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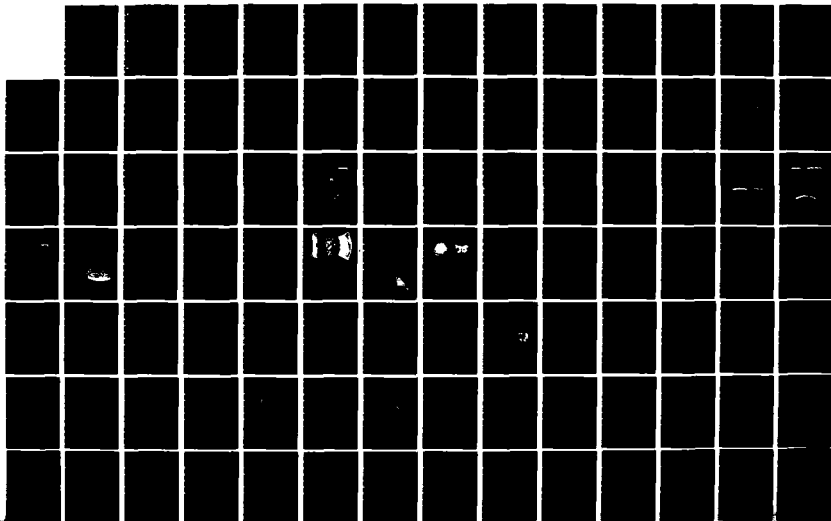
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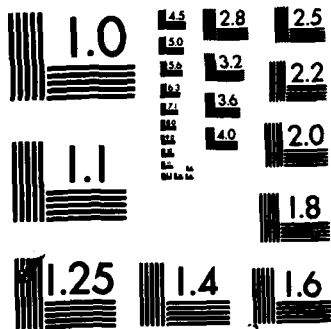
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A COMPUTER COMPATIBLE SYSTEM FOR THE CATEGORIZATION, ENUMERATION, AND RETRIEVAL OF NINETEENTH AND EARLY TWENTIETH CENTURY ARCHAEOLOGICAL MATERIAL CULTURE

Part II. Manual for Identification and Classification

by

Charles E. Cleland

A report on work undertaken in cooperation with the
Mobile District, U.S. Army Corps of Engineers, in partial fulfillment of
Contract No. CX 4000-3-0005 of the National Park Service, Mid-Atlantic Region

The Museum, Michigan State University

December 1983

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Part II. Manual for Identification and Classification

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Principal Investigator

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Abstract

This report presents a system for classifying nineteenth century and early twentieth century material culture from archaeological contexts. It consists of three parts, a codebook, a codebook manual, and a computer software package. The codebook provides a system for classifying artifacts and artifact fragments according to material of manufacture as well as form, organized to segregate material, style, and manufacturing techniques of functional and chronological significance. The codebook manual contains instructions for making critical classification decisions along with illustrations and references to facilitate the process. The software manual is not compatible with the current version of the codebook but is an illustration of the utility of computer assisted enumeration and retrieval.



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Preface and Acknowledgements

Recognizing that the excavation at the extinct nineteenth century townsites of Colbert, Barton and Vinton, Mississippi would result in a huge return of artifacts, as well as complex data manipulation problems representative from the Tombigbee Historic Townsites Project, the Park Service-Mid Atlantic Region and the Corps of Engineers-Mobile determined to design and produce a system which would facilitate the classification and computer manipulation of recovered artifacts.

It was initially hoped that this system would be available in time to use for the classification of material from other nineteenth century sites being excavated within the Tombigbee River Multi-Resource District of the Tennessee-Tombigbee Waterway. Unfortunately this was not to be since the design and testing of the system took far longer than was originally anticipated. While it was recognized from the beginning that the system was to represent the first step in a classification and retrieval scheme which would evolve through use, the difficulties of producing a working system were underestimated.

Essentially, the system as it now stands has evolved through three phases. The first was the design of the codebook and software. The second was a test of the system by coding the artifacts recovered from Colbert, Barton, and Vinton. The third, in part concurrent with the second phase, was the redesign of the codebook, preparation of the manual, and fine tuning of the retrieval software. In fact, the lessons learned in coding pointed out some major problems with the categorization and as a result, the codebook was ultimately refined three times. Since the Colbert, Barton and Vinton material was coded under the first and second versions, artifacts coded from these sites are not in conformity with the present system. Further, the software package presented here has not been updated to work with the present version of the codebook and manual although it is compatible with the second version of the codebook published in the project's Phase II report (Minnerly 1983). It is included here to illustrate the capability of computer assisted retrieval. It is hoped that appropriate changes will soon be made in the software package to make it compatible with the present codebook as well as to make it more powerful and efficient in operation.

Designing a universal system for classifying all of nineteenth century material culture that can be used by cataloguers with minimal training is not an easy task. This attempt has had its vocal critics; among these are a number of experts in nineteenth century material culture who have devoted a great deal of energy in reviewing drafts of the codebook and manual. For their criticisms and many useful suggestions, great thanks is due to Bill Adams, Marley Brown, Olive Jones, George Miller, Randy Moir and Tef Roddeffer. It should be understood that these colleagues do not necessarily agree with the categorization suggested, the contents of the manual, nor even the feasibility of the system itself.

Of the Tombigbee Historic Townsites staff, special thanks is due to Bob Sonderman and Randy Donahue who devoted many hours beyond their formal association with the project and to Tia Maxwell, project artist who is responsible for the illustrations in the manual. W. Lee Minnerly, who spearheaded the project to begin with, was instrumental in developing most of the major concepts as well as contributing a major portion of the section on ceramics in the manual. Lee's important contributions are gratefully acknowledged.

Finally and most especially, thanks is due to Kim McBride, editor, typist, coordinator and all around dynamo who is responsible for getting the job done.

C. Cleland
East Lansing
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INTRODUCTION

The cataloguing and retrieval system which is presented in this codebook and identification manual was originally developed as an aid to the computer manipulation of collections resulting from the archaeological excavations of the Tombigbee Historic Townsites Project. This project, sponsored by the U.S. Army Corps of Engineers - Mobile, was undertaken by the Museum and Department of Anthropology at Michigan State University under contract with the U.S. Department of Interior, National Park Service, Mid-Atlantic region.

Archaeological work at the extinct Mississippi townsites of Colbert (1836-1847), Barton (1847-1865) and Vinton (1840-1910) produced a collection of over one million artifacts representative of the entire nineteenth century. Because of the dearth of systems designed to order and manipulate data of this period, it was decided to design an entirely new system which could be tested with artifacts from the Townsites Project and would, thereafter, be of general use to other researchers working with collections from this era.

This system has gone through three basic revisions; the trial and error process in regard to both the categorization of materials and the computer software has resulted in an improved system but not a perfect one. It has always been the intention to produce a system which will continue to be improved with use.

At the outset, it is necessary to state in concise terms what this system represents and what it is not. This coding system is designed to categorize artifacts according to a consistent scheme based upon the observable physical properties of artifacts and fragments of artifacts. Further, the system provides a means whereby artifacts and artifact fragments can be enumerated by archaeological provenience and retrieved according to provenience category for any artifact grouping, from most to least inclusive. The same results could be obtained by writing the provenience and artifact category on separate file cards and manually sorting these to arrive at a listing of all artifacts of a given provenience or all proveniences of a given artifact category. The computerized system suggested here merely expedites what is essentially a traditional cataloguing and retrieval system. Artifacts can of course be classified in this system without using a computer for retrieval; in fact, if collections are small the use of a computer is not recommended.

This system is not a typology and it should therefore not be used to address functional and structural problems which must depend on typological systems designed specifically to address problems of these types. Formally speaking, a typology is a definition based on regularized relationships between specific attributes of the objects being classified. The specificity of a typology must necessarily rest on the specificity of the attributes selected and the size of units observed. A typology therefore is an analytic exercise and each specific problem require the design of an appropriate typology. This system is designed to expedite the retrieval of artifacts for subsequent formation of typologie

Stanley South (1977) and Rodrick Sprague (1981) have, for example, offered useful typological systems for addressing structural and functional questions of historic period artifact assemblages. If we look at South's system we find a means of categorizing artifacts and artifact fragments according to functional sets, i.e., architectural group or activities group. These categories include artifacts made of different materials having different forms, and even serving different specific functions.

By grouping these artifacts within a single functional set and by testing the variability between several sets over time and space, South offers a typological means of testing hypotheses about regularity (patterning) of his defined sets. In fact, the means of testing the hypotheses rests not only on his typology of groups but the initial classification of artifacts with each group.

The fact that this system is not a typology does not mean that it lacks all analytic power. In fact the attributes chosen as a basis for coding often exhibit structural, functional or chronological significance. Thus a medicinal bottle is a functional type, shares certain attributes of structure and style with other bottles, and if it exhibits a specific type of solarization, it may be of a specific age. Since bottles can be retrieved according to the categories medicinal/solarized or medicinal/unsolarized, it is often possible to learn a great deal about the age or function of a specific level, or site using the categories uncoded here. Insofar as possible, the categories used in this system are reflective of manufacturing process and chronology of manufacturing process and style change.

Even though this is true, the system is not designed to provide these kinds of data in a consistent or systematic fashion, that is from one attribute class to the next. Thus, the categories pressed glass, lead glass and solarized glass are defined by different kinds of attributes and these need not be mutually exclusive.

The attributes selected in the design of this system were chosen so the result would be widely applicable and so the attributes could be easily coded by cataloguers who have minimal familiarity with nineteenth century material culture. It is recognized that the more difficult the system, the more costly it will be in terms of both money and cataloguer error. For these reasons, the much more inclusive approach taken in designing systems like those used by the Canadian Historic Sites Service, Parks Canada was avoided. Though excellent systems, their use requires highly trained cataloguers and considerable expense. In order to design a less complex system, it was necessary to find a balance between the general and the specific, to sacrifice detail for clarity and to preserve detail for utility. This is, however, not only difficult, but it leads to disappointment by almost everyone in those particular areas of their speciality.

Apart from what some will undoubtedly see as a sacrifice of detail, a system of this type must necessarily suffer problems due to the way it is organized and the reality of manufacture. In the latter regard it is

necessary to note that while the coding system is based on the material from which an artifact is manufactured, many items are made of more than one material. The coding of a glass lamp font with an attached metal stand requires an arbitrary decision, since coding the artifact in two places will confuse enumeration. As a guide line, an artifact made of more than one material should be coded to reflect its most informative aspects, whether these reflect function, chronology, or style. Thus, in the example above, if the font is more instructive than its metal base, it should be coded as glass, irrespective of the relative size or completeness of its component parts.

Other problems arise due to the choice of particular attributes for subcategorization—these are noncorrectible structural weaknesses in the system. For example, whole bottles are categorized according to major method of manufacture because these methods can only be determined from complete or nearly complete specimens. Lip and neck fragments are, however, categorized by techniques specific to the finish of the bottle. If one is interested in lips manufactured with finishing tools these specimens would be retrieved from among the lip/neck fragments. Since whole bottles are not coded according to this attribute, however, it would be necessary to retrieve all whole bottles and then examine their lips to determine which were manufactured using finishing tools. Such structural problems can only be overcome by constructing a very complex system which would have its own substantial faults.

The descriptive narrative of the manual provides a key to designation attributes which are critical to classificatory decisions. Introductory paragraphs contain general information about each major category which are based on material type, i.e., ceramics, metal artifacts, etc. These statements are not meant to be exhaustive but to provide the minimal background necessary for making judgements concerning the future subcategories of artifacts within each category, such as earthenware, stoneware, or porcelain for ceramics. The sections of the manual which deals with each subcategory is designed to illustrate the variety of types and/or to explain attributes used to differentiate within the subcategories. When necessary, illustrations are provided along with bibliographical citations to works which will provide more detail on variability within the subcategories.

Finally, it is emphasized that this system and the manual is a relatively ambitious and unique archaeological endeavor. It is hoped that it will be used and improved by others working with nineteenth and early twentieth century material culture and further that this system will provide the beginnings of a standardized descriptive inventory toward broader comparisons of artifacts and artifact assemblages.

I. Glass

Not only are glass artifacts and glass fragments the most abundant category of artifacts appearing on nineteenth century sites, but they are also the most difficult category of artifact to classify for the historic archaeologist who is not a glass specialist. To a large degree, this situation is a result of the fact that glass came into common usage in the nineteenth century and was used to manufacture a huge variety of artifact types. In addition, the nineteenth century saw a major revolution in glass manufacture from an industry where most glass articles were made by hand to one featuring the use of complex machinery and rapid mass production. Since glass is a durable but brittle product, the variety and complexity of glass artifacts is complicated for the archaeologist because glass items are almost always broken. Irrespective of these difficulties, the proper classification and analysis of glass products provides an important research tool in the interpretation of historic sites.

Two types of glass were common in the nineteenth century: soda glass and lead glass. Sand is the major ingredient of both types but in the case of soda glass, limestone and soda were used in production while in order to produce lead glass, lead and potash were added. These two types can be easily distinguished since lead glass is fluorescent icy blue when subjected to ultra-violet light.

Nineteenth century glass appears in a wide array of colors. Soda glass is naturally a light blue green but increased amounts of iron oxide in the sand produce a darker and darker green when the glass is fired in a reducing atmosphere. High iron content will produce a glass which appears to be black. When soda glass is fired in a reducing atmosphere, it has a natural straw yellow-green color (Elville 1951). Uncolored lead glass is clear but has a slight grayish tinge.

During the early decades of the century, small glass containers were usually made of lead glass or light green soda glass (Jones 1975:6) while larger containers, especially those containing unstable products, were generally made of dark glass (Munsey 1970:37). The advent of the home cannery process in the last quarter of the century pushed manufacturers to perfect the decoloring of glass by the use of manganese oxide. Such glass is clear but when exposed to sunlight for prolonged periods it assumes an amethyst color (solarized glass). Selenium was used as a decoloring agent between 1916 and 1930 but this glass solarizes to an amber color (Munsey 1970:55).

The oxides of many elements were also added to glass during the nineteenth century to produce colored glass from white (tin) to red (copper and gold) to black (iron). Green, aqua, cobalt blue, and brown are by far the most frequent colors for this period. Herskovitz (1978:3) provides a list of approximate Munsell hue and value/chroma determinations for the most frequent nineteenth century glass colors. Since, however, color varies so widely, Munsell values have little classification value and were therefore not used for this code book.

