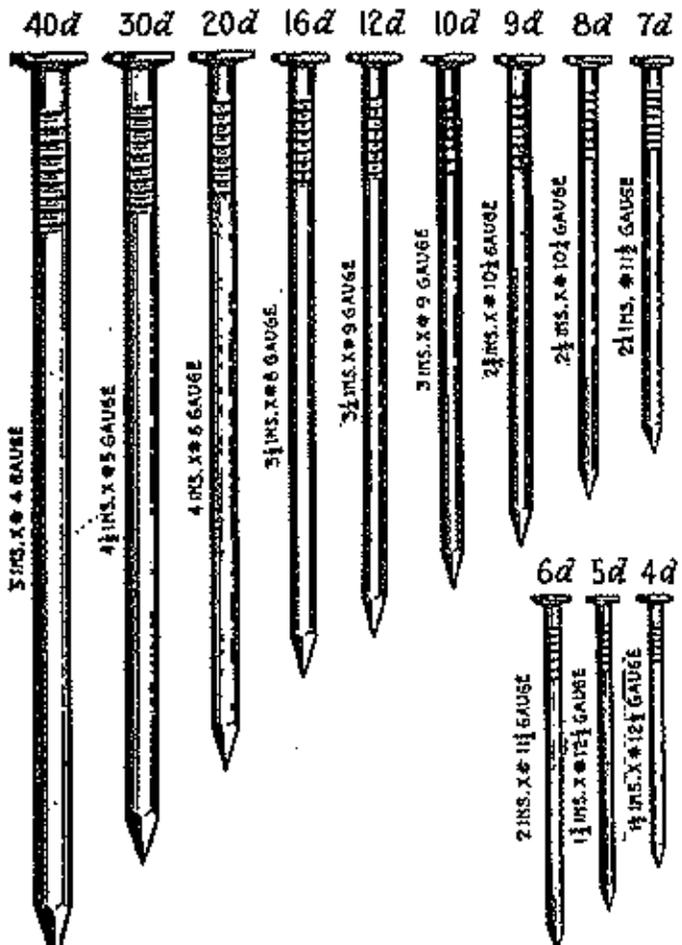
### Wire Gauge



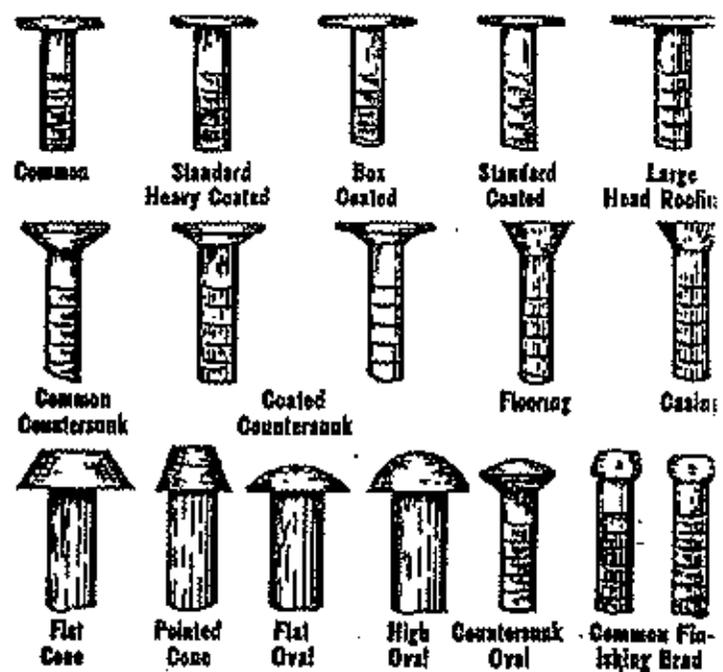
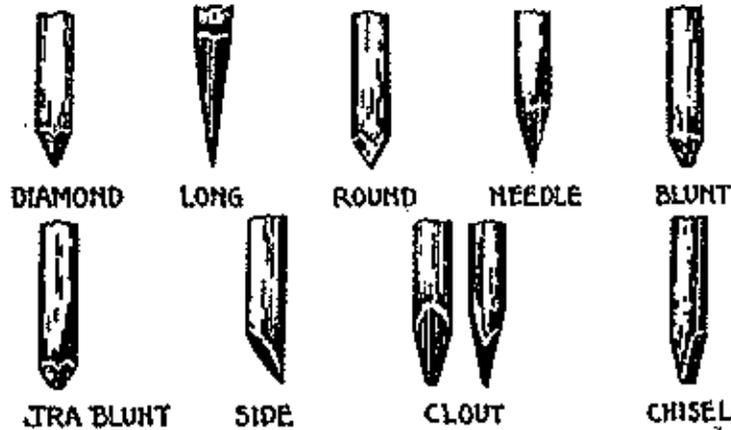
**Nails.**—The term "nails" as popularly applied to all kinds of nails except extreme sizes such as tacks (small) brads, and spikes. Broadly speaking, however, it includes all of these. The most generally used are called common nails, and are regularly made in sizes from 1 in. (2d) to 6 in. (60d) according to the following table:

Illustrations Full Size  
**STEEL WIRE GAUGE**

Steel-Wire Gauge No.	Size of Wire		Weight One Mile - Pounds	Lbs. per Foot	Feet to Pound
	Common Fractions	Decimally			
1		.2830	1128.0	.216	4.661
	$\frac{7}{8}$	.28125	1215.0	.211	
2		.2675	970.4	.183	5.441
	$\frac{3}{4}$	.250	840.2	.1667	
3		.2437	836.4	.164	6.313
4		.225	714.6	.134	7.386
	$\frac{5}{8}$	.21875	675.9	.1274	
5		.2070	602.4	.1163	8.750
6		.1920	519.7	.0983	10.17
	$\frac{3}{4}$	.1875	495.1	.0937	
7		.1770	441.2	.0835	11.97
8		.1670	399.6	.0760	14.29
	$\frac{7}{8}$	.15625	343.8	.0651	
10		.1453	309.7	.0586	17.05
	$\frac{1}{2}$	.1330	256.7	.0486	20.57
11		.1350	270.0	.0514	
12		.1205	204.5	.0387	25.82
	$\frac{5}{8}$	.1055	156.1	.0296	33.69
13		.09375	123.8	.0234	
14		.0915	117.9	.0225	44.78
15		.0800	96.13	.0180	58.38
16		.0720	71.01	.0134	73.31
17		.0675	55.0	.0100	92.98
18		.0540	41.67	.0077	118.4
19		.0475	31.73	.006	160.2
20		.0410	23.61	.0044	213.0
		.0248	11.05	.0022	309.6



FIGS. 27 TO 38.—Common wire nails; the standard nail for general use. Regularly made in sizes from 1 in. (2d) to 6 in. (60d)



**Kinds of Nails.**—There is a great variety of nails, to meet the needs of all kinds of construction. They may be classed

1. With respect to cross sectional shape, as:

- a. Cut (rectangular)
- b. Wire (circular)

2. With respect to size (broadly speaking), as:

- a. Tacks
- b. Sprigs
- c. Brads
- d. Nails
- e. Spikes (various sizes)

3. With respect to material, as:

- a. Steel
- b. Brass
- c. Copper

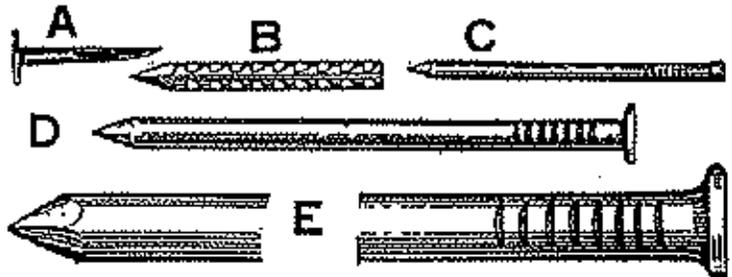
4. With respect to finish, as:

- a. Plain (smooth)
- b. Coated (various)
- c. Galvanized
- d. Blued

5. With respect to service, as:

- a. Common
- b. Flooring
- c. Finishing
- d. Roofing
- e. Boat

Etc., etc.

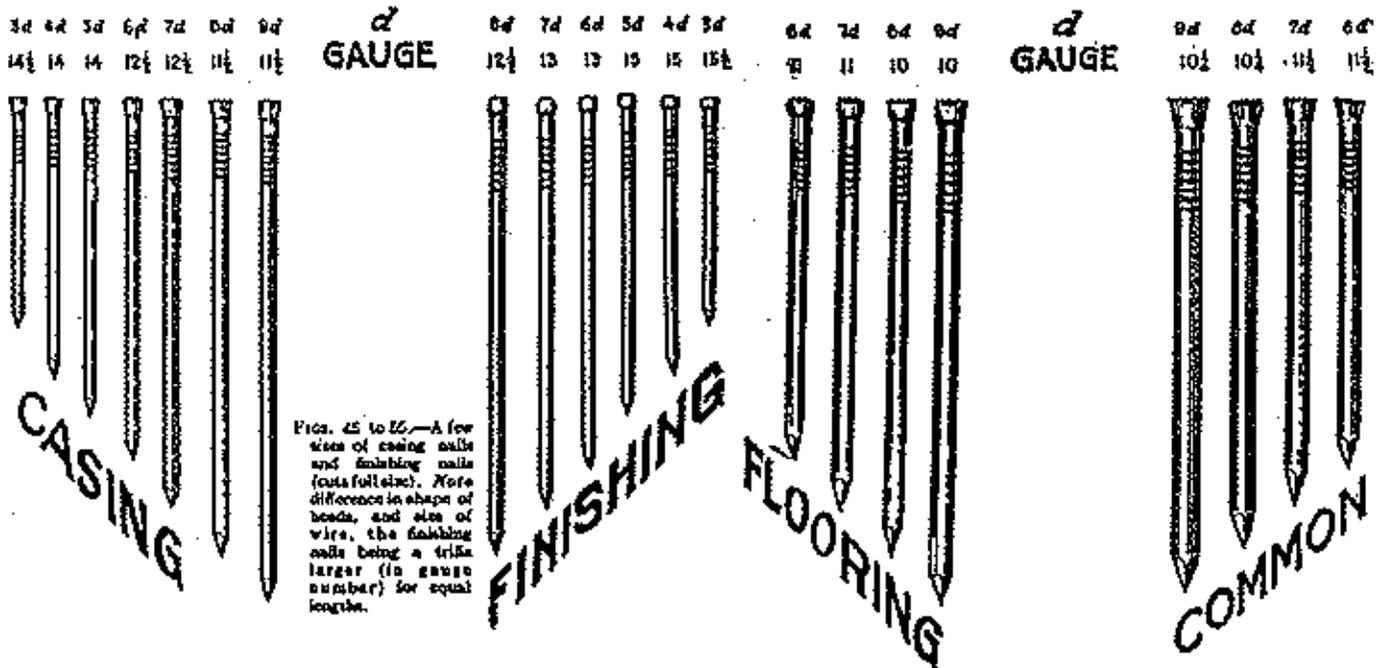


Figs. 39 to 42.—Various nails grouped according to popular notion as to size in general; A, tack; B, sprig or dowel pin; C, brad; D, "nail"; E, spike.

**Tacks.**—Small sharp pointed nails, commonly with tapering sides and a thin flat head; used chiefly in fastening down carpets. The regular length of tacks are from  $\frac{1}{4}$  to  $1\frac{1}{4}$  ins.

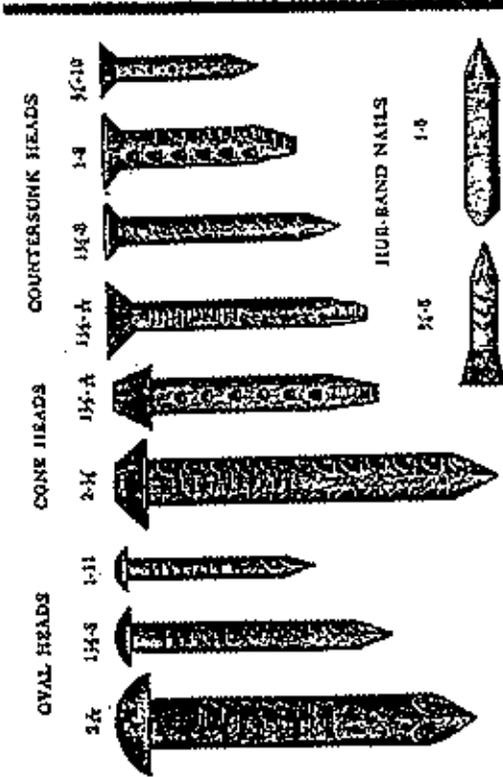
**Sprigs.**—The narrow sprig is sometimes given to a small headless nail; usually called *barbed dowel pin*. Sprigs are made regularly in sizes  $\frac{1}{2}$  to 2 ins.; No. 8 steel wire gauge or .162 in. diameter.

**Brads.**—Small slender nails with small deep heads; sometimes having instead of a head, a projection on one side. There are several varieties adapted to varied requirements. Although brads are generally thought of as small slender nails, the common variety is made in sizes from 1 in. (2d) to 6 ins. (60d) in length; flooring brads from 2 ins. to 4 ins. in length. The following tables give the sizes, etc., of the two kinds of brads:



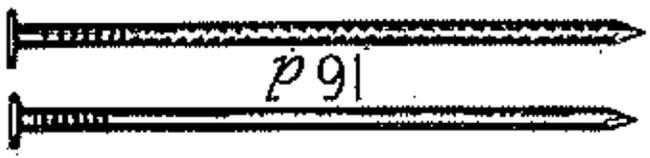
Figs. 45 to 55.—A few sizes of casing nails and finishing nails (cuts full size). Note difference in shape of heads, and size of wire, the finishing nails being a trifle larger (in gauge number) for equal lengths.

Figs. 55 to 63.—A few sizes of flooring and common brads (cuts full size). Note difference in shape of heads and variations in gauge numbers for equal sizes.



Figs. 115 to 124.—Various special nails.

Figs. 43 and 44.—Smooth and barbed hot nails. (See text also). Note sharp point and thin flat head.

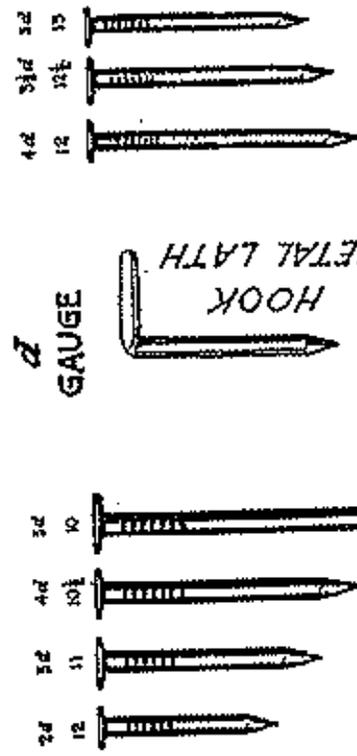


COUNTERSUNK HEADS

CONE HEADS

OVAL HEADS

FOUR-BAND NAILS

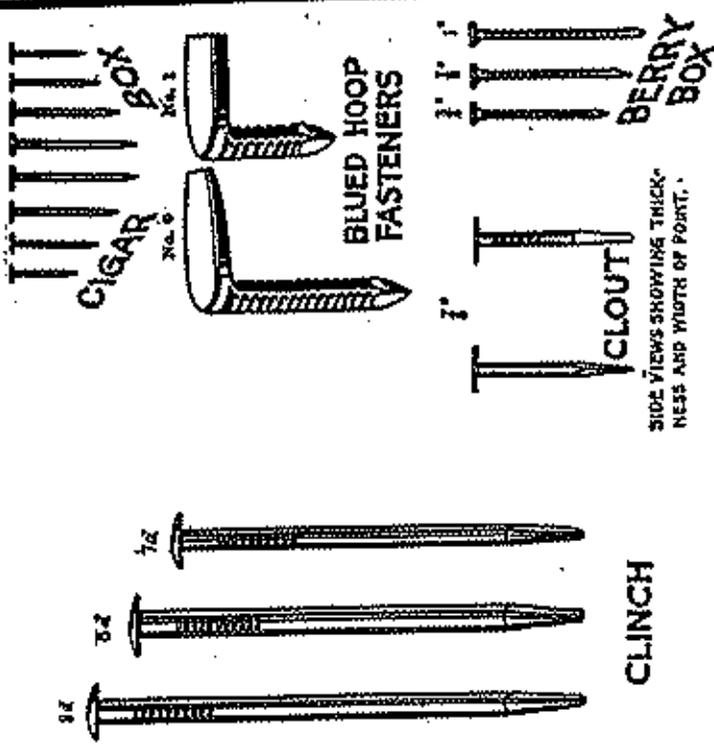


Figs. 84 to 87, and 89 to 91.—A few sizes of slating and shingle nails (cut full size). Note that the slating nails are considerably heavier than the shingle nails for equal sizes.

FIG. 88.—Hook head metal lath nails, semi-barbed (cut full size). This is a 3 1/2 x 12 bright so-called smooth nail with a long thin flat head, especially suitable for applying metal lath. It is also regularly made black, galvanized and in other lengths.



Figs. 154 and 155.—Hinge nails. FIG. 154, oval head; fig. 155, countersunk head. Range of sizes, 3 1/2 x 3 1/2 to 4 x 3 1/2 inch (4 to 9 per lb., oval head per lb.; 8 1/2 to 19 countersunk head per lb.). An ordinary hinge nail, state whether oval or countersunk head, light or heavy, antisepted or bright.



SIDE VIEWS SHOWING THICKNESS AND WIDTH OF POINT.

CLINCH

1 IN.	1 1/4 IN.	1 1/2 IN.	1 3/4 IN.	2 IN.
1	1	1	1	1
1	1	1	1	1

LARGE HEAD BARBED

AMERICAN FELT

STANDARD BARBED

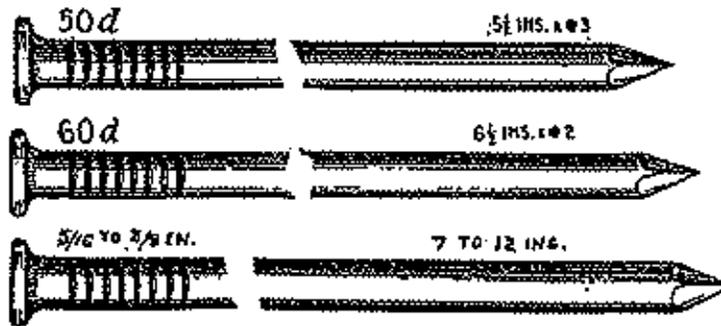
Figs. 98 to 118.—Miscellaneous nails (cut full size). Clinch nails are regularly made in sizes from 1 in. No. 14 gauge to 4 in. No. 7 gauge (24 to 260). Clutch nails are made with short chamfered point, or if so ordered with short outside point, bright, barbed or smooth. Made in sizes 1/2 in., 3/4 in., and 1 in., of either No. 18, No. 19 or No. 20 gauge. Package in legs, 25-lb. boxes, and in 5-lb., 6-lb., or 10-lb. packages. Made with either oval or flat heads. Blued hoop fasteners range in size from 3/4 to 1 in. long. No. 35 to 6 gauge. Skip of 100 or 110 lbs. Clutch nails. By definition, a driving screw nail with a large flat circular head and long sharp point; used for securing leather and the like to wood, as in box, low, hand pump buckets, etc. Clutch nails are regularly made in lengths 1/4 to 3/4 in., 3/8 to 1 1/2 gauge, 1 1/4 to 2 1/2 to the pound. Berry box nails range in lengths 1/4 to 1 1/4 in., 16 or 17 gauge; diameter heads 9 ga.