The reader is referred to the seminal work by McKearin and McKearin (1941) on American glass, which provides a detailed discussion of the manufacturing processes in use during the nineteenth century.

Categories (1) through (19) include all items manufactured of glass except bottles, which appear in Ia to Id, and tableware, which is Ie to If. Ig is other glass and is for totally unindentifiable fragments.

(1) Bead

Whole or fragments of beads are coded in this category. Beads are generally regarded as either necklace beads, which are large, and small seed beads, which are sewn to costumery. This distinction is in some cases arbitrary. Both seed and neckless beads are made by three basic processes: drawn, mandrel wound, or molded/pressed. Kidd and Kidd (1970) provide an excellent description of these processes and Karklins and Sprague (1980; 1972) have drawn together a large bibliography on beads. See also Karklins (1982).

Drawn beads are produced by drawing out a tube of glass which is broken into appropriately sized pieces after hardening. These pieces are then tumbled to produce the finished bead. Drawn beads occur in a multitude of colors, including polychromes, especially of the striped variety. In drawn beads, air bubbles in glass are elongated and parallel to the axis of the bead. Drawn beads are the most common variety, particularly in the early quarter of the nineteenth century. Seed beads are invariably made by this method.

Mandrel/wound. These beads are made by wrapping molten glass around a wire rod or mandrel. Large beads, particularly those with complex polychrome layering, are usually made by this method. Mandrel wound beads can be distinguished because tiny air bubbles in the glass parallel the equator of the bead.

Molded or pressed. This method of making beads did not become prominent until the second quarter of the nineteenth century. Molded beads frequently are made with facets and will show a mold seam. See Karklins (1982) for examples.

Cut/Ground. Beads were also made by grinding or cutting facets on a bead produced by one of the methods mentioned above. This process seems to have been most widely used in the first quarter of the nineteenth century as a forerunner of molded beads, which they resemble. Cut beads are also used in costumery well into the twentieth century. Grinding striations are usually visible.

Other. Rarely one encounters a bead that was free blown. These exhibit lipping around the center hole. These and any other types of beads should be classified as other.

(2) Brick

This category includes glass building blocks or "bricks." These are generally square and translucent. Glass bricks became available in about 1900 and were used in construction where light was important (Hudson 1972:69). Glass building bricks and building brick fragments are coded here.

(3) Button

Buttons made of glass should be coded in this category. Mold made glass buttons were made in the late nineteenth and early twentieth centuries. These appear in clear and opaque varieties as well as in a wide variety of colors in both monochrome and polychrome. Cast buttons

are usually round and dome shaped but may appear in other forms, particularly faceted. Milk glass buttons apparently in imitation of pearl or porcelain buttons are common.

Sew through buttons are those in which holes for the thread attachment are molded all the way through the button back. Generally there are four such holes.

In the case of the self shank button, the method of attachment is a shank mold as part of the body of the button. Thread is passed through a hole in this shank. Other styles of glass buttons have shanks made of metal, either pole types or wire types. These shanks are embedded in the button glass.

Buttons with metal shanks as well as metal bottom attachments which have become separated from the body of the button should be coded as shank.

All unidentifiable or unidentified buttons or button parts, that is those which cannot be identified as to means of attachment, should be coded as unidentified.

(4) Cuff link set

Like finger rings, cuff links were often decorated by pieces of colored glass in imitation of precious stones. These are generally larger than ring sets and usually planoconvex in cross section. Most cuff link sets are cast in monochrome semitranslucent glass.

(5) Doorknobs

This category includes knobs and pulls used on doors. Patents for pressed glass knobs were granted in the late 1820s (Alexander 1924:116; McKearin 1924:118). These were generally secured by means of a screw that passed through a central hole. Knobs were plain and decorated by twists and a large variety of molded patterns. Generally, glass knobs are clear but also occur in a variety of colors, including milk glass. Doorknobs are generally larger than drawer pulls and are more often secured at the base by a metal sleeve or cast around a metal flange.

(6) Drawer Pull

Refer to discussion on Doorknobs. Furniture knobs and pulls are generally smaller than door knobs and secured by means of metal or glass screw. They are most often clear glass and circular but may occur in the form of a glass bar which was secured by means of metal brackets.

(7) Insulators

Glass insulators first appeared in the early 1840s in conjunction with the invention of the telegraph. The earliest insulators were developed by Ezra Cornell and were square. Later, a bell shaped form appeared with a groove to afix the wire. In 1865 these were in turn modified by the addition of interior threads as an aid in attaching the insulator to a wooden peg which was attached to the pole. The invention of the telephone and light bulb in the late 1870s brought an increased demand for insulators and most of these were produced by a two step molding process developed by Hemingray in 1871. These insulators, which were made well into the twentieth century, featured a

interior threaded portion which was molded after the cap was poured (Munsey 1970:62). Most early insulators are made of aqua and green glass.

Smaller insulators used to wire electric fences and homes occur and these are often made of milk glass. After 1889 two piece or petticoat insulators appear in several forms (Stuart 1968).

(8) Jar Lids/Liners

This entry includes all glass lids and lid liners of glass used in closing preserved food jars.

Milk glass liners. John Mason invented a screw top zinc closure for home canning in 1858. Although convenient, this device did not gain popularity because food exposed to the zinc lid became discolored. In 1869 Lewis Boyd developed a milk glass liner for zinc lids, which became very popular (Munsey 1970:146).

Clear lids. In 1856 the first glass lids were developed for closing wide mouthed fruit jars but the first successful glass lid did not appear until 1868. In 1875 glass lids adapted for a Lightning Closure became popular and these persisted well into the twentieth century (Munsey 1970:146).

Other lids. This entry should be used for glass lids that are not clear or that were not designed for wide mouthed jars, but not for stoppers, which are coded under (15).

(9) Lamp parts

With the development of kerosene as a clean burning, nearly odorless fuel in the period after the Civil War, kerosene lamps were used to light most homes. This lamp was fairly rapidly replaced, particularly in urban areas, by the wide use of electric lighting after the turn of the twentieth century (Deiss 1981:114-115; Cook and Ferro 1983:28-48). Kerosene and gas lamps were made of both metal and glass. The glass components include a font for fuel reserve, a chimney, which contained the flame, and a shade. See Russell (1976) and Hayward (1962:150) for general discussion, and especially see Thuro (1976).

Font. Glass lamp fonts were most often produced in molds. The cheaper examples exhibit faceted panels and are generally quite thick. Fancy parlor lamps exhibit thin and ornately decorated fonts.

Chimney. Chimneys used in lamps and lanterns are composed of a cylindrical base expanding near the midpoint and contracting at the top. By 1818 a crimping machine was developed and chimneys produced by this method quickly replaced those made by the hand blown method (Deiss 1981:114).

Shades. Kerosene lamp shades or globes are round and were made in two piece molds and exhibit ground rims (Deiss 1981:114). Shades for kerosene and wall lamps and for gas wall lamps as well as for electric lights are in the form of a shallow inverted dish with a central opening. These were frequently made of colored glass, including greens and yellows and frequently of milk glass. Shades were frequently fluted. Lamp parts are also made of metal and the user is referred to III(15).

(10) Optical glass

This category includes all optical lenses including those for eyeglasses, scientific instruments, and prisms used in lighting

devices. Lenses are generally biconvex and made of clear glass and have excellent refractive qualities. Optical glass was developed in the eighteenth century when it was discovered that a special stirring technique could reduce the imperfections that distorted refraction. In the second quarter of the nineteenth century, European glass makers perfected lenses by annealing soft and hard "flint" glass in the same lens (Angus-Butterworth 1958:359). Apparently, most sophisticated optical lenses continued to be produced in Europe until the twentieth century (Douglas 1958:673).

American manufactures did, however, market lenses for lamps, pressed glass prisms, and eyeglass lenses from at least 1870 onward. Decorative prisms like those used on chandeliers should be coded under (18).

(11) Light bulb

Edison's discovery of the electric light in 1879 brought a rapid demise to the kerosene lamp and by 1900 light bulbs were commercially available. Before 1895, all bulbs for incandescent lights were hand blown but by 1920 sixty percent were machine made. By 1926 all light bulbs were machine made (Scoville 1948:78-79). Bulb glass is very thin and either translucent or white. Also coded here are colorless glass rods containing the filaments.

(12) Marble

The marble category includes all glass spheres which were used as gaming pieces, elements of bottle closures, bullet marbles, or ornaments. Hand made glass marbles were produced in Germany as early as 1846 and imported into the United States until World War I. They were also produced in the U.S. from 1880-1882 and from 1897 to 1902 (Baumann 1970:35-37).

Hand made marbles can be distinguished by twisting scar marks on opposing ends although an effort was sometimes made to obliterate such marks (Randall 1979:15). Hand made marbles appear in monochrome and polychromes using translucent and opaque glasses.

Between 1901 and 1905 the first machine made glass marbles appeared and by the latter date were in successful competition with hand made foreign imports (Baumann 1970:84). By 1918 machine made marbles were rapidly replacing all other types (Randall 1979:18). Machine made marbles appear in a great variety of colors both monochrome and polychrome.

(13) Mirror

Mirrors include all reflecting glasses. Early in the nineteenth century, mirrors were made by the ancient means of backing glass plates with tinfoil amalgamated with mercury. This method became obsolete in about 1840 when the chemical deposition of silver was introduced. During the last half of the nineteenth century, the glass was treated with an ammoniacal solution of silver nitrate to which tartaric acid and sugar-candy had been added (Angus-Butterworth 1958:362-363). Under archaeological circumstances the mercurial process is unstable and the

thin amalgamum backing often detaches, leaving only traces adhering to the glass. The silver nitrate process, when aged and subject to archaeological conditions, often blackens.

(14) Jewelry set

This category includes all cut or ground glass insets used to decorate finger rings, brooches, other jewelry, and clothing accessories. During the nineteenth century, glass jewelry insets were popular and were frequently molded or cut with facets in order to resemble gem stones.

(15) Stoppers

This category includes all pyramidal glass stopping devices used in bottles or decanters. Before finishing tools were used in conjunction with the self-centering post bottom mold in the 1870s, glass stoppers were individually ground to fit, and in fact the ground glass stoppers are still in use for decanters and perfume bottles. After this date, bottle openings could be standardized and glass stoppers were generally made with molded peg shafts. Cork wrapping as a means of securing stoppers appears by the second half of the nineteenth century and is still in use to a limited extent (Herskovitz 1978:24-26).

(16) Tubing

During the nineteenth century glass tubing was made in the manner described under drawn beads.

(17) Window

This category includes all flat glass.

Before the nineteenth century, most window glass was made by spinning a gather of glass on a blowpipe to produce a glass disc. This type of pane was called crown glass for the roughed pontil mark at its center. Crown glass is thickest at the center and the bubbles tend to be curved (Angus-Butterworth 1958:365; Wilson 1976:150). During the nineteenth century the thickness of window glass seems to increase through time, probably the result of improved technology leading to larger panes (Chance and Chance 1974; Moir 1983; Roenke 1978).

Broad glass was made by forming a large elongated bubble which was cut open before reheating to form a flat plate. This process was in use as the major window glass producing technique for most of the nineteenth century. Broad glass has the characteristic of being not quite flat, slightly thick toward the ends, one side slightly more opaque than the other, and bubbles which are distorted in straight lines (Brown 1971:127).

Hand made plate glass was also produced in the nineteenth century but was expensive to produce and most frequently used for small objects such as mirrors. Plate glass is very clear compared to crown and broad glass.

In 1896 John Lubbers invented a machine to produce a cylinder of glass that revolutionized the window glass industry by mechanizing the broad glass process. This glass was successfully competing with hand-blown products by 1905. Machine made glass produced by the

Lubbers process is clear and rather uniform in thickness but shows elongated bubbles and wavy lines as a result of the pulling and subsequent flattening of the glass sheet.

Although the cylindrical process of producing window glass was used successfully through the first quarter of the twentieth century, the process was made obsolete by the sheet drawing process developed after 1910 (Scoville 1948:190-191).

If the manufacturing process for window glass cannot be determined, specimens should be coded (17.00) or (17.002).

(18) Other glass

This category includes all other articles of glass that cannot be coded in the foregoing categories and that are not glass containers.

(19) Unidentified

Fragmentary specimens relating to other than glass containers should be coded in this category.

Ia. Bottles/Jars Complete

Bottles and jars are glass containers designed to hold a variety of products usually in liquid form or commodities packed in liquids. Closure is usually accomplished by a stopping device although self-contained closures do occur. Complete refers to whole or nearly whole specimens or when attributes of finish, neck, body, and base can be observed in conjunction.

For convenience, the code book section dealing with bottles and jars is arranged by functional categories. The entries of alcoholic beverage; chemical; foodstuffs; ink; nonalcoholic beverage; perfume/scent/cologne/lotion; proprietary/medicinal; and snuff include the vast majority of nineteenth century containers. Others are classified in the other category or as unidentified containers. Many of these broad categories have structural or functional correlates which relate to preservation, access, or closure requirements of container contents.

Excellent descriptions of the American glass and bottle industries are to be found in McKearin and McKearin (1941) and in McKearin and Wilson (1978). The latter reference provides a detailed account of a large number of nineteenth century American glasshouses and their products. Lorrain (1968:35) provides an excellent summary of nineteenth century glass bottle production including a list of key innovations and dates in the development of the industry. Baugher-Perlin (1982:259-290) presents an excellent discussion of the attributes of glass bottles as well as a discussion of various bottle types. Newman (1970:70) has constructed a binomial key for the dating of post-eighteenth century bottles based on innovations in glass processing and manufacturing techniques, although the reader should also see Jones' (1971) comments on the key. A detailed account of changes in machine-made glass containers is provided by Miller and Sullivan (1981) and by Holscher (1965). Fletcher (1976) and Lief (n.d.) give detailed descriptions and dating for the development of various bottle and jar closure systems.