Figs. 92 to 97.—Various roofing nails (cut full size). Note that the large head nails are regularly made in lengths from 1/4 to 1 1/4 in., and in gauge numbers 9, 9 1/2, and 10 for the length. The American felt roofing nail has a large head especially suitable for which it is fastened. The head is reinforced on cable nail off.

**Spikes.**—By definition, an ordinary spike is a stout piece of metal from 3 to 12 ins. in length and thicker in proportion than a common nail. It is provided with a head and a point, and is frequently curved, serrated, or cleft to render extraction difficult; much used in attaching railroad rails to ties and in the construction of docks, piers, and other work requiring large timbers.

It should be noticed that spike and common nail sizes overlap—sizes common to both being from 3 in. to 6 in., the spike being thicker for equal sizes. There are two kinds of ordinary or round wire spikes classed with respect to the shape of the ends; as

1. Flat head, diamond point.
2. Oval head, chisel point.



FIGS. 64 AND 65.—Two sizes of flat head diamond point ordinary spikes (full size).

FIG. 66.—A large flat head, diamond point spike.

### Ordinary Spikes

Size	Length	Gauge No.	Deg. of Counter-sunk	Diam. Head	Head Rad. (oval)	Approximate No. to Pound
10d.....	3 in.	6	123	3/8	3/8	41
12d.....	3 1/4 "	6	123	3/8	3/8	38
16d.....	3 3/4 "	5	123	1/2	1/2	30
20d.....	4 "	4	123	5/8	5/8	23
30d.....	4 3/4 "	3	123	3/4	3/4	17
40d.....	5 "	2	123	7/8	7/8	13
50d.....	6 1/2 "	1				10
60d.....	6 "	1	123	1 1/8	1 1/8	9
7 inch.....	7 "	3/8 inch	123	1 1/4	1 1/4	7
8 "	8 "	3/8 "	123	1 3/8	1 3/8	4
9 "	9 "	3/4 "				3 1/2
10 "	10 "	3/4 "				3
12 "	12 "	3/4 "				2 1/4

**Boat Spikes.**—These are driven mostly in hard timbers, hence a clean cut sharp chisel point is necessary to facilitate this kind of work. They are regularly made according to the following table:

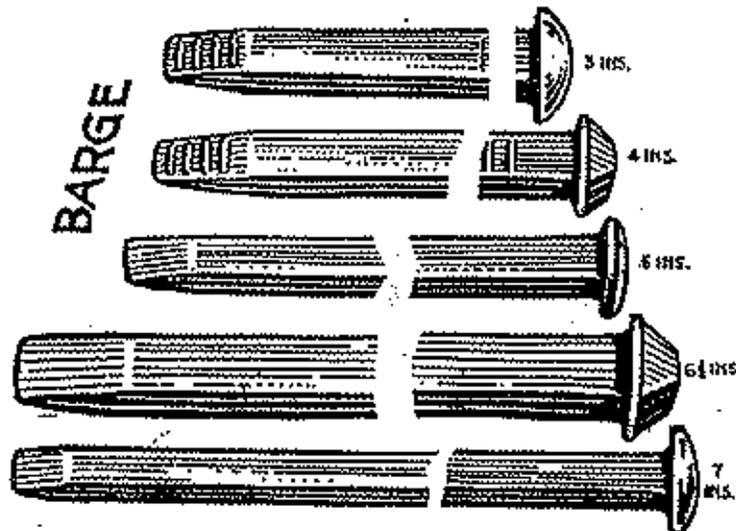
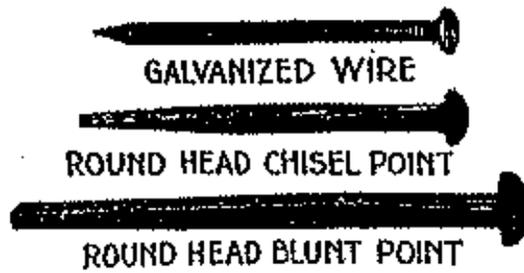
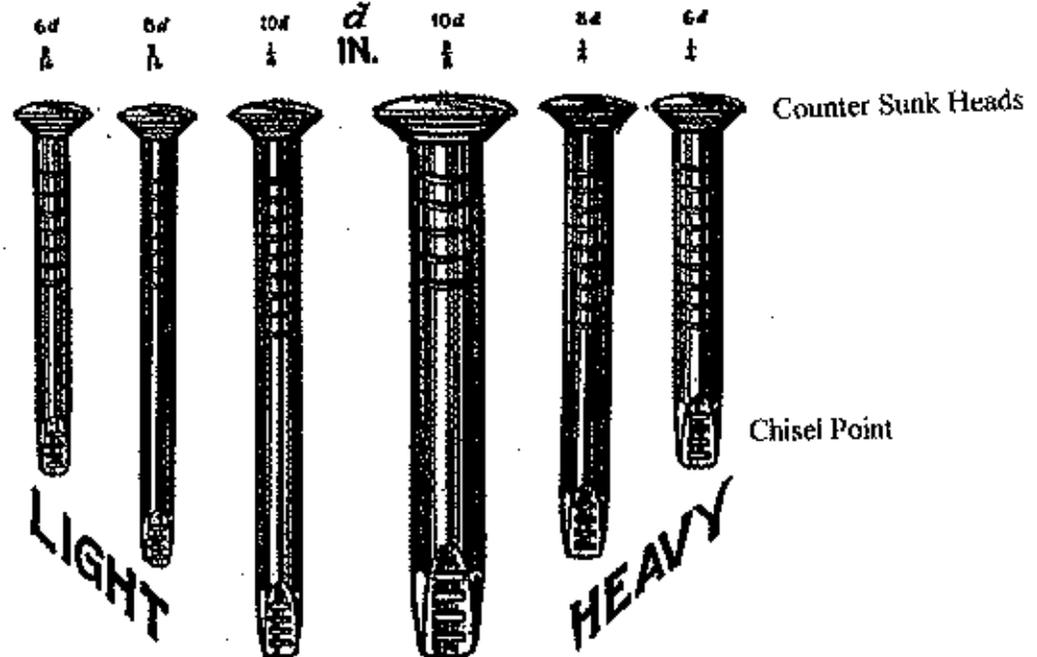


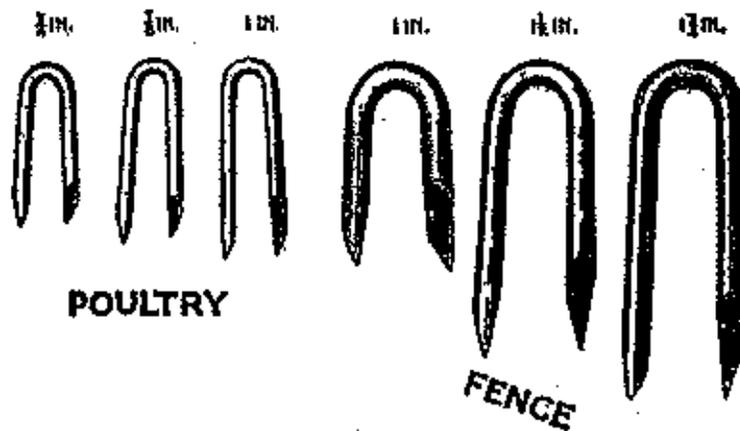
FIG. 157.—Railroad spike. Size range from 3/4 x 1 1/4 up to 1 1/2 x 2 1/2 and larger.



Figs. 67 to 69.—Various boat nails.



Figs. 70 to 75.—A few sizes of light and heavy boat nails, made regularly 1½ in. to 4 in., (4d or 20d), light gauge No. ¼ to ¾; heavy No. ¼ to ¾.



Figs. 160 to 171.—A few sizes of poultry and fence wire staples. Note difference in gauge number as seen by comparing the 1 inch staples.

### ELECTRICIANS STAPLE NAILS



These staple nails are easier to drive and hold insulated electrical wires securely. They may be placed near the edge of the molding without danger of splitting the wood. Most popular finishes—bright or galvanized; can be cement coated, etc.

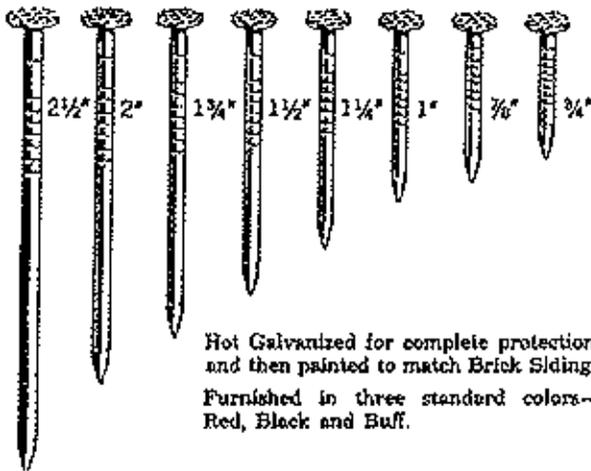
### LEAK-PROOF ROOFING NAILS

Hot Galvanized Zinc Coated, Diamond Point



### PAINTED BRICK SIDING NAILS

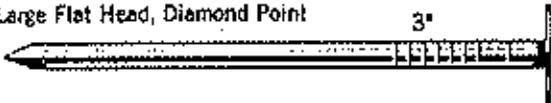
Checkered Flat Heads, Diamond Point



Hot Galvanized for complete protection and then painted to match Brick Siding. Furnished in three standard colors—Red, Black and Buff.