For general and specific reading on nineteenth century bottles and their formal attributes, the reader is directed to Jones (1975; 1971b), who offers a description of observations and attributes useful in working with nineteenth century bottles. Both Switzer's (1974) description of bottles from the wreck of the steamboat Bertrand and Wilson's (1981) study of bottles from the nineteenth century western frontier contain terminology for description of bottle shape, neck finish, and other bottle attributes. Both these publications provide excellent illustrations and classification of extensive collections as well as lists of manufacturers. Wilson (1981) lists advertisers of bottles produced between the years 1841 and 1903. An extensive list of company and bottle names for Illinois, 1860-1930, is to be found in Paul and Parmalee (1973:77). Many descriptions of specialized bottle and flask types are to be found in the literature. Jones (1983:69-84; 1981:1-33) gives a detailed account of the history of peppermint and mustard bottles, and McKearin and Wilson (1978) illustrate a wide variety of figure flasks and pattern molded bottles. Finally, the reader is referred to Hulan and Lawrence (1970:62) for a general bibliography.

Complete bottles and jars are grouped under the columns free blown, hinged mold, blown back mold, and fully automated machine made containers. Placing specimens in one of these categories depends upon the presence or absence and placement of mold seams (BaugherPerlin 1982; Deiss 1981; Munsey 1970; Toulouse 1969; 1976).

Free blown. This category includes completely hand made containers that lack all mold marks as well as those hand blown into a dip mold. The latter expand from the base to the shoulder and may occasionally exhibit a "blow over" seam at the shoulder. Hand blowing was the predominate technique until the mid-1830s and dip mold bottles were abundant until 1860 (Deiss 1981:92). Both techniques were occasionally used in later periods.

Hinged molds. Hinged molds were the primary means of manufacturing bottles during the last half of the nineteenth century, although they were certainly in use much earlier. The two major types of two piece molds were the hinged shoulder mold and the bottom hinged mold (Munsey 1970:39). The bottom hinged mold, in use from 1750 until 1880, creates seams that run vertically up the sides of the bottle and then straight across the bottom or curving around a basal push up (see Figure 1). Bottom seams may be obscured by the empontilling marks. The hinged shoulder mold was in use at least by the 1840s. It has a cup bottom so that the mold leaves a single verticle seam which runs up the body, meeting encircling horizontal seams at the shoulder and at the base (see Figure 2).

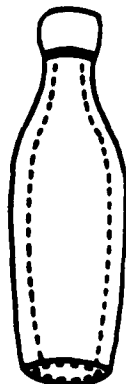


Figure 1. Bottom hinged mold



Figure 2.
Hinged shoulder mold

Three piece molds were used in combination with dip molds as early as 1821 for the purpose of imparting embossing on the neck and shoulders of containers. This mold leaves vertical seams on the opposite sides of the neck meeting a seam that encircles the lower shoulder (see Figure 3). Bottles were still made by this process as late as 1905 (Deiss 1981:93). Three piece body molds produce containers with seams that run vertically on opposite sides of the length of the bottle. Two different base finishes were in use. The cup bottom leaves a seam on the outside perimeter of the base (see Figure 4), while the post bottom centers the bottle in the mold, leaving a circular seam on the bottle bottom. This process was patented in 1858 and was in use until 1915 (Munsey 1970:39) (see Figure 5).



Figure 3. Three piece mold



Figure 4. Cup bottom mold



Figure 5. Post bottom mold

Some mold made bottles, particularly those made to contain wine, were turned in the mold to obliterate the mold seams. These so called turn mold bottles date from 1870 to as late as the 1920s and may be distinguished by slight horizontal marks on the bottle (Baughler-Perlin 1982:265; Munsey 1970:45).

Blow back mold. These molds were developed in the mid nineteenth century to produce wide mouth bottles with screw threads. In 1858 Mason secured a patent for this process (Baughler-Perlin 1982:265). Since the seams of blown back jars run on opposite sides the full length of the vessel, these can easily be confused with vessels produced by fully automated machines. In most cases, however, jars formed by this process were rough and ragged around the top and show evidence of the grinding wheel which produced a smooth finish (Munsey 1970:40).

(21) Chemical

Bottles used to contain chemical agents are usually cylindrical in shape with rounded shoulders. Necks are short and thick with the finish exhibiting a wide collar with a flat lip (Herskovitz 1978:Figure 21 and Figure 3g). Generally, chemical bottles are transparent aqua in color and are closed with a glass stopper. These bottles range from 5 to 10 inches high and have a capacity of from 32 to 38 ounces.

(22) Foodstuff

Foodstuffs were packaged in bottles of a wide array of sizes and shapes. Catsup bottles may be recognized by their traditional elongated cylindrical or faceted bodies and round necks. Bottles containing sauces show this same basic form but have long narrow necks. The so-called Gothic form used for gherkin pickles, honey, tamarinds, and some pepper sauces feature side panels and corner columns that resemble church windows (Switzer 1974:52). Mustard frequently was packaged in a short, barrel shaped jar with a wide mouth. Culinary bottles are usually stoppered with large corks and the finish exhibits a heavy neck and a small rounded to square lip. Bases are round to square and frequently exhibit mold markings. Color ranges from dark brown to clear.

(23) Ink

In the nineteenth century, ink was transported in bulk in large ceramic bottles. This code entry is reserved for smaller ink bottles and wells used on a writing desk. In general, these bottles are squat with heavy bases to prevent tipping. Herskovitz (1978:Figures KK, LL, MM, and NN) lists four forms: the carmine bottle, which is a square bottle with squared corners; the conical bottle, which is cone shaped; the round bottle; and the igloo bottle with an offset mouth. Ink bottles are frequently clear but occur in amber and brown. Some ink bottles exhibit elaborate relief molding. Ink bottle necks are short with lips that are slightly expanding. Ink wells usually lack necks but abbreviated necks are present in some cases and they also display only a hole for dipping the pen into the bottle.

(24) Nonalcoholic beverages

These bottles contain such beverages as soda water, root beer, and mineral water. Since soda water is carbonated these bottles are built to withstand pressure. They are cylindrical in form with short necks and heavy rims and convex bases. Other nonalcoholic beverages were bottled in cylindrical or square bottles with short necks containing from 16 to 20 ounces. These bottles and bottles bases are usually impressed with company names and seals, most quite elaborate. Non-alcoholic beverages, particularly water, were marketed in clear or aqua bottles.

(25) Perfume/scent, cologne/lotion

Bottles containing perfumes, lotions, and toiletries are generally small with a content of from 1 to 8 ounces. Three ounces is the norm. In general, these small clear bottles are impressed with beads or ridges and infrequently with the names of companies. Generally these bottles are round or square but other shapes occur. Necks are about

one-third the height of the bottle and bear a heavy flat lip suitable for a glass stopper or a cork. Bases are slightly concave.

(26) Proprietary/Medicinal

The nineteenth century was the heyday of proprietary medicines which were generally prepared by mixing vegetable extracts or tinctures with alcohol and narcotics. These medicinals were packaged in bottles of a huge variety of shapes and colors. Most contained less than 8 fluid ounces and many were impressed with a product or corporate name. Most medicinals produced came in square or oval paneled bottles (Herskovitz 1978:Figure 2m-q) with a narrow collar and flat lip (Herskovitz 1978:Figure 3g and h); wide outsloping collars are also common (Herskovitz 1978:Figure 3i). Cylindrical medicinal bottles are common and like squared bottles, usually exhibit a neck that is about one-fourth of the total bottle height. Proprietary/medicinal bottles are most frequently made of clear glass.

(27) Snuff

Snuff jars typically are rectangular with rounded shoulders and a very short neck (Herskovitz 1978:Figure 2jj). Characteristically, the lip is thin and outsloping. The mouth is wide and the jar is stopped with a cork. Generally, snuff containers are dark brown to amber in color. The bases are usually impressed with one to four raised dots that are said to indicate the strength of the snuff (Munsey 1970:77).

(28) Other

This entry is reserved for specialized glass containers, for example those used to contain poison, candy, milk, fire grenades, and nursing bottles. It is usually possible to identify these special use bottles either from a product impression such as skull and cross bones on most poison bottles or from the special form of the container. Reference can be made to Munsey (1970) or Switzer (1974) for most identification.

(29) Unidentified

Since bottles and jars were made in a great variety and since it is not always possible to determine function from form, glass containers of doubtful use should be coded in this category.

Ib. Bottles/Jars--Lip and Neck Fragments

Lip and neck fragments are those that exhibit some aspect of vessel finish. Columns include specimens with are made free hand, with a finishing tool, by automated machine, or unidentified. The latter category is for the inclusion of specimens where attributes of finish cannot be distinguished.

Free hand. Until the second half of the nineteenth century nearly all bottle finishes were made free hand, that is by adding, cutting, or shaping molten glass to produce a variety of rim and lip forms. Generally these finishes are asymmetrical and lack the striations usually produced by tool finishes. Folds and flanged finishes were present until the 1860s.

Automated machine. Containers made by fully automated machines did not appear until the last decade of the nineteenth century and did not become the predominate type until the first decade of the twentieth century although the transition was very rapid (Miller and Sullivan 1981).

Machine made bottles display the following characteristics: one or more horizontal seams encircling the top of the bottle, ghost or wandering seams on the body, and cut off scars or valve marks on the base. The latter are nonsymmetrical, indented grooves while scar marks, such as the Owens scar, leave feathered edges (Miller and Sullivan 1981:21-24) (see Figures 6 & 7).

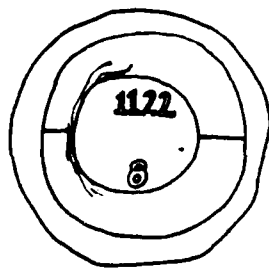


Figure 6. Owen's scar

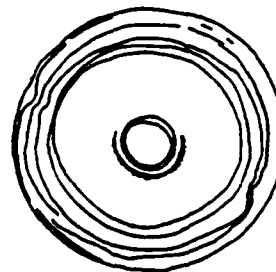


Figure 7. Valve mark

(20) Alcoholic Beverages

Bottles used to contain brewed, fermented, and distilled beverages are included in this category. Beer, ale, and stout bottles of glass display conical bases, low sloping shoulders, and long necks (Herskovitz 1978:Figure 2a). Collars are broad and slightly flaring. Specimens of this type are generally made of brown glass and have mold marks on the base. Wine bottles are generally of the same form but are frequently handblown, exhibiting a kick-up and pontil mark at the base. Wine bottles are more typically dark green in color and have a string or bead collar. Champagne bottles are thick to withstand pressure and exhibit a straight collar for attachment of a cork fastener. Whiskey bottles are sometimes cylindrical but more often flask shaped (Herskovitz 1978:Figure 2d-f; McKearin and Wilson 1978). Necks are short and the finish exhibits a wide, slightly flaring collar. Whiskey bottles are usually made of clear glass and are frequently imprinted with a brand name. Schnapps and gin bottles are typically square and of transparent blue or green glass (code blue or other). Gin bottles taper upward from the base to the shoulder (case bottle). Refer to Wilson (1981:1-21) and Switzer (1974:9-32).

Finishing tool. Finishing tools were in use by the 1820s and were used fairly widely by mid century (Olive Jones, personal communication). By the 1870s improved finishing tools, used in conjunction with the snap case or self-centering post bottom molds, permitted the standardization of finishes and were almost universally used in bottle production. The use of a separately fired high temperature "glory hole" oven for reheating the finish was common by the late 1870s and produced a very smooth finish (Baugher-Perlin 1982:169).

The standardization of finishes in part accounts for the huge variety of closure types which appeared in the last quarter of the nineteenth century. The Lightning closure, patented in 1875, and the Hutchinson closure, which appeared in 1885, were two of the most popular types (Munsey 1970) (see Figures 8 and 9).



Figure 8. Lightning closure

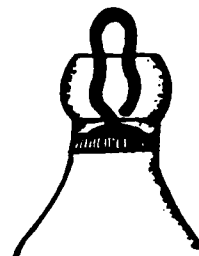


Figure 9. Hutchinson closure

Automated machine finished. The chief innovation of the automated manufacture of containers was that finishes were made first rather than last in the manufacturing process (Miller and Sullivan 1981). Machine finishes bear at least one mold seam encircling the top of the vessel. This seam is made by the plunger, which defined the inner throat diameter of the finish. Finishes of this type are not common until the twentieth century.

Categories (30) through (39) are identical to those described under Ia categories (20) through (29).

Ic. Bottles/Jars--Body Fragments

Body fragments are broken elements of glass containers that represent portions of the neck, shoulder, and body of the bottle or jar. Columns include the categories embossed, lettered, and unmarked.

Embossed. The distinction between embossed and lettered is an arbitrary one to the extent that containers may be both embossed and lettered. Embossed as used here refers to a geometric or curvilinear motif or design element that is impressed in the molten glass by means

of a mold. Specimens that are both embossed and lettered should be coded in the lettered category.

The development of the three-part mold with a dip mold body in the 1830s provided the possibility of embossing containers on the neck and shoulders. Embossed and lettered bottles are present by the mid eighteenth century but this was not a common practice until after the first quarter of the nineteenth century (Munsey 1970:30). Whiskey flasks were apparently one exception. In the early half of the century, these heavily embossed containers were decorated with scrolls, sunburst patterns, ribbing, and even pictorial scenes and busts of famous Americans, and reached great popularity prior to the Civil War (McKearin & Wilson 1978:458). The neo-Gothic revolution in America, starting in the second decade of the nineteenth century, lent its influence to embossed designs on glass containers. Architectural elements like columns, arches, panels, and rings frequently appear but by the 1840s are mainly used for products used by women (Deiss 1981:66).

The introduction of the three piece, post bottom mold in the early 1870s brought about a revolution in bottle embossing since three dimensional forms could be imparted (Deiss 1981:67).

Lettered. The history of the rise of lettering on bottle bodies is closely allied with developments in the embossing category (see above). As early as mid eighteenth century large companies had their names cut into molds but this was not economically practical for buyers of small quantities of bottles until the development of the plate mold used in conjunction with the three piece post bottom mold. This device permitted the insertion of a plate bearing the company name or design into the mold and these plates could be interchanged. Plate molds leave a mold seam around the design or lettered impression (Munsey 1970:40). This development was used during the post Civil War patent medicine boom when contents and company names appeared very commonly on such containers as well as pharmaceutical and non-alcoholic beverage bottles.

Unmarked. This category designates bottle and jar body fragments that show no evidence of embossing and/or lettering.

Categories (40) through (49) are identical to those described in Ia categories (20) through (29).

Id. Bottles/Jars--Base Fragments

Base fragments refer to specimens that represent all or portions of the bottom of bottles or jars. Columns in this category are empontilled, molded/marked, molded/unmarked, and unidentified.

Empontilled. Until the invention of the snap case for handling containers while the finish was formed, all containers were manipulated by attaching a pontil at the bottle base. By the 1850s, nearly all American glasshouses had adopted this invention (Deiss 1981:54) and empontilling scars left by blowpipes or other tools are very rare after the mid-1860s (Munsey 1970:48). In addition to the snap case, three

other methods of empontilling were used in the nineteenth century. The solid iron bar pontil was in common use prior to 1845. Here the pontil was coated with molten glass which adhered to the bottom of the bottle. When the pontil was removed, the glass gather snapped off, leaving a jagged scar. The blowpipe was used as a pontil during the eighteenth century (Jones 1971b) and was commonly used through the second quarter of the nineteenth century. A blowpipe pontil leaves a ring shaped scar. In about 1845, the improved or bare iron pontil came into use (Munsey 1970:48). The pontil was heated red hot and applied to the bottom of the bottle, forcing an indentation where it would adhere. This pontil left a small, round, raised spot. Munsey (1970:48) states that reddish black marks of this type date to the period 1845 to 1870 while white base iron pontil marks date between 1870 and 1880. Snap cases do not have distinguishable empontilling marks.

Molded/Marked. This column is reserved for bottoms that are made in a dip, two-piece, or three-piece mold or are made in an automatic machine and show embossing or lettering. Such marking was common in the post-Civil War era when the names of the manufacturing company or abbreviations of company names were placed on bottle bottom. Wilson (1981:113) provides an extensive list of bottle bottom marks from Fort Union.

Molded/Unmarked. This column codes mold or machine made bottle bottoms that bear no embossed marks or letters.

Unidentified. Bottom fragments that are neither marked nor molded nor empontilled are placed in the unidentified category.

Categories (50) through (59) are identical to those described under Ia categories (20) through (29).

Ie. Tableware--Complete

This category includes all glass tableware complete or complete enough to be categorized as tumblers, cups, tankards, goblets, wine glasses, and other beverage glasses. Specimens can be coded as press molded, blown/cut/etched, or unknown.

Press-Molded. Press molded American glassware appeared in 1827 and continued to be produced throughout the nineteenth century. Glass vessels made in this manner have smooth interiors and sculpted exteriors. Mold seams are tiny and resemble threads of glass applied to the vessel. In the early period (1827 to 1840), press molded glass had a granular surface that was usually disguised by providing a stippled surface and complex design known as Lacy glass. Between 1840 and 1870, press glass design tended toward simple geometric motifs resembling cut glass patterns but after 1870, more elaborate floral and print motifs became popular (McKearin and McKearin 1941:394-395).

The reader is referred to the introduction on glass for more detail on glass content. After 1860, soda glass became popular at the expense of lead glass (Deiss 1981:75). Opaque glass became very popular in the 1870s; particularly milk glass, which was made by adding tin or zinc to the glass batch (Deiss 1981:76). Some milk glass also

contains lead and will fluoresce under ultraviolet light. Such specimens should be coded in this category.

Blown/Cut/Etched glass. This category contains tumblers, cups, and tankards that are hand blown, mold blown, cut, or etched. Vessels made and decorated in blown three mold production date between 1820 and the 1840s. This glassware is distinguishable from pattern mold ware in that it has concave-convex inner and outer surfaces; where the exterior is convex, the interior is concave. The mold scars on pattern blown glass are tiny rounded swellings (McKearin and McKearin 1941:244-245). Cut glass was made before, during, and after the nineteenth century but was very expensive since the wheel cut design was entirely completed by hand. Glass was sometimes decorated by etching designs into the surface by use of a template and hydrofluoric acid to produce the frosted surface texture.

Unknown. This category is provided for fragments of tumblers, cups, and tankards for which decoration is absent.

(60) Tumblers, Cups, Tankards

This category includes all hollow ware drinking vessels. McKearin and McKearin (1941) provide a discussion of these types.

(61) Stemware

This category contains all stemmed drinking vessels, including most notably all goblets and wine glasses. These are composed of three elements: the bowl, stem, and base. The stem is the most durable element. Nineteenth century stemware has not been extensively studied as a distinct glass category. Its history does, however, closely parallel developments in other glassware items. In the early nineteenth century, most American stemware was imported and hand blown. Glasses were therefore eccentric in symmetry. The development of blown molded and particularly the press molded processes in the early half of the nineteenth century produced great elaboration in stemware design. Vessels were now symmetrical and exhibit mold seams. Both stems and bowls display molded designs but particularly the stems, which exhibit knobs, flutes, and even more complex combinations of molded patterns. The complexity of design is greatest in the second half of the nineteenth century.

(62) Other Tableware

This category includes all glass tableware other than drinking vessels. Examples include dishes, salt cellars, celery vases, bowls, sugar bowls and creamers, pitchers, decanters, and condiment containers. McKearin and McKearin (1941) provide extensive lists of these varieties of tableware.

If. Tableware--Fragmentary

(63) This category includes all tableware too fragmentary to be assigned above. Classification should be by vessel morphology, i.e.

rim/neck, body, or base/stem. Fragments should also be categorized as pressmolded, blown/cut/etched, or unknown, as under 1e.

Ig. Other Glass--Fragmentary

(64) Unidentified Glass

Unidentified glass includes all glass fragments or objects which cannot be identified as to specific function. Bottle and flat glass fragments should be placed in entry (17.0) or (59.0). This category is most often used for burned or melted glass. Column categories included are decorated, undecorated, and unknown.

II. Ceramic

Ceramics are consistently an important component of historic archaeological sites, both because they make up a large variety of useful tools, implements, and decorative articles, and also because the products of the ceramic arts are so durable. Beyond this, however, ceramics represent a plastic medium which was the subject of rapid technological innovation during the nineteenth century, providing a durable record of evolving style and design. Ceramics also frequently provide the archaeologist with a means of establishing chronology, either by reference to historic documents or through the depositional sequences of archaeological sites. Most important of the ceramic arts for the archaeologist are tablewares and these are therefore given added emphasis in this code scheme. The introduction to IIa below discusses ceramic technology as well as modes of manufacture and decoration of these wares. More specific detail is provided under individual categories.

(1) Button

Late in the nineteenth century buttons were manufactured of porcelain in imitation of pearl buttons. These show four or five hole attachments but occasionally are dome shaped with wire fasteners.

Fired clay fillers were also used for backing on both compound metal buttons and covered buttons. Other includes earthenware or stoneware buttons.

(2) Brick

Bricks are classified into two types, underfired soft bricks, which are usually light in color and porous, and hard bricks, which are fired at higher temperatures and are usually red-brown in color. Each variety occurs in glazed and unglazed forms. The user is referred to Olin, Schmidt and Lewis (1975:205), Kelly and Kelly (1977:84), and Lazarus (1965:69).

(3) Doll Parts

Both glazed and unglazed (bisque) soft porcelain was widely used for the manufacture of doll parts during the last half of the nineteenth century. Commonly these include head and shoulder segments as well as arms and legs which were attached to wooden, cloth, or kid bodies. So called China doll heads did not gain popularity until the 1840s (Coleman and Coleman 1968:118). Most of the heads of the 1850s are adults and exhibit long necks and elaborate coiffures. In 1855 a patent was issued for putting glass eyes in porcelain heads (Coleman and Coleman 1968:143). Many dolls of the 1860s exhibit very finely made heads of tinted bisque and usually had wigs. All bisque bebe dolls were patented in 1878 and the 1880s saw a shift in popularity from adult dolls to babies and children (Coleman and Coleman 1968:152). At the turn of the century character dolls, that is those resembling real children, appeared and these became extremely popular after 1910. Up until 1917 many dolls were produced in Germany but with World War I the market for American and Japanese dolls increased dramatically (Coleman and Coleman 1968:154). Style changes in dolls and doll parts are well known and

the reader is referred to Coleman and Coleman (1968) as well as Foulke (1982) for detailed listings of terms, styles, and makers marks.

Complete refers to complete dolls as well as complete parts. Broken portions of heads, arms and legs should be coded as fragment.

(4) Doorknobs

This category includes both doorknobs and drawer pulls manufactured of ceramic materials. Mineral finish knobs are most principally those with a marbled or tortoise-shell finish, usually in brown and yellow or brown and brick red. Large numbers of these "Rockingham" glazed knobs were made by the Fenton Potteries at Bennington, Vermont (Spargo 1972). Porcelain finish knobs are of a single color, most often white or black, and are made using a "flint enamel" process patented in 1849 (Barret 1958:19).

(5) Gaming Piece

Counters, markers and chips made of ceramics are coded here.

(6) Electrical

The invention of the telegraph in 1835 and the telephone in 1875 as well as the advent of the use of electricity for home lighting in the last decades of the nineteenth century brought about the widespread use of mold made electrical porcelain and stoneware. Before 1888 electrical stonewares were dry pressed but after that date molded from dampened paste. The use of a ceramic component for spark plugs was patented in 1888 (Jameson 1958:663). These include such articles as spool shaped, tube and two part clamp insulators and spark plugs. See Figure 10.

(7) Marble

Fired clay marbles were produced from about at least the seventeenth century until about 1917. These are a single opaque color--white, blue, green, purple or pink. Crockery marbles are covered with a blue or brown glaze and these are thought to date from the last half of the nineteenth century (Randall 1971:104).

Porcelain marbles were produced by the last third of the eighteenth century and are white with thin concentric rings of red, brown, blue, green, and purple or floral or swirling designs (Randall 1971:104).

(8) Smoking Pipe

Pipes and pipe parts are common artifacts of nineteenth century sites. Humphrey (1969), Hamilton and Hamilton (1972), Thomas and Burnett (1972), Walker (1975), and Wilson (1961), all provide descriptions of nineteenth century clay pipe collections or types.

The codebook recognizes two major types, the ball clay pipe, of one piece construction including a bowl, base and stem, and detachable stem pipe, made to fit a wood or reed stem.

In the case of both forms the bowls, bases, spurs, if present, and stems can be decorated with molded or impressed designs. In the case of detachable stem pipes elaborately molded effigy forms as well as deep fluting is common (see Figure 11). Marked pipes or parts are those with impressed or molded names or initials of makers or place of manufacture. The initials T. D. on pipes should be treated as a decoration rather than a marking since "T. D. pipes" were made by many manufacturers.

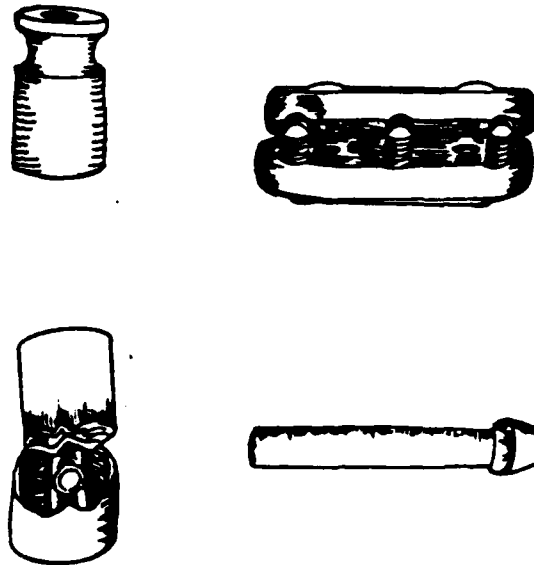


Figure 10. Insulators

Detachable stem pipes are made of both earthenware and stoneware depending on the temperature of firing during manufacture. These can be separated by the fact that stoneware paste will not take up moisture.



Figure 11. Effigy pipe

(9) Tile

Drain tiles are generally cylindrical and are manufactured in a wide variety of dimensions.

Wall/fireplace/floor tile is high fired, thin, square or rectangular tile with one finished and often decorated surface.

Roofing tile is biconvex in cross section.

Building or structural tile is square or rectangular in form and except for flue liners and some facing tile has internal cells and supports (Olin, Schmidt and Lewis 1975:205-8).

(10) Toy

This category includes such items as doll or play china, ceramic toy figurines of both human and animal form, and whistles.

(11) Sanitary

Included here are the sanitary porcelains, including toilets, sinks and urinals, which are granular in part and covered with a transparent glaze. Ceramics were widely used for sanitary purposes in the last quarter of the nineteenth century. The earliest toilets were decorated under glaze but by the turn of the century plain white was the rule. Many of the patents relating to indoor plumbing were the result of the English inventions of Thomas Crapper during the last half of the nineteenth century (Reyburn 1971). It was not until the second decade of the twentieth century that sanitary porcelains were common in American homes.

(12) Other Ceramic

This category includes, for example, statuary, ceramic art works, mosaic tile and novelty items.

(13) Unidentified

Unidentified is used to code ceramic pieces whose functions cannot be determined.

IIa. Introduction

Although sherds of ceramic tablewares and storage containers make up large proportions of the artifacts recovered from nineteenth century sites, and although it is widely accepted that these ceramics are an important reference tool for archaeologists, the technology, and historical and cultural significance of ceramic tablewares are generally poorly understood. This situation is due to the complexity of the ceramic manufacturing industry in the last century, the diversity of ceramic products, and the fact that the literature on ceramic table and storage wares is specialized, scattered and often technical. The major difficulty for archaeologists, however, is the lack of a well developed classification system for nineteenth and early twentieth century ceramics.

In order to begin to draw together a useful scheme of classification it is necessary to address several categories of published information of general interest to archaeologists. These include: 1) vessel structure and form, 2) ceramic terminology, 3) ceramic classification, 4) ceramic trade-marks, and 5) social and economic studies. In this general introduction only principal works are cited, leaving more specific references to appropriate sections of the codebook manual.

Vessel Structure and Form

All ceramic vessels are composed of clay, a natural substance derived from the decomposition of feldspar. Chemically, clays consist

of hydrous aluminum or magnesium silicates, which when combined with greater amounts of water produce a plastic mass. This most outstanding property of clay--plasticity--permits objects made of it to be shaped into desired forms. Once fired, ceramic vessels lose the chemically saturated and additional water used to help create their shape, and become rigid. Ceramic sherds recovered from archaeological sites may be thought of as the component parts of formerly rigid, complete vessels.