### CORK INSULATION NAILS

Hot Galvanized  
Large Flat Head, Diamond Point

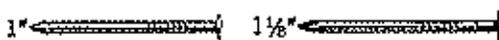


Especially adapted for fastening cork and similar insulations in large, built-in refrigerator rooms. Usually required in lengths 3 to 9 inches, No. 9 gauge. Heads, 1/2 inch diameter. Other lengths and gauges can be supplied. Count per pound approximately the same as Smooth Foundry Nails. Cork Insulation Nails are Non-Stock Items.

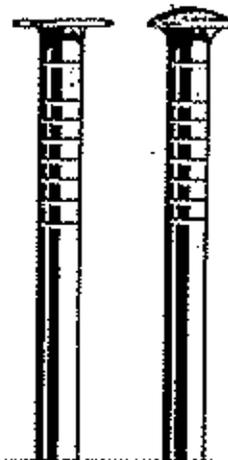
Length from underside of head to tip of point.

### BLUED LATH NAILS

Flat Head, Diamond Point

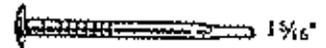


### GUTTER SPIKES



### BEER CASE HINGE, LOCK AND LATCH PLATE NAILS

Oval Head, Duck Bill Point



NON-STOCK ITEMS

Lengths: 1/2" to 1 1/2" inclusive.  
Gauges: Nos. 13 and 14 inclusive.  
Length from underside of head to tip of point.

NON-STOCK ITEMS

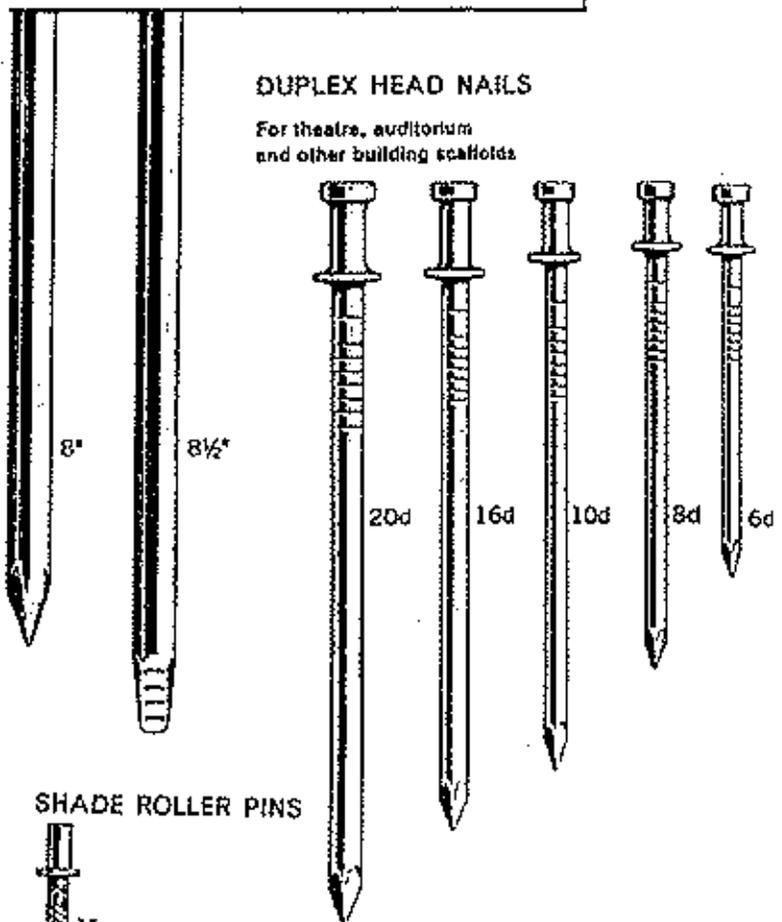
Approximate Count Per Pound

Length In.	14-Inch		5 Gauge		3/4-Inch		5 Gauge		5 Gauge	
	Flat Head	Oval Head								
1 1/2"	10	11	15	16	19	20	18	19	26	27
1"	10	10	14	15	18	18	17	17	24	25
3/4"	9	9	13	14	15	17	16	16	22	23
3/8"	8	8	12	13	15	16	15	15	21	21
1/2"	8	8	12	12	14	15	14	14	20	20
1/4"	7	7	11	11	14	14	13	13	18	19
1/8"	7	7	10	11	13	13	12	13	17	18
0"	7	7	10	10	12	12	12	12	16	17

1. Head Length from underside of head to tip of point.  
2. Oval Head Length from top of countersunk to tip of point.

### DUPLEX HEAD NAILS

For theatre, auditorium and other building scaffolds.



### SHADE ROLLER PINS



CAVALRY

MACHINE-MADE SHOES

Shoes, weights and approximate number per 100-pound bag

Weight	Size									
	1	2	3	4	5	6	7	8	9	10
Horse shoes:										
Front:										
Extra extra light.....	182	114	94	80	58	48	42	36		
Extra light.....	118	94	80	70	58	48	42	36		
Light.....	107	82	71	62	50	42	36	30		
Medium.....	94	75	62	52	43	37	33	28		
Heavy.....	84	68	58	48	41	34				
Hind:										
Extra extra light.....	177	160	123	106						
Extra light.....	146	110	92	78	63	53	45			
Light.....	123	97	80	65	55	47	41	33		
Medium.....	110	92	71	60	51	45	41	36		
Heavy.....	92	75	62	53	45	40	36			
Mule shoes:										
Light.....	145	123	103	80	63	51				
Heavy.....	123	97	78	60	50	45				

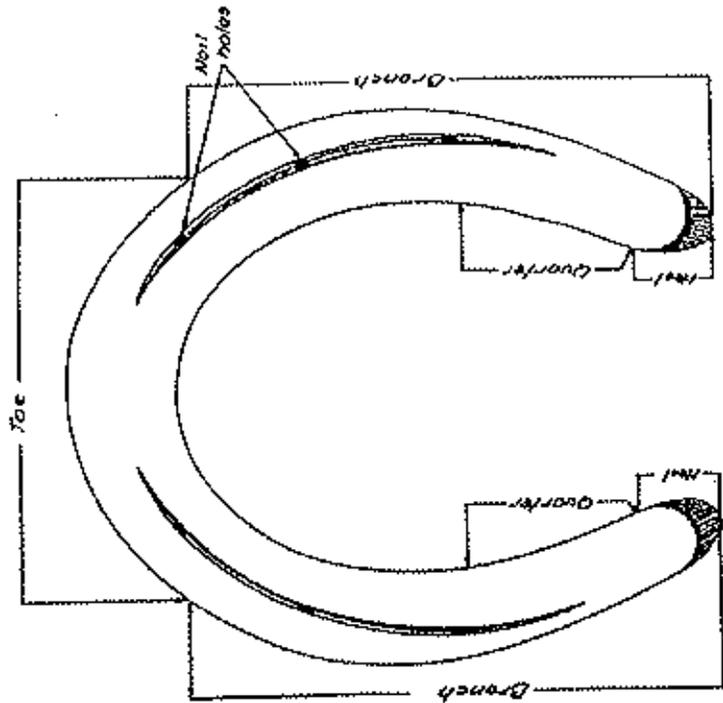
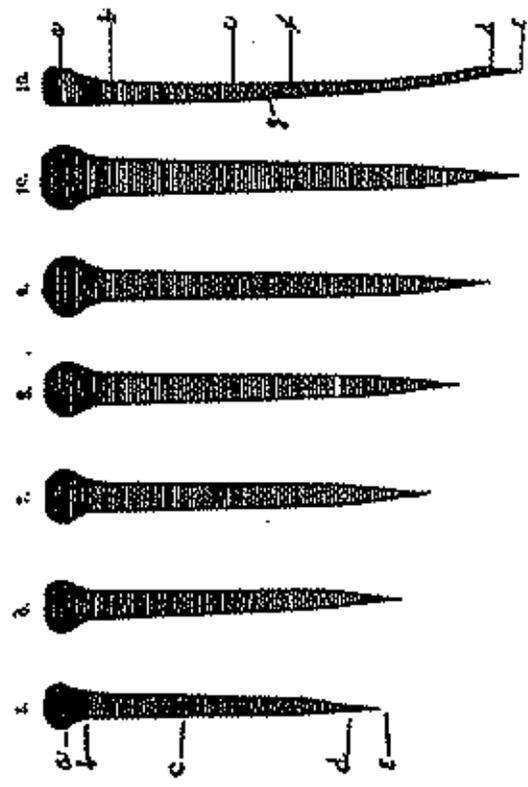


FIGURE 30.—Hand-forged shoe.



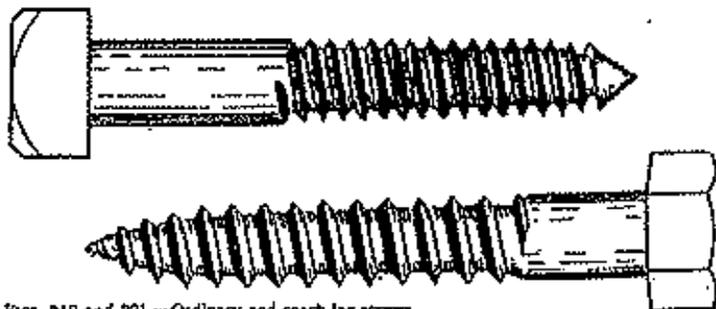
a. Head.  
b. Neck.  
c. Shank.  
d. Bevel.  
e. Point.  
f. Inner face.  
g. Outer face.