Yet the structure of ceramic sherds and vessels found on most North American historic period sites, or those manufactured in a European-based technological and aesthetic tradition, also share a more complex set of observable features. These are features of paste (color, hardness, porosity, and texture), features of glaze (color, luster, and texture), and features of shape. To the archaeologist, paste color refers to the color of the fired clay or clays used to construct the body or form of a particular vessel, which range from nearly white to dark gray. Hardness generally concerns the ability of a ceramic body to resist chipping or breakage. Vessels highly resistant to damage are described as being of hard paste; those less resistant of soft paste. Porosity as a property embodies the ability of water to enter or pass through a ceramic body, and in this sense wares are generally classified as having either permeable (porous) or impermeable (nonporous) pastes. Those with permeable paste are commonly referred to as earthenwares, while those of impermeable paste are known as stonewares and porcelains. It should be remembered, however, that these differences are a matter of degree. Paste texture refers to the grade and size of particles composing the vessel body and is usually described by terms suggesting a very fine to very coarse quality.

Most simply, a glaze is a veneer of glass on the surface of a ceramic object for functional and/or aesthetic purposes. Usually the glaze is applied but some clays when fired will form an exterior vitrified surface. Glazes have the effect of making permeable or porous pastes impermeable to liquids, and the surfaces of all pastes easier to clean. Glazes also appear in a wide variety of colors, lusters, and textures, and are thus important as a decorative element. Differing proportions of minerals such as iron, cobalt, manganese, tin, and copper are combined and exposed to either an oxidized (high oxygen) or reduced (low oxygen) fire to obtain the desired color. Glaze luster refers to the ways the surface of a glaze reflects natural light. This quality is frequently described by archaeologists by terms such as "glossy," "dull," "opaque," and "opalescent." Glaze texture derives from many variations on the physical composition of the glaze itself during the firing process. This feature is embodied in such descriptive terms as "smooth," "pebbly," and "uneven."

The essential features of paste and glaze are not treated extensively in the archaeological literature. Two important discussions are to be found in Shepard's (1956) Ceramics for the Archaeologist and Jelks' (1958) description of the ceramics from Jamestown, Virginia. Shepard (1956) describes the nature of ceramic materials and glazes, how vessels are made, aspects of pottery analysis and description, and a host of other topics useful in understanding ceramic data. Although this book emphasizes prehistoric ceramics, historical archaeologists can find much relevant information in its pages. Jelks (1958) provides a

brief yet excellent description of both the materials and technology of manufacturing ceramic objects, including discussions of the physical characteristics selected as criteria for his classification. A more recent study (Jelks 1973) describes in greater detail the role of paste and glaze features in classifying nineteenth century wares from Signal Hill, Newfoundland. On the subject of nineteenth century utilitarian stoneware paste and glaze characteristics, good discussions are to be found in Greer (1971; 1981), Osgood (1971), and Myers (1980). Features of paste and glaze associated with Chinese porcelain exported for the American market through the first quarter of the nineteenth century appear in Mudge (1981).

More technical treatments of the subject are available in Rhodes (1973) and Green (1973). March (1934) has proposed a standard set of terms for describing features of paste and glaze but his terminology has not received wide use.

The subject of vessel form primarily concerns the shapes and sizes of ceramic objects. Generally, the forms of vessels manufactured during the seventeenth and eighteenth centuries derived from traditional European and Oriental sources (Jelks 1958:203), as did those of the nineteenth century. However, during the last century vessel sizes and shapes tended to standardize in response to advances in manufacturing technology. A brief summary of changes in vessel forms during the period from 1780 to 1850 is presented by Godden (1963:8-9). Miller (1980:27-35) summarizes the most commonly used terms for describing plates, tea cups and saucers, and bowls during the nineteenth century.

Illustrations of common vessel forms of the last two centuries appear in a number of historical and archaeological studies. Among the most helpful of the former are Rackham (1930), Wedgwood and Ormsbee (1947), Bemrose (1952), Mankowitz (1953), Osgood (1956), Godden (1966), Whiter (1970), Lehner (1980), and Greer (1981). Illustrations of vessel forms recovered from nineteenth century archaeological contexts may be found in Sussman (1977; 1979), and Baker (1978).

Ceramic Terminology

The language of ceramics used by past and present manufacturers, consumers, collectors, art historians and archaeologists is both rich and varied. It ranges from the highly technical terminology of the production process to the far less technical jargon of printed trade advertisements depicting "cups, saucers and plates." Historical archaeologists must increasingly become familiar with terms relating to wares, styles, patterns, shapes, and the materials and processes of manufacturing as they proceed to interpret the cultural context of ceramic objects. Understanding important terms and their usages can prevent misconceptions from becoming entrenched in the growing body of archaeological literature devoted to nineteenth and early twentieth century ceramic studies.

Toward this end a number of well prepared dictionaries of ceramic terms may be consulted, several of which primarily concern historical topics and nomenclature. Among the most useful of these are An Illustrated Dictionary of Ceramics by Savage and Newman (1974), The

Dictionary of World Pottery and Porcelain by Boger (1971), and Pottery and Porcelain; A Dictionary of Terms by Charles (1974). The compendious European Ceramic Art by Honey (1952) includes technical terms that continued in use throughout the nineteenth century, as well as a large body of information on factories and artisans.

More specialized dictionaries concerning individual potteries and wares also exist. The Dictionary of Wedgwood by Reilly and Savage (1980) contains many terms relating to wares, manufacturing processes, decorative styles, and vessel shapes associated with Josiah Wedgwood, but also adopted by other potters of the late eighteenth and nineteenth centuries. Terms associated with blue and white on-glaze transfer printed wares appear in Coysh (1974; 1972). A glossary of color terms associated with the ceramic bodies, glazes, and transfer prints of on-glaze transfer printed wares manufactured in England appears in Williams-Wood (1981). See also Parmalee (1973) and Matson (1965).

Ceramic Classification

Historic period ceramics are generally described by archaeologists as belonging to one of three kinds: earthenware, stoneware, or porcelain. These are distinguished on the basis of paste characteristics, most notably hardness and permeability (earthenwares are of permeable paste; stonewares and porcelains are impermeable). This approach to grouping wares found on North American sites was first devised by Jelks (1958) in his discussion of ceramics recovered at Jamestown, Virginia. Jelks (1958:203) classified the assemblage using characteristics of paste, glaze, decoration and form, proposing types and varieties of each of the "three basic ceramic 'wares' which influenced 17th- and 18th-century European ceramic art". Classification of historic period ceramics on the basis of observed physical attributes continues in widespread use today, though not without difficulty or controversy.

Powell (1962) was among the earliest to argue forcibly for a more rigorous approach to classifying ceramics, one based on the proposition that all classifications consist of a set of categories arranged in a ranked order or series. He further proposed that archaeologists apply three general rules of classification developed by logicians when attempting to systematically arrange ceramic assemblages. This suggestion was most directly considered by Miller and Stone (1970) in their classification of ceramics from Fort Michilimackinac, but was not adapted because of perceived limitations. These, as well as other difficulties associated with the classification of historic ceramics, are succinctly stated in the Foreword (written by Jelks) and introduction to this important work (Miller and Stone 1970: vii, 3-5).

More recent and detailed discussions of historic period ceramic classification appear in Jelks (1973) and Miller (1980), who suggest two very different approaches to the problem. In his study of nineteenth century ceramics from Signal Hill, Newfoundland, Jelks (1973:58-69) offers an elaboration of the technique applied to the Jamestown assemblage, suggesting that a comprehensive taxonomy for ceramics classification be based on both observable and inferable characteristics, with the observable criteria of paste, structure, glaze, etc. assuming greater

importance in the classification process. Miller (1980:1-4) argues that such "ware based" classifications are not appropriate for nineteenth century assemblages because the potters, merchants and consumers of the period tended to view ceramics in terms of decorative attributes only. Accordingly he offers four decorative groups or "levels" of differentiation as an alternative classification scheme.

The references cited above generally concern problems of historic period ceramics classification. Very few examples of classifications of nineteenth and early twentieth century ceramic assemblages exist at the present writing. Of these, the most comprehensive are those of Jelks (1973) and Price (1979).

Ceramic Trade-Marks

Ceramic trade-marks, or "maker's marks" as they are more commonly known by archaeologists, identify the manufacturer of a particular earthenware, stoneware or porcelain specimen and can provide highly useful dating information. They may be incised, impressed, printed or painted, though printed marks came into general use by about 1800 (Godden 1964). When present, trade-marks usually appear on the exterior surface of vessel bases. Fortunately for archaeologists, several excellent compilations of trade-marks and their associated dates of introduction or use are available as reference guides.

By far the most comprehensive compilation of ceramic trade-marks is the Encyclopedia of British Pottery and Porcelain Marks by Godden (1964). This monumental work contains over four thousand marks arranged alphabetically and is especially valuable for its detailed descriptions of trade-marks used by manufacturers of earthenwares during the nineteenth century. Godden also provides a helpful introduction to ceramic marks, noting the most common sources of their design and the general rules observed for their relative dating. A companion volume, An Illustrated Encyclopedia of British Pottery and Porcelain (1966), includes examples from many manufacturers but gives emphasis to more refined wares. Other works specifically addressing the marks of British manufacturers are those by Rhead (1910), Ormsbee (1959), and Cushion (1976).

Trade-marks appearing on ceramic vessels manufactured in other European nations and the Orient are described in Chaffers (1965), Cushion and Honey (1965), Kovel and Kovel (1953), and Thorn (1947). Cushion (1961; 1965) has published shorter guides to French, Italian, and German marks that also are of value.

Compilations of American and Canadian trade-marks are not as numerous although interest in wares manufactured in North America is growing among archaeologists and art historians alike. The best overall treatment of the subject is Marks of American Potters by Barber (1976). It contains over one thousand examples arranged by geographical locale. Additional American and Canadian marks may be found in Kovel and Kovel (1953), Ramsay (1947), Thorn (1947), Ketchum (1970) and Collard (1967). Marks used by potters working in the Ohio River Valley, an important center of earthenware and stoneware production during the nineteenth century, are described by Blair (1965) and by Gates and Ormerod (1982).

Marks appearing on coarse earthenwares and stonewares made in Tennessee are described in Smith and Rogers (1979). Greer (1981:138) explains how maker's marks were most frequently made on American stonewares of the last century.

Social and Economic Studies

Published literature on the social and economic aspects of ceramics found on archaeological sites is sparse and widely distributed. Much concerns eighteenth century topics, although interest in more recent subjects is increasing. Two excellent introductions to the interpretive potential of ceramics for archaeologists are Miller and Stone's (1970) discussion of wares recovered at Fort Michilimackinac in northern Michigan, and Deetz's (1973) analysis of ceramics from Plymouth, Massachusetts. Other instructive examples appear in the papers published from the eighteenth annual Winterthur Conference of 1972 (Quimby, ed., 1973), in Otto's (1977) study of ceramics from Cannon's Point Plantation in Georgia and in Sussman's (1978) discussion of British military tableware. Griffiths (1978) provides a useful article on the use marks on historic ceramics as a means of investigating their social utilization. Miller (1980) presents a valuable analysis of nineteenth century price index values and expenditure patterns.

IIa. White Paste Earthenware, Decorated/Unslipped/Glazed

(14) Edge Decorated

Edge decorated white paste earthenwares exhibit decorative features or elements around the rims of vessels. These features or elements consist of a simple band of underglaze color placed along and parallel to the rim, usually over a molded design. Monochrome blue, cobalt blue, or green are the most commonly used colors. The molded design may be impressed (recessed), embossed (raised), or a combination of both. These designs also appear in several characteristic patterns. Not all edge decorated wares possess molded rims, however. Plain, monochrome bands painted along and parallel to the rim of a vessel would qualify as an edge decorated ware under this scheme if the band is nearly contiguous to the edge. Similarly, a monochrome design painted so as to imitate a molded border pattern qualifies as an edge decorated example.

Molded edge decorated wares appear on both pearlware and whiteware bodies. The most common molded border pattern is shell-edge, an impressed design consisting of differently sized and spaced narrow grooves extending in perpendicular fashion from the vessel rim toward the vessel center. Other molded border patterns include "feather and fish scale" and "dot and plume" designs (Price 1979:17), which are here grouped under different categories depending on form.

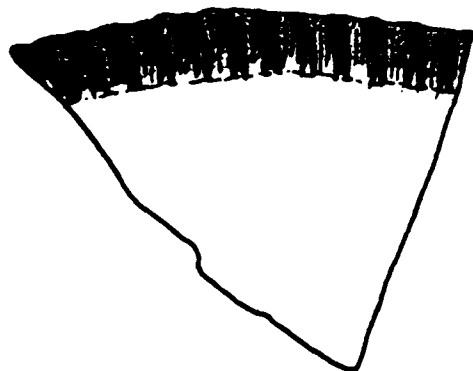
Additionally, edge decorated wares typically display scalloped or unscalped rims. These terms refer to the shape of the vessel rim itself and are regarded as part of the edge decoration. Scalloped rims

imitate the shape of a scallop shell and appear as a series of small, semicircular indentations around the rim (Charles 1974:229). Unscalloped rims are smooth and unmodified. Generally, scalloped rims predate unscalloped rims, which gained increased popularity after ca. 1850.

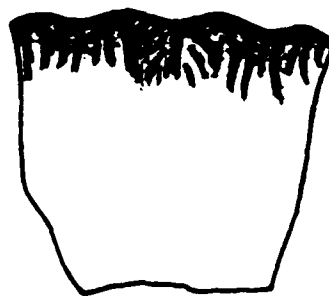
The following descriptions identify the essential characteristics of edge decorated subcategories appearing in the codebook.

Impressed, Scalloped Rim shell, other. Examples of these types display a molded decorative recessed surface in combination with a scalloped rim. Shell-edge sherds are here designated by name and grouped under the heading shell (see Figure 12); all other impressed molded borders are grouped under the heading other. Impressed shell-edge decorated sherds also exhibit a variety of design motifs. These include what may be referred to as "bud" shell-edge and "arrow" shell-edge, each of which reflects temporal significance according to the present level of understanding of edge decorated wares (Miller, personal communication). At this writing the period of greatest popularity of "bud" shell-edge is thought to be ca. 1840-1850, and of "arrow" shell-edge ca. 1850-1860. Both "bud" and "arrow" varieties of shell-edge may appear along either scalloped or unscalloped rims.