FIGURE 29.—Machine-made horseshoe nails (natural size) with low, wide head for fullered shoe. Last nail shows from one border; others from inner face.

**Wood Screw Numbers**  
(American Screw Co. and Asa I. Cook Co. standard. Illustrations full size)

No.	Inch		No.	Inch	
0	.0578		110	.2684	
1	.0710		117	.2816	
2	.0842		118	.2947	
3	.0973		120	.3210	
4	.1105		22	.3474	
5	.1236		24	.3737	
6	.1368		25	.4000	
7	.1500		28	.4263	
8	.1631		30	.4526	
9	.1763				
10	.1894				
11	.2026				
12	.2158				
13	.2289				
14	.2421				
15	.2552				

**Lag Screws.**—By definition, a lag screw is a *heavy duty wood screw provided with a square or hexagon head so that it may be turned by a wrench.*



FIGS. 219 and 221.—Ordinary and coach lag screws.



Phillips Head screw - 1920's to present

By definition a wood screw is a screw with, having right handed coarse thread to give a good grip, a gimlet point, enter the wood and a slotted head for the reception of a screw driver.

Wood screws may be classed

1. With respect to the material of which they are made, as:

- a. Iron
- b. Steel
- c. Brass
- d. Copper
- e. Bronze

2. With respect to the shape of the head, as:

- a. Flat
- b. Round { ordinary  
          { piano
- c. Pillster { oval  
              { countersunk
- d. Oval
- e. Winged
- f. Bung { round  
          { square
- g. Pinched
- h. Headless
- i. Slotted (wood screws)
- j. Square (lag screws)
- k. Hexagonal
- l. Clove
- m. Grooved

3. With respect to the shape of the point, as:

- a. Gimlet
- b. Diamond
- c. Conical or Fetter

4. With respect to the thread, as:

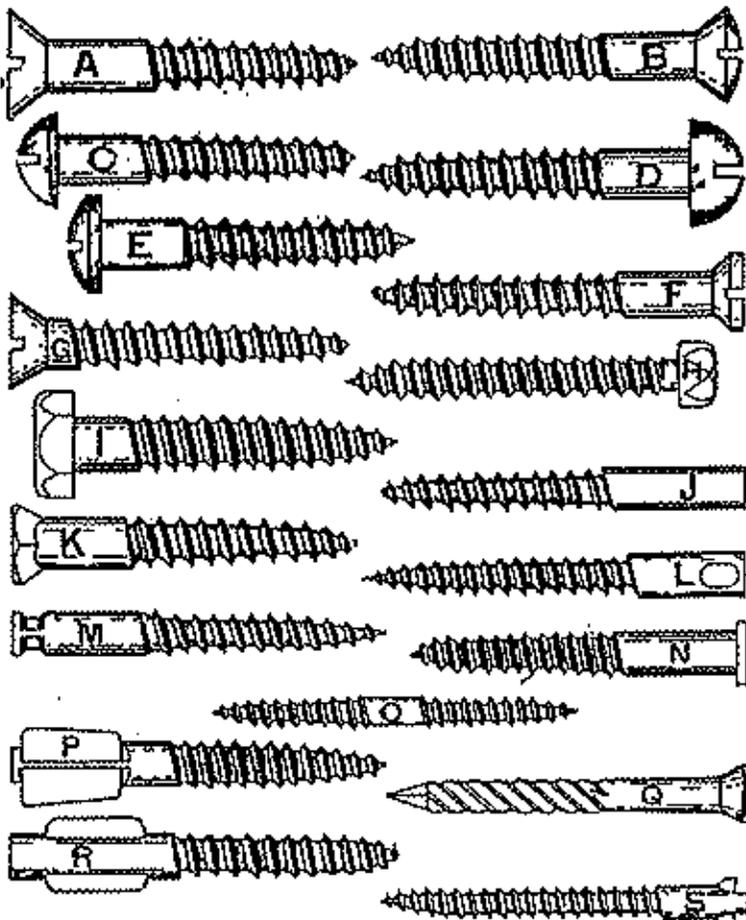
- a. Standard
- b. Full length (felloe)
- c. Coarse (drive)

5. With respect to duty, as:

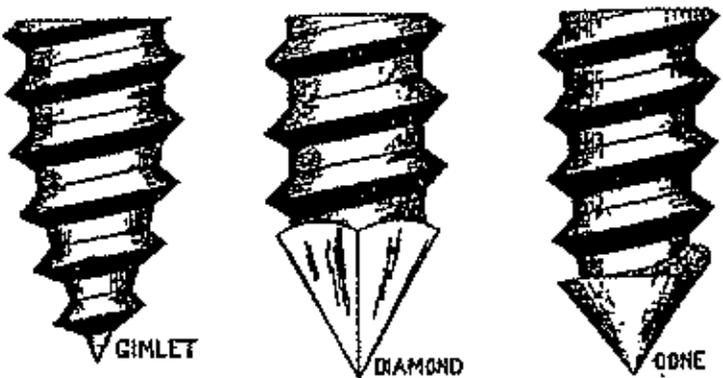
- a. So-called "wood" (light duty)
- b. Lag (heavy duty)

6. With respect to finish, as:

- a. Bright
- b. Blued
- c. Nickel plated
- d. Silver plated
- e. Brassed
- f. Bronzed
- g. Coppered
- h. Japanned
- i. Lacquered
- j. Tinned
- k. Galvanized



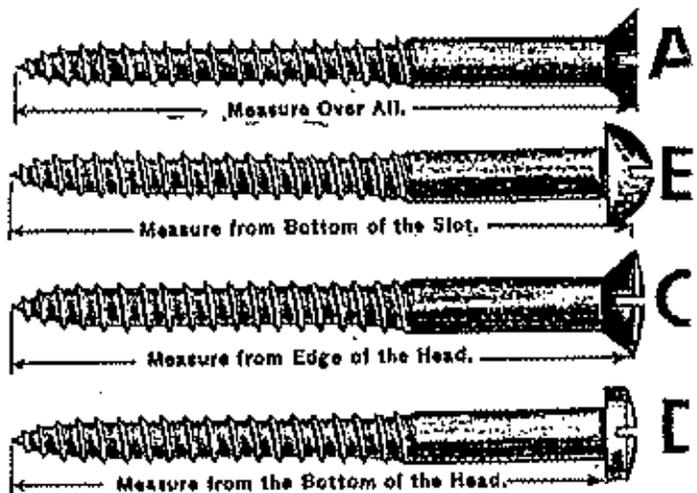
189 to 211.—Various wood screws illustrating the multiplicity of thread shapes to meet requirements. A, flat head; B, oval head; C, round head; D, piano head; E, oval pillster head; F, countersunk pillster head; G, felloe; H, clove head; I, hexagon head; J, headless; K, square bung head; L, grooved; M, pinched head; N, round bung head; O, dowel; P, winged; Q, drive; R, winged; S, winged head.



Figs. 212 to 214.—Standard wood screw points. The gimlet point is an all turn or self feed point while the diamond and cone are for heavy duty work where the screw is partly driven and partly turned in inserting.

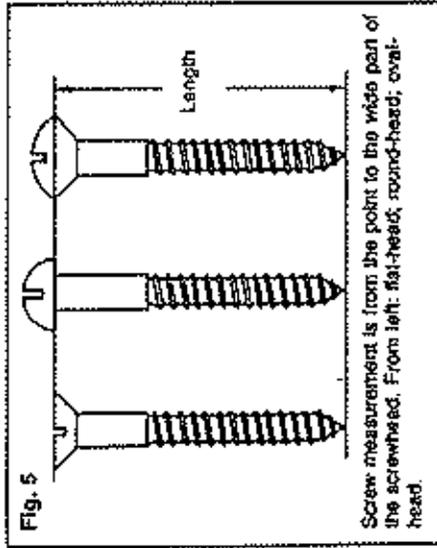


FIG. 215.—Rogers' flat head drive screw. The thread is made so coarse that the screw will turn as it is driven in by a hammer.

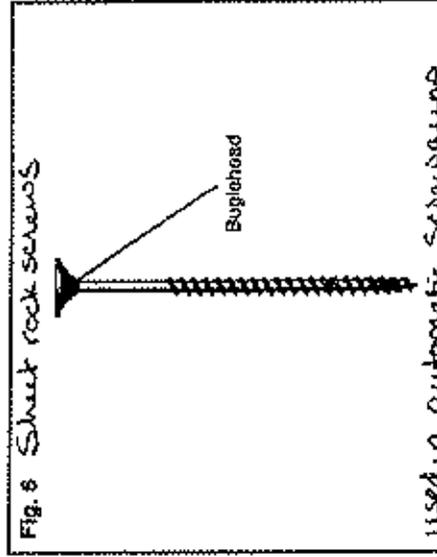


Figs. 189 to 192.—Various wood screws defining the length of screws. Avoid mistakes by remembering how to measure the different types.

measurements at turn of century (~ 1900)



Common wood screws are made of steel or brass. Brass screws won't rust, but steel screws are generally stronger and are available with a hot-dipped galvanized or ceramic coating for exterior use.



The shank of the screw is threaded from the point up, about two-thirds of its length. The upper third of the shank is smooth. Screws are often identified by the shape of their heads (Fig. 5).

- Flat-Head Screws. Used where the screw must be

flush with the surface of the work.

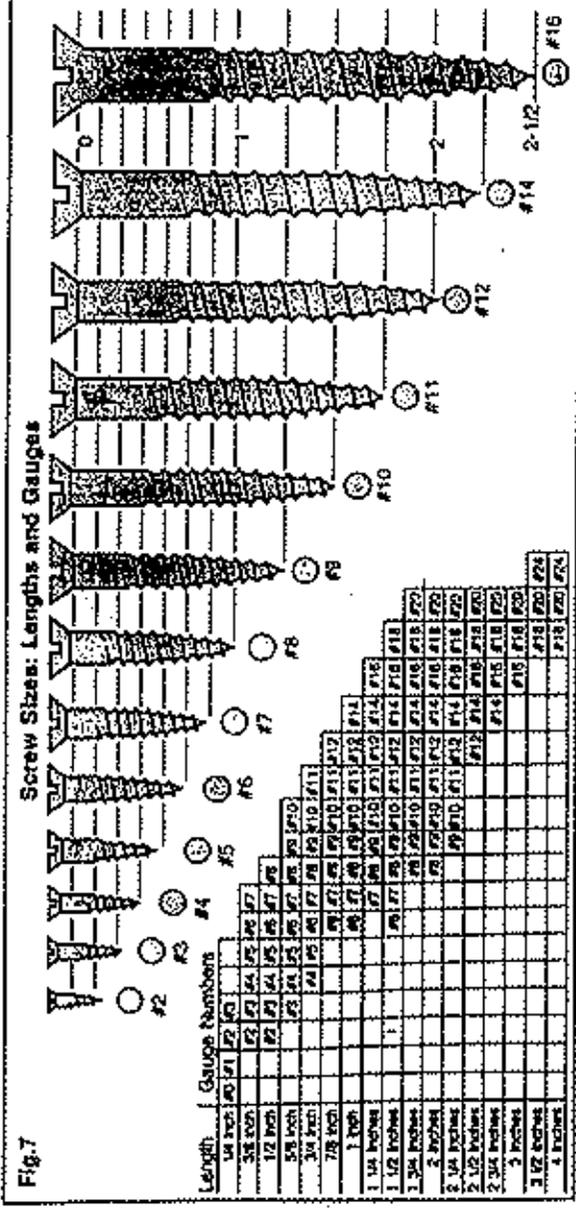
- Round-Head Screws. Protrude above the surface, making them easier to withdraw.
- Oval-Head Screws. Combine features of flat-head and round-head screws—they are partly countersunk in the work, and they protrude slightly above the surface.
- Bugle-Head Screws. Commonly known as drywall screws (for which they were originally designed), these screws have an aggressive thread and a tapered shank just below a flat head. The taper allows them to be driven flush in soft materials without the need for countersinking. These screws are extremely popular and are used for many woodworking and carpentry projects (Fig. 6).

**Screw Sizes.** Wood screw length is measured from the point to the widest part of the head. Lengths range from 1/4 inch to 6 inches and are graduated by 1/8 inch to 1 inch. Screws also vary in body diameter (Fig. 7), expressed as a gauge number from #0 (about 1/16 inch) to #24 (about 3/8 inch).

Lower-numbered (thinner) screws are for fastening thin wood or where splitting is a problem. High-numbered (thicker) screws are used where greater strength is required.

**Driving Screws.** Screwheads have been designed to accommodate different driving tools and bits. Here are the most common.

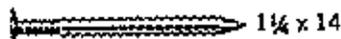
- Slotted Head. Single slot cut across the entire width of the head. A normal blade-type screwdriver (or driver in a drill) is used to tighten these screws.
- Phillips Head. Recessed, X-shaped slot centered on the head. Commonly driven with a Phillips-screwdriver bit in a drill. Slips less than a blade-type bit.
- Square-Drive Head. Square hollow centered on the head. Square-drive bits in a drill rarely slip or strip the screwhead.
- Hex Head. Hexagonal (six-sided) head. Gets tightened with a socket driver.





# Amering and Screw-Shank Nails

## UNDERLAY NAILS

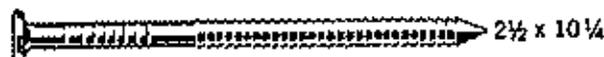


Slightly countersunk head with regular diamond point. Amering Underlay floor nails, when properly applied, never work up to mar floor coverings, hold firm and tight, assuring underfloors that stay permanently squeak-proof and trouble free.

Standard Size, in.	Gauge	Head Diam. in.	Approx. No. to lb.
1 1/4	14	1 1/4	537

Length is over-all.

## COMMON NAILS

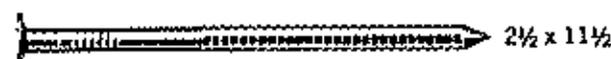


Flat head with diamond point. These nails save labor-cut costs in erecting framing. They are scientifically engineered to develop the approximate holding power of wood screws, yet they drive with the ease of ordinary nails. Available in both Amering and Screw Shank features.

Standard Size, in.	Gauge	Head Diam. in.	Approx. No. to lb.
2 1/2	11 1/2	1 1/4	167
2 1/2	10 1/4	1 1/2	101

Length from underside of head to tip of point.

## BOX NAILS



Large flat head, diamond point, Amering or Screw Shank features.

Standard Size, in.	Gauge	Head Diam. in.	Approx. No. to lb.
2 1/2	12 1/2	1 1/2	225
2 1/2	11 1/2	1 3/4	135

Length from underside of head to tip of point.

## HUMMER NAILS



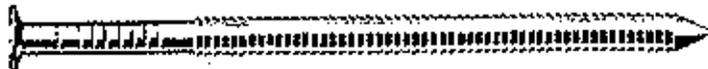
Diamond point, slightly countersunk flat checkered heads, Amering shank. Recommended by Certainteed Products Corp. Smaller head is more easily covered; checkered head prevents hammer slipping. Slight countersunk head increases strength of head. Bright or cement coated as specified.

Standard Size, in.	Gauge	Head Diam. in.	Approx. No. to lb.
2 3/8	12 1/2	1 1/2	225

Length from underside of head to tip of point.

## POLE BARN NAILS

4 x 7

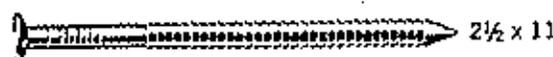


Flat, slightly countersunk head, diamond point. Ameringed 3" upward from the point. Designed as a low cost replacement for nuts and bolts in barns erected with creosoted poles for roof supports.

Standard Size, in.	Gauge	Head Diam. in.	Approx. No. to lb.
4	7	1 1/2	225

Length is over-all.

## ROOF RAFTER NAILS

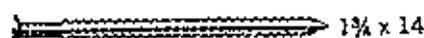


Flat slightly countersunk head, diamond point, Amering or Screw Shank features. Gives increased holding power and solidity to rafters.

Standard Size, in.	Gauge	Head Diam. in.	Approx. No. to lb.
2 1/2	11	1 1/4	130
2 1/2	10	1 1/2	79
2 1/2	9	1 3/4	60

Length is over-all.

## SHAKE NAILS

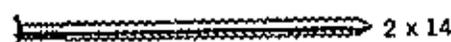


For insulation shingles or shakes. Flat head, diamond point, Amering Shank. These nails hold shingles or shakes securely against wind, moisture and expansion and contraction. The demand primarily is for electro galvanized. May be also furnished bright or hot galvanized.

Standard Size, in.	Gauge	Head Diam. in.	Approx. No. to lb.
1 3/4	14	1 1/4	406

Length from underside of head to tip of point.

## FACE NAILS



2" x 14-gauge, 3/8" flat head, diamond point, Amering Shank. For applying redwood and other types of siding. Amering's prevent siding from loosening. Usually furnished electro-galvanized. Approx. 350 per lb.

Length from underside of head to tip of point.

# MORSE HARDWARE COMPANY

## CLOUT NAILS



Blued; 1 Lb. Papers

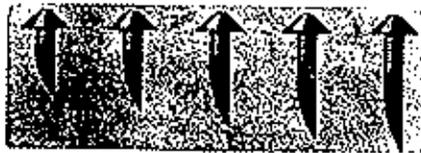
Length, Inches	1/2	3/4	1	1 1/4	1
Per Pound	\$0.32	.31 1/2	.31	.30 1/2	.30
Length, Inches	1 1/4	1 1/2	1 3/4	2	
Per Pound	\$0.30	.30	.30	.30	

Tinned—1 Lb. Papers

Length, Inches	1/2	3/4	1	1 1/4	1
Per Pound	\$0.37	.36 1/2	.36	.35 1/2	.35
Length, Inches	1 1/4	1 1/2	1 3/4	2	
Per Pound	\$0.35	.35	.35	.35	

One Hundred Pounds in a Case

## HUNGARIAN NAILS



Blued, Cone Head—1/2 Lb. Papers

Length, Inches	3 1/2/8	4/8	4 1/2/8	5/8
Per Dozen, Papers	\$0.60	.60	.60	.60

One Dozen Papers in a Package; 100 Dozen in a Case; Weight per Case, 160 Lbs.

## HOB NAILS



Grooved Head, 1/4 Lb. Papers

Length, Inches	3 1/2/8	4/8	4 1/2/8	5/8
Per Dozen, Papers	\$0.45	.45	.45	.45

One Dozen Papers in a Package; 50 Dozen in a Case; Weight per Case, 160 Lbs.