Impressed, Unscalloped Rim shell, other. Examples of these types display the same decorative features or elements as those directly above, with the exception of scalloping along the rim. See Figure 12.



unscalloped arrow pattern



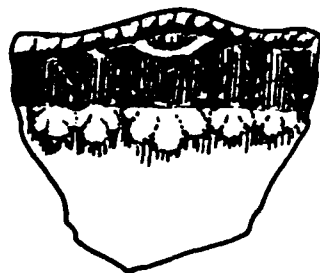
scalloped bud pattern

Figure 12. Edge decorated; impressed shell

Embossed, Scalloped Rim shell, other. Embossed, scalloped rimmed examples of edge decorated wares exhibit a molded decorative (raised) surface in combination with scalloping. Shell-edge sherds are here designated by name and are grouped under the heading shell; all other molded embossed borders are grouped under the heading other.

Embossed shell-edge decorated sherds typically include "dot," "plume," "leaf," and/or combinations of "dot," "plume," and "leaf" motifs. Other embossed edge decorated sherds tend to exhibit more elaborate raised floral designs incorporating flowers, stems, leaves, and/or baskets. These are occasionally unpainted, which is to say the

embossed design is left plain. Both types, on scalloped rims, enjoyed popularity during the period ca. 1820-1850 (Miller, personal communication). See Figure 13.



plume



dot and leaf

Figure 13. Edge decorated; embossed shell, scalloped

Embossed, Unscalloped rim shell, other. Examples of these types display the same decorative features or elements as those in the preceding section, with the exception of scalloping along the rim. However, due to the generalized absence of embossed edge decorated wares after ca. 1850, examples of these wares will be comparatively smaller in number. See Figure 14.

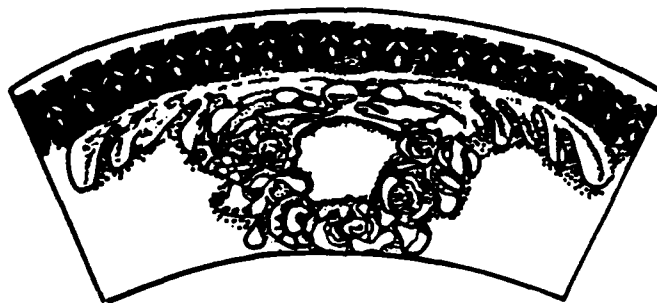


Figure 14. Edge decorated; embossed shell, unscalloped

Impressed and Embossed Unidentified. Occasionally, combinations of different moldings may appear on an individual edge decorated specimen, such as an embossed (raised) floral motif in combination with an impressed (recessed) grooved surface (simple shell-edge). These may tentatively be assigned to the period ca. 1820-1840. Specimens of this type, regardless of rim shape, are grouped under this heading.

Painted Shell-Edge. As also mentioned in the initial discussion of edge decorated wares, monochrome designs painted so as to imitate molded border patterns may be found. All specimens exhibiting paint applied in brush strokes perpendicular to the vessel rim to specifically imitate an impressed shell-edge design are grouped under this heading. See Figure 15.



Figure 15. Edge decorated; painted shell edge

Other Edge Decorated. This group includes all edge decorated specimens that do not display characteristics described in the previous subsections.

(15) Sponge Decorated

Sponge decorated white paste earthenwares typically exhibit variegated or mottled (cloud-like) designs produced by applying a sponge dipped in colored glaze to the ware before covering it with a transparent glaze (Charles 1974:66, 246). The sponged ornament technique usually refers to underglaze designs used in combination with painted motifs such as birds or flowers, however, archaeological specimens may not reveal such details. Sponged decorations of this type appear on both pearlware and whiteware bodies in a variety of colors, including blue, pink, red, brown, orange, yellow, lavender, and green (Price 1979:19).

Another type of sponge decorated white paste earthenware consists of a stamped/stenciled decoration applied with a sponge cut in the form of a small geometric or floral pattern. These were also dipped in colored glaze and then placed on the surface of the vessel, often in repeating patterns in combination with painted or other sponged designs (Godden 1963:147; Jelks 1973:66; Price 1979:20). Chronologically, there appears to be little difference between the two as both were produced through the entire nineteenth century.

Textured Design. The term "textured" here refers to sherds exhibiting sponge decorations of the variegated or mottled type only. Sponged decoration of this kind appearing on whiteware bodies is sometimes referred to as "spatterware."

(16) Painted underglaze

Painted white paste earthenware exhibits designs that are hand applied underglaze with a brush. Decorative features or elements

typically consist of simple floral motifs, chinoiserie landscapes, or geometric patterns. Blues, greens, yellows, and reds are the most frequently occurring colors. Painted designs may be found on the exterior or interior of a vessel, as well as on both surfaces. Painted designs also occur in combination with a wide variety of border patterns, including simple bands and geometric designs (Jelks 1973:63). Flatware, teaware, and bowls all may display painted designs.

Chronological aspects of painted wares found on archaeological sites are not presently widely understood. South (1972:85, Figure 1) places underglaze blue painted pearlware in a 1780 to 1820 date range, and polychrome painted pearlware from 1795 to 1815. Stylistic differences among painted designs on pearlware are not discussed. Noel Hume (1970:129) remarks that "soft pastel" colors depicting floral designs on pearlware bodies predominate during the period from 1795 to 1815.

Lofstrom (1976:27) offers a more detailed consideration, suggesting that three varieties of hand-painting may be distinguished among sherds recovered at Fort Snelling. These are: 1) monochrome blue floral designs executed in broad brush strokes (see Figure 16), 2) polychrome floral designs executed in broad stroke blues, greens, and earth tones, and 3) "sprig" floral patterns executed in black, greens, reds, and cobalt blue. The first two varieties occur on pearlware bodies and are referred to by Lofstrom and Bemrose (1952) as "peasant style" wares; those recovered at Fort Snelling are from contexts dating from the first quarter to the middle-second quarter of the nineteenth century, while "sprig" wares appear on whiteware bodies after ca. 1836 (Lofstrom 1976:29-32).



Figure 16. Painted underglaze; broad leaf monochrome blue

Price (1979:21) suggests yet another chronology, distinguishing two distinct subtypes from the Ozark Border region: 1) wares exhibiting an overall bluish-tinted glaze with fineline decorations executed in earth tones, and 2) wares of a whiter glaze with brightly colored fineline, "sprig," and broadline decorations. Examples of the former are believed to date from the period 1790 to 1840, and the latter 1830 to 1860. Generally, sherds with painted designs executed underglaze in either monochrome blue or an earthen colored palette may be regarded as contemporaneous. Such predate the more brightly colored polychrome designs, which usually occur on whiteware bodies.

Monochrome Blue. Examples of this type display painted underglaze designs in blue only. Cobalt blue is the most frequently represented.

Monochrome Other. Examples of this type display painted underglaze designs in a single color other than blue.

Polychrome. Underglaze painted designs in this category are executed in more than one color. Both fineline and broadline floral designs depicted in earth tones and brighter colors are included under this heading.

Annular Banded. Annular painted white paste earthenware refers to vessels or sherds exhibiting a single black or colored band applied to the vessel lip. This is accomplished while the vessel is turned on a wheel or lathe (Jelks 1973:66). Annular banded white wares are most popular between 1830 and 1860 (Lofstrom, Tordoff and George 1982:10) but they occasionally appear earlier. The present category is somewhat problematical because examples grouped under it are most likely to be rim sherds from vessels that may display the floral designs described above. Annular decorations occurring in combination with molded grooves along the vessel rim are not coded here, but rather under section (14). This category does not subsume slip decorated annular wares (see section (24)).

Other Painted. Painted earthenwares of this type include examples that exhibit under- or overglaze decorations not readily placed under the above headings.

(17) Printed

Of the varieties of decoration and decorative elements found on wares of the nineteenth century those with printed designs are among the most easily recognized on archaeological sites of the period. In part this is because the printed design or "pattern" results from a process that produced a clarity of image distinctive from that of hand painting, and because the manufacturing process itself was highly economical. The perfection of the technique of printing on ceramics greatly contributed to the overall success of the English potteries of the nineteenth century (Charleston 1981).

Most simply, printed wares are those which exhibit an inked design transferred to the vessel body from another medium. Thus they are commonly referred to as "transfer printed" wares, or more simply, "transfer prints." Transfer printing first evolved as a decoration on the thin metal bodies of jappaned and enamelled wares during the 1750s. While the earliest history of this process, as well as its first applications to pottery and porcelain, is yet not completely known, it is generally believed that the technique was perfected by Sadler and Green of Liverpool in about the year 1756 (Noel Hume 1970:128). From that time onward a number of technological developments were made in the manufacturing process, resulting in three distinct types of transfer printing.

The earliest form of transfer printing on ceramics is known as on-glaze printing, a low-temperature process that was prevalent in the potteries from about 1756 through the mid 1820s. A greater variety of colors were available in overglaze printing since it was not until the mid 1820s that the technical problems associated with printing red, green, and purple underglaze were resolved. After this time these colors were added to the popular blue underglazed variety, and

underglaze transfer printing became the dominant form of printing throughout the nineteenth century, and is so today (George Miller, personal communication). A third type, known as "bat printing," was characterized by fine stipple-printing on-glaze and was popular from about 1790 to 1825 (Williams-Wood 1981:28,232).

Although each of these types reflects different features of printed designs on- or underglaze, it is important to realize that all transfer printing of the nineteenth century was a form of intaglio printing. This is a process by which a design is first engraved or etched into the surface of a metal plate, known as an intaglio plate. Next, ink is applied to the plate in order to fill the design, the excess ink is removed from the plate's surface (leaving ink in the design cavities), and then the plate is placed on the bed of a printing press with a piece of damp paper on its top surface. In the press the paper is forced into the inked design, thus transferring the image to it. In ceramic transfer printing intaglio plates were usually of copper and the medium of transfer was almost invariably a piece of tissue that was first moistened in soapy water. Soap prevented too much oil in the ink from being absorbed by the tissue, and also aided as a parting agent when the design was transferred to the ceramic body (Williams-Wood 1981:44). Descriptions of the processes involved when transferring printed designs onto pottery and porcelain appear in a number of sources (Coysh 1974, 1972; Godden 1963; Hughes 1960; Little 1969), but the most complete are to be found in Copeland (1980:21-31) and Williams-Wood (1981:40-63).

Underglaze transfer printing, the kind most prevalent during the nineteenth century, is characterized by the presence of a transparent glaze over the surface of the printed design. Underglaze prints appear on a wide variety of flatware, teaware, and bowls, as well as other vessel forms such as soup plates, eggcups, sugars, pots, and meat dishes. Usually the process was begun by an artist designing a pattern for a ten-inch dinner plate on paper, which was then engraved or (less frequently) etched into a copper plate and transferred to a sample plate to be checked for proper placement. If the pattern "fitted" well then complimentary designs were drawn and engraved to be placed as either center or border patterns once manufacturing began in earnest (Copeland 1980:21). During the nineteenth century many center and border patterns were designed by artists in the employ of the potteries. These reflect the popular decorative styles of the period and so constitute an important area of study for archaeologists and other students of material culture.

Of the many printed patterns transferred to pottery and porcelain during the nineteenth century, those depicting Chinese themes and motifs enjoyed the earliest and most lasting popularity. This was an outgrowth of the immense attraction Chinese and other Oriental decorative arts had to the population of Europe following its initial contacts with China and the development of the China trade in the mid-sixteenth century (see Section IIc below). Early in the nineteenth century several printed patterns illustrating Chinese landscapes emerged as especially popular subjects on common tableware. One of the most popular of these was the "Willow" pattern developed by Josiah Spode from an original Chinese pattern in about 1790 (Copeland 1980:33). The Willow pattern in its earliest form depicts a tea house, a bridge carrying three persons

across a natural river, a willow tree, a boat, two birds, and a fenced garden in the foreground. Later versions by Spode reveal subtle variations on this design, but many other potteries copied the pattern, often incorporating their own small design changes.

Other widely copied Chinese patterns are the so-called "Mandarin" and "Two Temples" patterns. Excellent discussions and illustrations of all three may be found in Whiter (1970) and Copeland (1980).

Apart from the Chinese landscape prints are those depicting English countryside and other rural scenes, romantically styled ruins, and both simple and elaborate floral arrangements. Each has a different origin and initial style commencing with one pottery, but as in the case of the Willow pattern most were widely copied and altered to some degree by competing firms. Especially popular ones include the "Botanical," "British Flowers," "Broseley," "Italian," "Ruins," and "Rural Scenes" patterns produced by the Spode/Copeland firm throughout the nineteenth century. These are discussed and illustrated in Sussman (1979), and Figure 17 gives several examples. Historical views as well were exported to America in large quantities during the nineteenth century (Miller 1965). Arman and Arman (1974), and Laidacker (1951) all treat this subject in useful detail.

The color of transfer prints on ceramics is certainly an obvious feature, but one whose temporal implications are not widely agreed upon (see Miller 1974:201; Sussman 1979:11). Generally, the earliest mass-produced prints were executed in red and purple on white salt-glazed stoneware, as well as black on creamware (Noel Hume 1970:128-129). Underglaze printing in various shades of blue is commonly known to be especially popular during the ascendancy of pearlware, from about the last quarter of the eighteenth century through the first quarter of the nineteenth century (Coysh 1974:7; Godden 1963:149; Hughes 1960:128-129). The predominance of blue printed designs of this period is attributed to both the numerous gradations of tint achieved by the use of cobalt oxide, as well as consumer taste (Copeland 1980:20; Hughes 1960:128). After the late 1820s, other single underglaze colors such as green, red, and brown were produced at the Staffordshire potteries, and beginning about the late 1840s polychrome prints in blue, red, yellow, and other combinations appeared (Godden 1963:149, 152; Hughes 1960:129). Additional information about the colors of underglaze transfer prints appears under specific headings below.

The designation of colors as a classificatory device is always problematic. They are used here in a general sense. Blue is differentiated from Old blue not on the basis of color but of style. Old blue is a transfer print style of the first quarter of the nineteenth century in which the ceramic object is decorated with a very dense design such that the specimen is more blue than white in overall appearance.

Flowed refers to transfer print designs of several colors which are "bled" into the surrounding glaze by the addition of volatilizing chlorine into the kiln before firing. This technique was first introduced in the 1840s and seems to largely disappear by the 1860s (Lofstrom, Tordoff and George 1982:9). Other printed is used to code colors or styles which are not otherwise described.