## SHOE NAILS



Countersunk; Flat Head; Clinching Points; 16 Gauge

Improved Brass, 1/2 Lb. Papers

Length, Inches	3/8	3 1/2/8	4/8	5/8	6/8
Per Dozen, Lbs.	\$0.90	.90	.90	.90	.90

Brass Plated, 1/4 Lb. Papers

Length, Inches	3/8	3 1/2/8	4/8	5/8	6/8	7/8
Per Dozen, Lbs.	\$0.60	.60	.60	.60	.60	.60

One Dozen Papers in a Package; 100 Dozen in a Case; Weight per Case, 165 Lbs.

## UPHOLSTERERS' NAILS



BRASS

Solid Polished Brass Oval Heads; Steel Wire Point.

Fifty in a Carton; Twenty Cartons in a Box

NOS.	42	43	12
Diameter Head, Inches	5/8	3/4	1 1/4
Length Point, Inches	5/8	5/8	3/4
Weight per Thousand, Lbs.	1 1/4	1	1
Per Thousand	\$1.60	1.70	

One Hundred in a Carton; Ten Carton in a Box

NOS.	42	43	12
Diameter Head, Inches	5/8	3/4	1 1/4
Length Point, Inches	5/8	5/8	3/4
Weight per Thousand, Lbs.	1 1/4	1	1
Per Thousand	\$1.70	1.50	2.10

## LEATHERINE

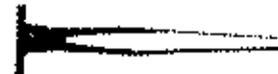
1/2 Inch Plain Oval Steel Enamelled Head; 1/2 Inch Steel Wire Point

NO. 1902

Color	Tan	Black
Per Thousand	\$1.60	1.80

Fifty Only in a Paper; One Dozen Papers in a Carton; Weight per Dozen Papers, One Pound

## COPPER CUT NAILS



For Boat Work, Etc.

In 25 Lb. Boxes

Length, Inches	3/4	1	1 1/4	1 1/2
Number to Pound	625	500	408	285
Per Pound	\$0.87	.66	.65	.65
Length, Inches	1 1/4	2	2 1/4	3
Number to Pound	165	97	77	69
Per Pound	\$0.85	.65	.65	.65

## BOAT NAILS



Galvanized

In One Hundred Pound Kegs

Length, Inches	1	1 1/4	1 1/2	1 3/4	2
Number to Pound	288	192	160	144	112
Per Pound	\$0.18	.16	.14	.14	.14
Length, Inches	2 1/4	3	3 1/2	4	
Number to Pound	80	48			
Per Pound	\$0.14	.14	.14	.14	

## CASING NAILS



STEEL CUT

Size	6d	8d	10d
Length, Inches	2	2 1/4	3
Number to Pound	300	178	150
Advance, Over Base, per Keg	\$0.35	.25	.15

One Hundred Pounds in a Keg

MORSE HARDWARE COMPANY, BELLINGHAM, WASHINGTON

# **“Good to the Last Drop”: A Maxwell House Chronology Based on Advertising Images**

**by Ann Sharley**  
Archaeological and Historical Services  
Eastern Washington University



Paper presented at the  
59th Annual Northwest Anthropological Conference  
Seattle, Washington  
March 2006

Twenty-one-year-old Joel Owsley Cheek earned his living as a salesman for a Nashville grocery wholesaler, but his real interest lay in coffee. In his spare time he sought out the finest beans, and roasted, ground, and combined them, always looking for "the perfect blend of matchless flavor."<sup>1</sup>

By the 1890s he had found what he was looking for. Mr. Cheek soon convinced the management of Nashville's elegant Maxwell House Hotel to try his blend, and the guests raved about the new coffee's full rich flavor. Cheek's coffee became so popular, in fact, that the hotel owner ordered his staff to serve their customers no other brand.



Figure 1. Joel Cheek, developer of Maxwell House Coffee.

Around 1900 Cheek formed a partnership with John W. Neal, and the two men began to produce Maxwell House coffee for a wider market.<sup>2</sup> In 1907 the firm, by then called the Cheek-Neal Coffee Company, adopted its now-famous "Good to the Last Drop" slogan. Theodore Roosevelt, or so the story goes, was served a cup of Maxwell House coffee during a visit to The Hermitage in Nashville. When asked if he'd like a refill, the president is said to have replied, "Will I have another? Delighted! It's good to the last drop!"<sup>3</sup>

<sup>1</sup> Kraft Foods Inc., "Joel Cheek" (Website <http://www.kraft.com/100/founders/1Cheek.html>, 2006); Molly Wade McGrath, *Top Sellers, U.S.A.: Success Stories Behind America's Best-Selling Products from Alka-Seltzer to Zippo*, (New York: William Morrow and Company, Inc., 1983), 85; William H. Ukers, *All About Coffee*, (New York: The Tea & Coffee Trade Journal Company, 1935), 445.

<sup>2</sup> Kraft Foods Inc., "Joel Cheek"; Kraft Foods Inc., "Our Heritage" (Website [http://www.kraftfoods.com/maxwellhouse/mh\\_heritage.html](http://www.kraftfoods.com/maxwellhouse/mh_heritage.html), 2004); Ukers, *All About Coffee*, 445.

<sup>3</sup> Kraft Foods Inc., "Our Heritage."

Adoption of the slogan immediately created a furor among English language buffs, who wanted to know what, exactly, was wrong with "the last drop." The issue was finally put to rest after a respected English professor at Columbia University assured the critics that this was, indeed, correct English usage—that "to" in this case included "the last drop."<sup>4</sup>

From the beginning, the Cheek-Neal Coffee Company devoted much of its budget to advertising and, in 1920, the firm began to place ads in nationally distributed magazines.<sup>5</sup> This exposure, as well as passage of Prohibition legislation, created an increased nationwide demand for the beverage. Over the next decade, the Cheek-Neal company expanded from a regional to a national firm: the four plants listed in 1921 ads—Nashville, Houston, Jacksonville, and Richmond<sup>6</sup>—grew to five the following year with the addition of New York City.<sup>7</sup> In 1925 a sixth plant was added, this one in Los Angeles,<sup>8</sup> and three years later the company expanded into Chicago.<sup>9</sup>

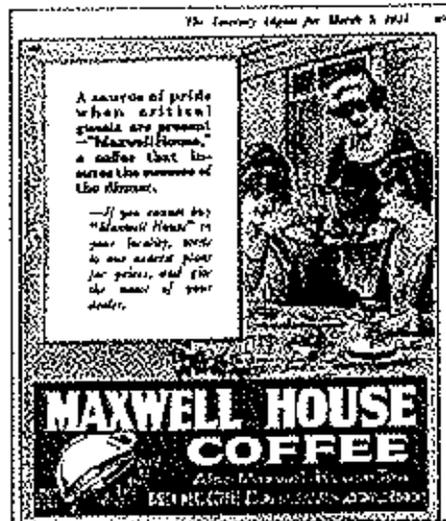


Figure 2. Maxwell House advertisement, 1921.

This rapidly growing firm caught the eye of the Postum Company, and in 1928 Postum purchased Cheek-Neal and renamed it Maxwell House Products Company. One year

<sup>4</sup> Hannah Campbell, *Why Did They Name It ...?* (New York: Bell Publishing Company, 1964), 16.

<sup>5</sup> Periodical Publishers Association, *Nationally Established Trade-Marks*, (New York: Periodical Publishers Association, 1934), 38.

<sup>6</sup> Cheek-Neal Coffee Company, Maxwell House Coffee advertisement, *The Literary Digest* March 5, 1921:69.

<sup>7</sup> Cheek-Neal Coffee Company, Maxwell House Coffee advertisement, [unidentified magazine] June 3, 1922.

<sup>8</sup> Cheek-Neal Coffee Company, Maxwell House Coffee advertisement, *The Ladies' Home Journal* September 1925.

<sup>9</sup> Cheek-Neal Coffee Company, Maxwell House Coffee advertisement, *The Country Gentleman* January 1928:58.

later the Postum Company changed its own name to General Foods Corporation.<sup>10</sup> Maxwell House remained a General Foods subsidiary until 1985 when Philip Morris purchased General Foods. Today Maxwell House, although merged with Kraft Foods Inc., remains part of the worldwide Philip Morris empire.<sup>11</sup>

With this background, we'll move on to Maxwell House packaging, with an eye to temporally diagnostic changes in container design, information that will assist archaeologists and other students of material culture in estimating Maxwell House container dates of manufacture. This chronology of design changes is derived from images seen in Maxwell House advertising, hence it is limited to 1923-1955, a period for which a complete sequence of Maxwell House advertisements was available. The chronology was refined through comparison of the advertising images with a small collection of actual Maxwell House cans and jars.

Advertisements from 1923 to 1931 show Maxwell House coffee packaged in tall, narrow (4 1/4" diameter x 6" high), one-pound sanitary cans with replaceable external friction (slip) lids. Although the beginning date for this can style was not located, use of the "Good to the Last Drop" slogan in the design provides an earliest possible date of 1907. Labels on these early cans are paper, resulting in poor archaeological preservation. Lids, however, are embossed with the words **MAXWELL HOUSE COFFEE / "GOOD TO THE LAST DROP"** surrounding the Maxwell House cup and drop logo; sometimes the words **100% / PURE** flank the cup. Although a number of variations in lid and label design occur during this period, differences—other than listings of company plants—do not appear to be temporally meaningful.

In 1931 the Maxwell House can underwent its first radical design change. The can became short and broad (5 1/4" diameter x 4" high)—the classic one-pound coffee can shape—still sanitary in style but with a key-strip opening and the key attached to the top of the can. The lithographed label retained the earlier paper label's blue background, red **MAXWELL / HOUSE / COFFEE** lettering bordered in gold, an elongated left leg on the "M", and red and gold chain border design. New features, however, include the words **VACUUM PACKED / VITA-FRESH PROCESS** at the top of the front panel, the coffee cup and drop logo superimposed on a green coffee branch below the first two letters of **MAXWELL**, "**GOOD to the / LAST DROP**" below the coffee cup, a navy rectangle with the words **VITA-FRESH / PROCESS / KEEPS IT FRESH** to the left of the cup, **HIGH GRADE** at the bottom of the front panel, and a navy oval noting **GROUND / STEEL CUT / PERCOLATOR** partially covering the lower chain border.