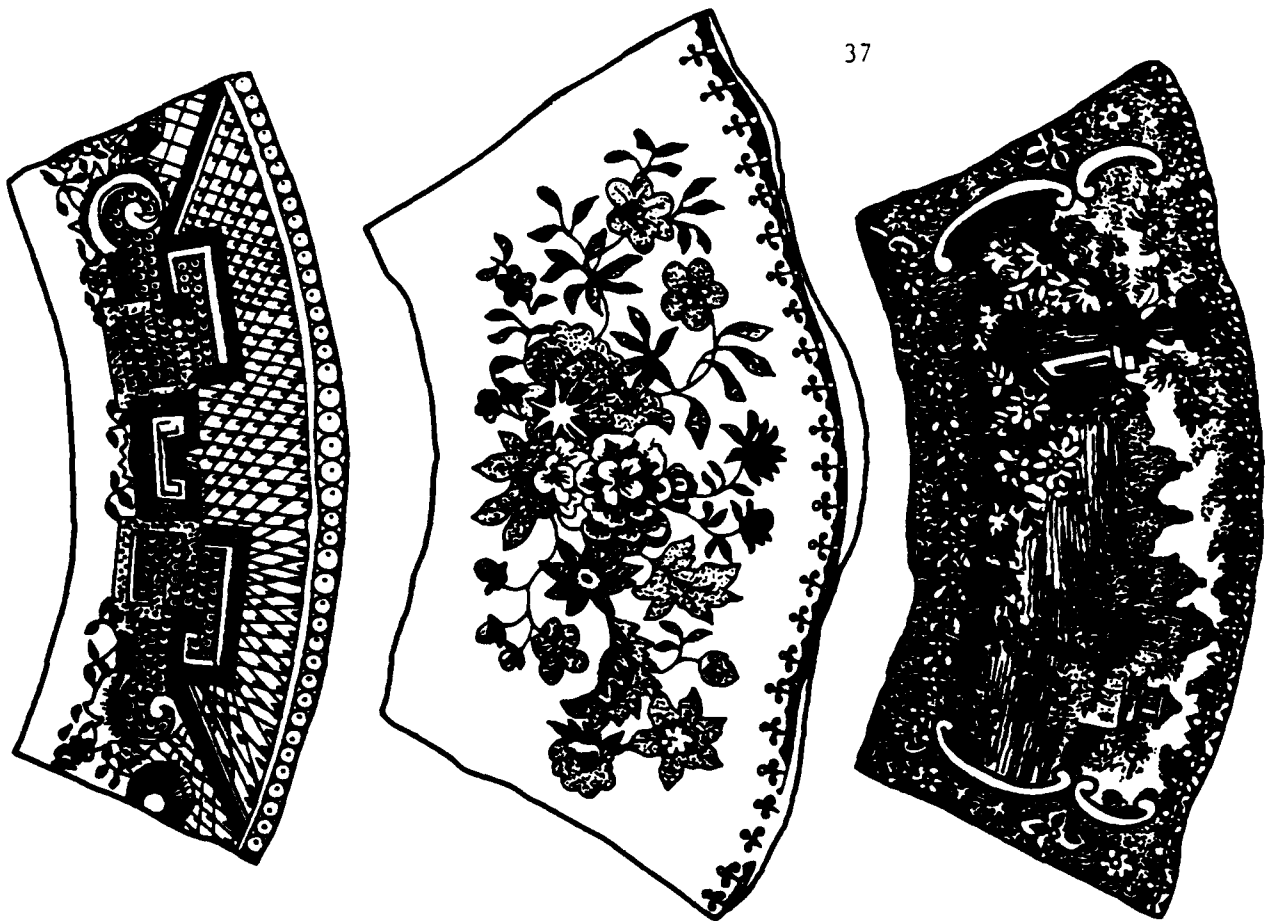


Figure 17. Examples of printed

(18) Printed and Painted

Examples of this category exhibit designs executed by both transfer printing and free hand painting. The chronological significance of wares depicting both printed and painted designs is not very well understood at the present although it is known that some early prints were hand colored after transfer to simulate hand painting (Williams-Wood 1981:50).

Printed patterns in monochrome blue or monochrome green in combination with any painted decorative element are coded separately. All other colors of printed designs in combination with painted elements are coded under the heading other and painted.

(19) Printed and Sponged

Printed and sponged vessels display transfer printed designs in combination with sponge applied designs. As in the previous category, the color of the printed design serves as the basis for differentiation. Prints in colors other than green or blue are coded separately.

(20) Painted and Sponged

Painted designs, particularly in the form of annular bands, often occur in combination with sponged designs. These are coded in this category.

(21) Decalcomania

Decalcomania or decal decorated ware is a very important but poorly understood type of the very late nineteenth and early twentieth century.

Decal decorated wares began to dominate the ceramic industry at the close of the nineteenth century with the collapse of the plain white ware trend associated with Victorian concepts of hygiene in food preparation. Essentially, decalomania resulted from the successful development of the means of applying lithography to ceramic decoration. Although the use of decals for transferring printed designs was invented in 1852, and decals appear on overglaze in the third quarter of the nineteenth century; ceramic application was not perfected until about the turn of the twentieth century (Anonymous 1903; Rhead 1925). The decal process involves the transfer of color prints from paper to the ceramic and had the advantage that designs could be moved around while wet, permitting the use of complex and irregularly spaced designs of numerous colors. Decalomania decorations usually feature clusters of flowers and sprigs of foliage. As we might expect, decal decoration opened the possibility of tremendous variety in the types of ceramic decoration available.

(22) Tinted Glaze

Tinted glaze earthenwares are unslipped and display either an opaque or transparent colored glaze. Decorative elements such as painted or molded designs may or may not be present. The opaque glaze on unslipped examples is usually cream to dark brown in color with a glaze luster ranging widely from dull to very glossy. Transparent colored glazes include various hues and shades of yellow, brown, green, and blue.

(23) Hand Painted/Overglaze

This category is primarily used to code overglaze hand painted white paste earthenware which was widely produced in American homes around the turn of the twentieth century.

IIa. White Paste Earthenware, Decorated Slipped/Glazed

(24) Slip Banded

This category refers to white paste earthenware decorated with one or more bands which are made by applying a slip of finely ground clay while the vessel is spun on a wheel. These bands are slightly raised and can be clearly distinguished in cross section. See Figure 18.



Figure 18. Slip banded

(25) Mocha

Mocha refers to either fern or moss like designs which are produced by mixing pigment, usually, black, blue or green, with tobacco juice and an acidic base. Commonly, mocha designs are also produced by using a

finger to swirl the pigment within a broad plain zone delineated by annular bands. Mocha decoration on whiteware is not common but appears in the first half of the nineteenth century. See Figure 19 and 20.



Figure 19. Mocha; dendritic



Figure 20. Mocha; finger swirled

(26) Trailed Slip

These vessels are decorated by pouring a mixture of pigment, usually blue, mixed with water and finely ground clay, onto the moistened surface of the white earthenware body. Slip trailing could be used to produce bud, flower, or geometric motifs (Denker and Denker 1982:95).

(27) Other

This category is reserved for any white paste earthenware specimens not anticipated in the current codebook.

IIa. White Paste Earthenware, Plain/Glazed

This category encompasses decorated and undecorated wares commonly referred to as "plain whiteware," "whiteware," or "white earthenware." It also includes those known as "pearlware," and "pearl white." Indeed, the distinction between pearlware and whiteware is not presently uniform among archaeologists because the historical and technological development of each is poorly known. Resulting confusions of terminology and differences in approaches to classification have produced widely ranging views concerning how best to develop temporally sensitive assemblages of these wares (Lofstrom 1976; Miller 1980; Price 1979). Generally, however, two schools of thought are represented in the literature.

Most archaeologists define pearlware on the basis of observed physical characteristics of glaze color. Pearlware, which was developed by Wedgwood and Bentley during the last quarter of the eighteenth century as both an imitation of porcelain and replacement for creamware (Miller 1980:15-18; Noel Hume 1969:391, 1970:128), originally exhibited a blue-

tinted body covered by a clear glaze containing cobalt. The presence of cobalt in the glaze imparted the blue tint or "cast" to the body, but also frequently darkened the crevices of vessel footings. This is known as the "blue-puddling" effect, generally cited as a diagnostic feature of pearlware identification (Noel Hume 1969:395) and used as an important criterion of most ware-based classifications. Other criteria include observations of overall glaze tint and color palette in combination with decorative styles (Price 1979), and visual comparisons of body coloration with the hue, value and chroma scales of the Munsell Book of Color (Lofstrom 1976).

A second, and quite different, approach to the problem of distinguishing pearlware from whiteware is represented by Miller's (1980) study of white paste earthenware variability in the nineteenth century. Miller observed from mercantile and related ceramic industry documents of the period that the classification of wares by potters, merchants and consumers tended to be by attributes of decoration. Hence archaeological classifications of nineteenth century ceramics should follow this example to avoid problems of applying ware-type distinctions to an industry largely unconcerned with them. Miller's own research, as well as that of Delhom (1977), revealed that early producers of pearlware utilized many body and glaze formulas that evolved through time. Additionally, there was a tendency to produce a whiter-bodied ware by reducing the amount of cobalt in the glaze or by adding a small amount of cobalt to the body. Miller (1980:17) suggested this may have been to better imitate the bone china introduced by Spode around 1800, although important are his observations that what archaeologists now term "whiteware" anonymously derived from pearlware by about 1825 (see also Noel Hume 1970:130-131), and that the production of wares incorporating the word "pearl" in their maker's mark continued through the nineteenth century. According to Miller (1980:18) most likely potters did not recognize a significant distinction between pearlware and whiteware.

The cream cast category is used to code those specimens which exhibit a yellow "cast" to the glaze. Again, these may be more or less cream colored depending on the amount of cobalt introduced. By and large cream cast white earthenware is an eighteenth century variety which may be present to a significant degree in the first two decades of the nineteenth century.

The categories proposed address both approaches by incorporating the essential feature shared by each: variation in overall glaze tint and color palette expressed through time, without reference to "pearl-" or "white-" ware qualifiers. Under this system rim, body, base or other sherds are observed to be either Mold Decorated (28) (see Figure 21) or Undecorated (29).

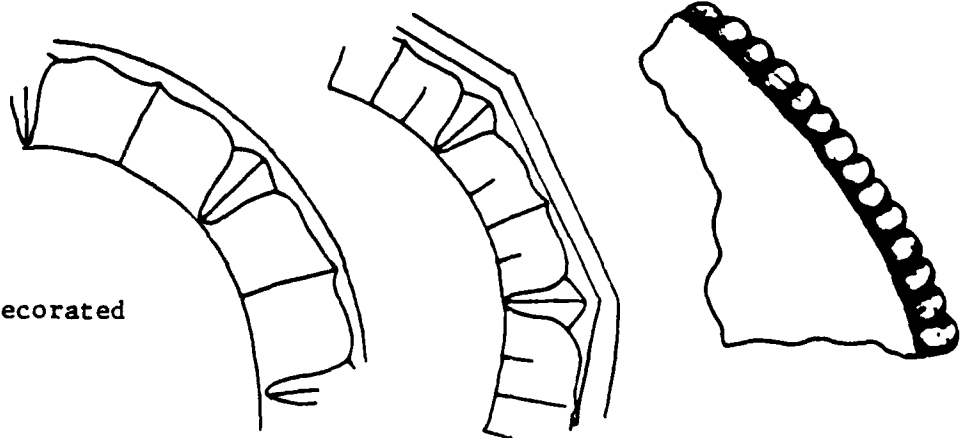


Figure 21. Mold decorated

IIa. Yellow Paste Earthenware

(30) Decorated and Glazed

Decorated yellow paste earthenware is by and large a heavily potted utilitarian ware which was made in both England and America throughout the nineteenth century. These wares are a drab yellow covered with a clear transparent glaze.

Painted refers to hand painted brush applied decorations which may be simple lines or complex designs while sponged decorations are those applied by blotting with a paint impregnated sponge. This decoration is exceedingly common in the nineteenth century and appears in brown, orange, blue, green, yellow and less commonly, black and purple.

Slip decorated yellow pasted earthenware is decorated by applying a slip of finely ground clay in water.

Slip banded annular bands are applied while the vessel is on a wheel. Usually several bands are applied, sometimes of multiple colors and frequently in combination with bands of sculpted relief or rollett decoration.

Mocha, a form of annular banded ware, shows a dendritic pattern set in a wide plain band and usually set off by painted or slip decorated bands. The dendritic pattern is produced by mixing pigment and tobacco with an acidic base. This decorative form appears to have been most popular in the first half of the nineteenth century (Noel-Hume 1978:131). Another mocha form is produced by using the finger to produce swirls of pigment, usually black, blue and white in a broad plain zone set off by annular bands. This form was most popular during the last half of the nineteenth century (Noel-Hume 1978:132).

Slip trailed refers to linear free hand slip application to produce stylized naturalistic or geometric patterns.

Other is a category used to code combinations of decorative techniques which cannot be conveniently placed into other categories of decorated and glazed yellow paste wares. An example is the combination of slip decorated ware which is also decorated with trailed slip. The exception is mocha, which, while almost always exhibiting banding, is a distinctive type of annular banded ware. Other also refers to the use of such devices as rolleting or stamping when these are the predominate decorative devise.

(31) Undecorated

Rockingham glaze is a brown mottled glaze applied over a yellow body which resembles tortoise shell. Other color glazes were also used to produce the same effect. Generally Rockingham is used synonymously with Bennington glaze and both were used by a large number of English and American potteries. Glazed wares of this type were mainly produced between 1849 and 1860 (Denker and Denker 1982:130).

Other glaze is used to code a variety of brilliant colored glazes which came into fashionable use in about 1870. These wares are often referred to as "majolica" because they are reminiscent of tin glazed earthenwares popular in the eighteenth century. These wares are usually molded in low relief and glazed in pink, green, turquoise, and light

blue over the yellow body. The colors are suspended in a clear, shiny glaze (Denker and Denker 1982:134).

(32) Unidentified Yellow Paste Earthenware

This is mainly reserved for slip decorated wares in which it is difficult to determine the true nature of the body.

IIa. Other Colored Paste Earthenware

Earthenware vessels may be made from a wide variety of clay types and often fire to colors ranging from almost white to buff to deep red-brown. Generally these are referred to as red-ware but this is a poor term since some stoneware clays also fire red (Greer 1981:27). In fact, some earthenware vessels of these colors may represent underfired stonewares. Nonetheless red earthenware is a common nineteenth century ceramic.