The next few years saw several minor design changes. In 1932 the **VITA-FRESH** lettering at the top of the front panel became slightly larger and the word was repositioned above **VACUUM PACKED**. During either 1932 or 1933 wording in the navy rectangle was replaced with **VITA-FRESH / INSURES FRESHNESS / AND FULL FLAVOR**, and, in 1933, a navy band reading **Ground Just Right / FOR DRIP OR PERCOLATOR**, was added, encircling the central depression on the lid.

<sup>10</sup> Kraft Foods Inc., "Our Heritage."

<sup>11</sup> Gregory Dicum and Nina Luttinger, *The Coffee Book*, (New York: The New Press, 1999) 127, 128.

In 1934 Maxwell House modernized its product with a slightly shorter (5¼" diameter x 3¾" high), updated one-pound can. This container's lithographed label retained the traditional blue background, but the red and gold chain designs around the upper and lower margins had disappeared. **MAXWELL / HOUSE / Coffee** still appeared in red, although minus the gold borders and **Coffee**, other than its initial letter, had become lower case. The wording in the navy rectangle changed to **FRESH / AS THE DAY ROASTED / NO COFFEE CAN BE FRESHER** and the words **HIGH GRADE** moved into the navy oval at the bottom of the front panel.

Two years later, in 1936, Maxwell House coffee became available in **ALL PURPOSE GRIND**, noted in the navy oval, or **DRIP GRIND**, noted in large block letters above the key strip. Wording in the navy rectangle changed to read **FRESH / AND STAYS FRESH IN / THIS SUPER VACUUM CAN**. That same year, the navy band and wording on the lid disappeared. Minor changes in 1937 included replacement, on the regular/all purpose grind can, of the navy oval with a navy banner reading **REGULAR GRIND**.

The next major design change occurred in 1940 as the cup and drop logo grew smaller and more stylized, the green coffee branch turned white, and "**GOOD TO THE LAST DROP**" was condensed to one line. The navy rectangle, now reading **ROASTER / FRESH / AND STAYS FRESH IN / THIS SUPER-VACUUM CAN**, moved to the right side of the front panel, and the navy banner at the bottom of the regular grind can's front panel disappeared.

In 1942, in response to war-time metal shortages, Maxwell House coffee appeared in colorless or amber one-pound glass jars with paper labels, screw lids (some indicating jar contents), and pebbly stippling over shoulders, heels, and bases. Jar label wording and layout closely mimicked that of can labels. Advertisements, however, indicate that cans were still available in 1942. Over the next three years, Maxwell House ads depict only the jar, but in 1946 the one-pound can is again shown, the label unchanged.

In 1947 the one-pound jar underwent a change in form, becoming squatter with broader shoulders, a shorter neck, and a thinner lid. The jar label and can design, however, remained the same. That same year, advertisements show a new Maxwell House product—instant coffee—in a small round jar with a paper label and screw lid. In addition to the word **Instant** on the traditional blue label, **MAXWELL / HOUSE / Coffee** and the cup and drop/coffee branch logo appear in white on a red rectangle. Returning servicemen, who had become accustomed to instant coffee in the military, created a ready market for this new product.

The one-pound can, one-pound jar, and instant coffee jar remained unchanged through 1949. In 1950, however, the one-pound jar disappeared entirely, and late in the year, the one-pound can underwent another major overhaul: The "M" in **MAXWELL** lost its tail, the cup and drop logo became much larger and less stylized and moved up the label until the top of the can truncated the cup's handle, the coffee branch disappeared, **GOOD TO**

**THE / LAST DROP** lost its quotation marks and became two lines on a red banner, and the key moved to the bottom of the can.

The following year, 1951, the can remained the same, but the instant coffee jar evolved: The screw lid became red, the top sporting a large white star with smaller white stars sprinkled over the top and sides. The paper label also changed to red with **MAXWELL / HOUSE / Coffee** in white lettering and **INSTANT** in a white band across the top. And, as in earlier can design changes, the cup and drop logo increased in size and moved to the top of the label.

The next change occurred between 1952 and 1954 with loss of the "**GOOD TO THE / LAST DROP**" banner; the wording, however, remained, with the quotation marks reinstated. The container is shown unchanged in 1955 advertisements.

Maxwell House design changes continued through the second half of the twentieth century. After 1955, however, print advertising rapidly dropped off, presumably replaced by television marketing efforts. Although advertisements that would establish dates for post-1955 design changes were not located, these modifications include a color/case change for **MAXWELL / HOUSE / COFFEE** with **MAXWELL / HOUSE** in white and **COFFEE** in red. At a later date, the key opening was discontinued, a plastic lid was provided to seal the opened container, and the cup and drop logo moved back to the space beneath the first two letters of **MAXWELL**. And, in closing, a word of caution: Recent years have seen the earliest Maxwell House containers reproduced as commemorative cans and decorative kitchen canisters. Close examination of these containers, however, leaves no doubt as to their lack of antiquity.

And that's where the current study leaves us. The chronology presented here is, of course, only a beginning. Today Joel Cheek's "perfect blend" remains as popular as ever, ensuring that archeologists will be dealing with Maxwell House containers for many decades to come.

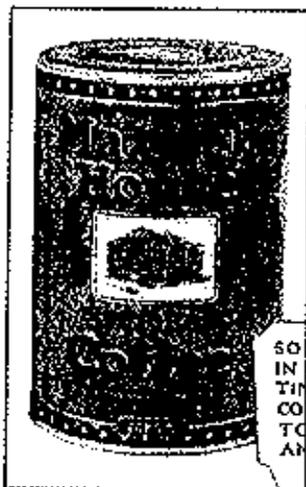
## Appendix A

Maxwell House Advertising Images

**Maxwell House Coffee container images from Cheek-Neal Coffee Company and General Foods Corporation advertisements, various years:**



1923 can



1924 can



1925 can



1926 can



1927 can



1928 can



1929 can



1929 can



1930 can

(Maxwell House Coffee container images, continued:)



Early 1931 can



Late 1931 can



1932 can



Early 1933 can



Late 1933 can



1934 can



1935 can



1936 cans

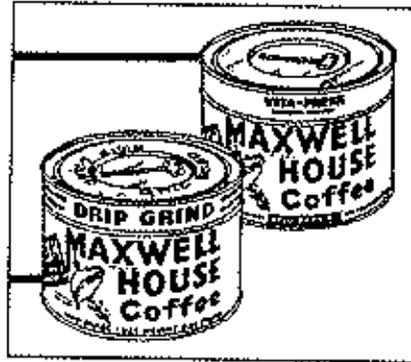


1937 cans

(Maxwell House Coffee container images, continued:)



1938 cans



1939 cans



1940 can



1941 can



1942 can



1942 can & jar



1943 jar



1944 jar

(Maxwell House Coffee container images, continued:)



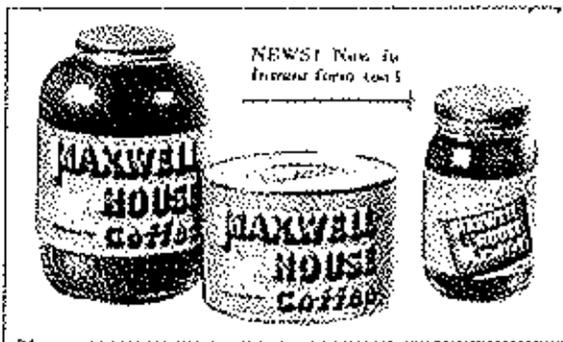
1945 jar



1945 jar



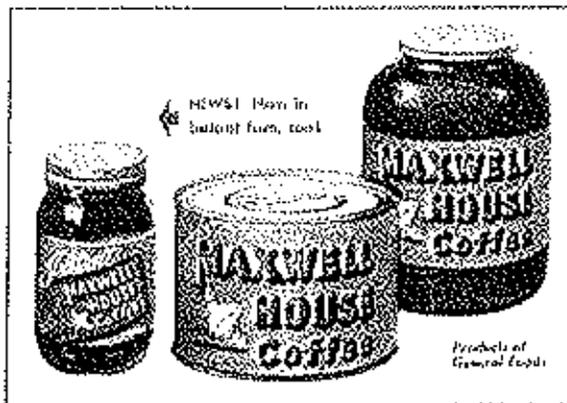
1946 can & jar



1947 can & jars



1948 can & jars



1949 can & jars



Early 1950 can & jar

(Maxwell House Coffee container images, continued:)



Late 1950 can



1951 can



1951 jar



1952 can



1953 jar



1954 can



1954 jar



1955 can

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# BRICK AND TILE BIBLIOGRAPHY

Compiled by K. Kris Hirst [hirst@inav.net](mailto:hirst@inav.net)

This is a bibliography of some useful texts on bricks, agricultural tiles, and manufacturing processes of same. It is broken into three parts; namely treatises for the archaeologists, treatises for the non-archaeologist but still useful, and a very very short listing of excavations of brick/tile manufacturers. This last is brief because there are so many of them in the grey literature that it seems more practical to omit them. Additions, corrections, and suggestions are welcomed. Please send to: Kris Hirst [hirst@inav.net](mailto:hirst@inav.net).

Undoubtedly the best reference for archaeologists is Gurcke 1987 listed below. This works includes a terrific bibliography, which is not reproduced herein.

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