(33) Decorated

This includes all painted, stamped, and sponged decorated earthenwares of colored paste other than yellow.

The most common decorative techniques used on red earthenware is slip trailing—often in white or green.

In addition to this decoration, many colored paste earthenwares were embellished with colored metallic glaze, with black and green the most common.

A variety of slips, especially brown and yellow, were often used to cover crude redware bodies (Spargo 1972:165). Slipped ware was usually also glazed. Specimens in this category should be coded according to the combination of glaze and slip.

Other includes a variety of decorative techniques similar to those used in the decoration of yellow earthenware, such as mocha or slip trailed.

(34) Undecorated.

This includes all glazed, slipped, or slipped and glazed redware pottery which shows no applied painting, stamping, sponging or trailed designs.

Other includes a large category of bisque vessels which are unglazed; flower pots are coded under this category.

(35) Unidentified colored paste earthenware

This is often used to code slipped ceramics where it is difficult to determine the nature of the underlying paste.

IIb. White Paste Stoneware

This category includes heavy, high fired durable wares that may be differentiated from white earthenwares in that the unglazed paste does

not readily take up moisture; that is, they have a nearly impermeable paste. This ware is glazed with a transparent glaze which seldom shows evidence of crazing. White paste stoneware was marketed under a wide variety of trade names, for example, ironstone, granite ware, stone china, semi-porcelain and opaque porcelain.

Ironstone tableware was first produced in quantity in 1805 by the Spode potteries and by 1810-1830 by a large number of English potteries (Godden 1965, xxiii). The earliest white paste stonewares were commonly decorated with the same underglaze transfer print designs typical of white earthenware. The first all-white ironstone appeared shortly after 1840 (Wetherbee 1981:37), and through the remaining part of the century was decorated with molded patterns in keeping with the Victorian hygiene revolution in food preparation and serving. Wetherbee (1981) provides an excellent description of the appearance and popularity of a great variety of molded design patterns as well as bottom marks and listings of British and American manufacturers of ironstone china. Gates and Ormerod (1982) provide an excellent index of marks used by East Liverpool potteries, many of which manufactured hard paste stoneware. By the 1870s the method for imparting underglaze design in metallic luster was perfected and this led to the popularity of simple Luster Band and Sprig designs, which includes the tremendously popular tea leaf ironstone of the last quarter of the nineteenth century (Wetherbee 1981:122).

(36) Decorated

This category includes all molded, painted, printed or decal decorated specimens, or combinations of these decorative techniques.

(37) Undecorated

All wares which show no molded or applied decoration are coded in this category.

(38) Unidentified White Paste Stoneware

This category is used to code white paste stoneware sherds which cannot be assigned to the decorated or undecorated categories.

I Ib. Colored Paste Stoneware, Decorated/Glazed

These ceramics are the utilitarian stoneware, primarily storage containers, such as jugs, crocks and ceramic bottles. These are the product of both cottage industry and large commercial establishments. Stoneware is fired at temperatures of between 1200 and 1300 degrees C, producing a very hard body impervious to fluids. The paste color of stoneware vessels results from the natural earth tone of the fired clay and ranges from dull white to browns and grays. Pigments are, however, occasionally added to color the paste. A discussion of vessel form, as well as manufacturing process and an excellent discussion of glaze types, is found in Greer (1981). Webster (1971) provides a description of decorated stonewares and Smith and Rodgers (1979) give a detailed discussion of the folk potteries of Tennessee, including an extensive listing of makers.

(39) Decorated

Decorated refers to stoneware which bears painted names, designs, rolling stamping or incising of a decorative nature. Glazes are assigned to one of four major types.

Salt vapor glaze. Salt glazing was the most common means of glazing stoneware during the nineteenth century. In this process sodium chloride is thrown into the fired kiln where the sodium reacts with silica in the body of the vessel to produce a transparent soda gloss glaze - sodium silicate (Greer 1981:180-193). Salt glaze is easily identified by its pitted surface which resembles that of an orange skin. The texture may vary, however, from very fine to heavy depending on the amount of salt introduced. Color also varies as a function of the chemical composition of the paste and the atmosphere of the kiln. Depending on these conditions the color of the vessel can vary from white to pearl gray to greenish. A brownish vessel can be produced by using an iron wash or adding iron to the salt, which creates a reducing atmosphere in the kiln (Greer 1981:186). Vessels decorated with cobalt blue often display a glaze which has a bluish tinge.

(40) Undecorated

This refers to color pasted stonewares which are glazed but do not show any other decoration. See glaze designation above (39).

(41) Unidentified Colored Paste Stoneware

This category is reserved for those specimens which cannot be coded in the categories above.

IIc. Porcelain

Porcelain is a high fired (approximately 1400 degrees C) vitreous and very durable ceramic. Although the degree of hardness varies, porcelain fractures in a conchoidal pattern. Porcelain wares are coded in three categories--Oriental export, Euro-American hard paste, and Soft Paste. Oriental porcelain is also a hard pasted ware but differs from Euro-American ware in characteristics of paste, glaze, and decorative form. Each of the three types is divided by the location of decoration, either overglaze, underglaze, underglaze and overglaze, or undecorated. All types occur throughout the nineteenth century.

(42) Oriental porcelain

These wares are finely potted, very hard, and glazed with a thinly applied transparent glaze. Vessels that are not carefully glazed exhibit defects such as running or pitting (Mudge 1981:95, 166). According to Miller and Stone (1970:90), glazes on European porcelains tend to show less obvious glaze imperfection but frequently show minute flecks of pigment which are detached from decoration in firing.

While oriental export porcelain appears in the western market in the late fourteenth century it was not until the relaxed trade restriction in the third quarter of the seventeenth century that these ceramics became common in the European and North American scene. By the last

quarter of the eighteenth and nineteenth century, Chinese porcelains were being mass produced for the North American market and these tended to be quite heavily potted (Herbert and Schiffer 1975:11). This trend was reversed in the last quarter of the nineteenth century when porcelain became very light.

Changes in U.S. custom law in 1891 required imported porcelain to be marked with the country of origin (Herbert and Schiffer 1975:24). Marks on Chinese porcelains have little dating significance although Ch'ing dynasty (1644-1912) registry marks are known in both stamped and script characters (Burton and Habson 1928; Noel-Hume 1978:164). Wynter (1972) provides lists of various European porcelain marks.

Other differences between Oriental and Euro-American hard paste porcelain exist in methods and techniques of decoration. In the eighteenth and nineteenth centuries Chinese wares were predominantly decorated in blue hand painted designs under the glaze. Bow, Worcester, Liverpool and Caughly teawares exported from England to North America during the last quarter of the eighteenth century are also decorated in this manner (Noel-Hume 1970:137). After this period Chinese porcelain is often decorated with poorly executed on-glaze decoration. According to Noel Hume (1970:262) Canton style porcelain characterized by simple swag borders dominated the first third of the nineteenth century although Nanking border styles featuring spearheads and daggers as an inner rim matrix also appeared at this time. The Rose Medallion pattern was, however, the pattern with the greatest range of quality and variety of shapes during the nineteenth century. This pattern consists of four alternating panels around a central gold circle enclosing a bird and a tree peony. The four panels show groups of birds, flowers, butterflies, and a group of people in a house (Herbert and Schiffer 1975:25). English porcelain also occurs widely with underglaze and overglaze transfer printed designs. Blue, maroon, puce, pale violet and brown color were used for overglaze prints while underglaze transfer prints occur in a greater variety of colors (Williams-Wood 1981:84).

(43) Euro-American Porcelain

By the beginning of the eighteenth century Europeans had discovered the kaolin-feldspar combination necessary to manufacture true hard paste porcelains (Wynter 1972:26). By the beginning of the nineteenth century hard paste porcelains were widely manufactured in Europe, including most notably in Germany, France, Austria, and Czechoslovakia, and by mid century in England (Wynter 1972:116). Late eighteenth and early nineteenth century European hard paste wares were often hand decorated, particularly in underglaze blue in imitation of Chinese export porcelain. Copies were faithful down to the Chinese character maker's marks. In addition to chinoiserie, hand painted florals, birds, and classical scenes appear on European hard paste porcelains. Unlike oriental porcelains, those produced in Europe were frequently decorated with underglaze blue transfer prints (Noel-Hume 1978:137).

The American porcelain industry was founded near the end of the first quarter of the nineteenth century but it was really not until the 1860s, at the end of the Civil War, that the industry began to flourish (Denker and Denker 1982:160). Porcelain works in East Liverpool and Trenton were the principle producers during the last half of the century. Oriental decorative motifs as well as florals, classical and patriotic figures, appear.

Both Oriental and Euro-American porcelains were generally decorated with underglaze decoration but both overglaze and combination of underglaze and overglaze decoration is frequent. These latter specimens are coded as both. The undecorated category for both Euro-American hard paste as well as bone China (44) is used to code all examples of what is called statuary porcelain or Parian ware, a distinctive type of porcelain developed in the 1840s by Copeland and Garrett (Godden 1963:144). Parian was created as an imitation of white marble used in classical statuary, a medium and art form Copeland and Garrett knew many Victorians appreciated but could not afford. Parian ceramics were also made by several factories in North America (Barrett 1958). These wares are distinguished by a dull, matte white surface finish. Most are unglazed, although Parian formulas were also used to manufacture tablewares requiring a glaze. These display a smear glaze, which is a very thin glaze applied to the surface in mist form during firing. Glazed Parian sherds are likely to be very rare in archaeological context. Parian figures and other objects remained popular in both England and North America throughout the Victorian era (ca. 1845-1901). Although there was a rapid decline in popularity of Parian wares after the turn of the century the Staffordshire firm of Robinson and Leadheater, who exported to Canada, continued to produce Victorian style Parian objects during the first quarter of the twentieth century (Collard 1967:187). The earliest Parian bodies were a glossy soft paste porcelain, which eventually evolved into a true hard paste porcelain (Charles 1974:182).

(44) Soft Paste Porcelain

The quest for a formula to produce hard paste porcelain led to much experimentation in the industry in both Europe and America during the eighteenth century. Of the variety of soft paste porcelains produced in the late eighteenth century, only English bone china persisted into and throughout the nineteenth century. In reality, bone china is half way between a hard and soft paste porcelain, its hardness the result of adding bone ash to the other paste constituents (Wynter 1972:8). The importance of the general use of bone ash was that it reduced manufacturing costs and made porcelain widely available. While hard porcelain is pure white, translucent, light reflecting, resonant, and very hard, soft paste porcelain, including bone china, is more porous, pearly gray or milky white, has a softer glaze and brilliant colors, and sometimes shows pigment in the glaze.

When enamel colors and gold were applied after the glazing of both hard and soft paste porcelain, another cool firing was needed to fix the colors permanently. As the glaze of hard paste porcelain was very hard, enamel colors used in decoration stand out and can be detected by touch. In the case of soft paste porcelain, however, the porosity of the body allowed both the glaze and enamel to sink in and fuse as one, so that in

most cases it is impossible to feel anything above the soft glossy coat of the glaze on these wares (Wynter 1972:11).

Like Euro-American hard paste porcelain, soft paste porcelain can be coded as having underglaze, overglaze, underglaze and overglaze decoration, or as undecorated.

III. Metal

Because of their common use and durability, artifacts made of metallic substances are very common on historic sites. Identification of metallic artifacts is often complicated by either pre-depositional breakage or post-depositional corrosion or both; this is particularly true of ferrous artifacts. Proper classification often depends on familiarity with the configuration of the total system from which a particular piece of metal is derived; machinery parts are a good example. Conservation of the artifact is often a necessary precursor to use of the code book because critical attributes may be obscured by corrosion.

Metal artifacts are those made of iron, aluminum, copper, nickel, gold, silver, zinc, tin, lead, and various alloys of these metals such as steel, brass, and pewter. Complete means all whole or nearly whole specimens.

(1) Activities

Activities refers to artifacts used dominantly in leisure pursuits, although they of course may also be related to subsistence and commercial enterprises.

Fishing equipment includes all metallic items of fishing tackle, for example hooks, reels, lines, swivels, rods, rod ferrules, spears, harpoons, leisters, and sinkers. Fishhooks, the most common fishing artifact appearing in archaeological contexts, have been made in graded sizes since the eighteenth century (Stone 1974). They continued to be sold in that manner throughout the nineteenth century and until modern times. Artificial lures combining wood and metal parts were first patented in 1859 but widespread bait casting with plugs did not begin until 1890; luminous paint was not in widespread use until 1910 (Anonymous 1971c; Luckey 1980:4-5; Melner and Kessler 1972).

Gaming pieces refer to dice, talley pieces, pawns, jacks, and marbles made of metal substances. Metal marbles were available as early as 1780 and were probably recycled for recreational purposes from ball bearings during the late nineteenth century. They were not abundantly available for this purpose until 1914; hollow metal marbles of various colors were also available at this period and show a large X where the surface was sealed (Randall 1979:48). For general reference, refer to Fraser (1966), Kelley (n.d.), Remise and Fondin (1967), and especially Anonymous (1971c).

Musical Instruments are all sound producing metallic artifacts, including, in addition to conventional musical instruments, whistles, calls, mouth harps, kazoos, and wizzers. The last are flat disks, usually of lead, which are perforated and strung to produce a whining noise when the wizzer is spun on a string which is alternately stretched and slackened. General references include Baines 1966.

Toys include all metal and metal parts used in the manufacture of children's playthings. Some examples include "tin" soldiers, wagons, scooters, bicycles, and tricycles, tops, doll furniture, banks, and all other play items not considered musical instruments or games. Refer to Fawcett (1964), Fraser (1966), Kelley (n.d.), and Remise and Fondin (1967).

The other category is used to code items of leisure amusement not included above.

(2) Adornment

Adornment refers to all decorative items worn as a matter of personal adornment, or costumery made primarily of metal. For all technical items relating to personal adornment, such as pattern names, metallic composition, sizing information, and definitions, the reader should refer to the Jewelers Pocket Reference Book (Shipley 1950).

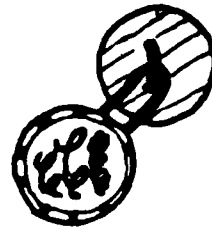
A bracelet is a C-shaped or circular item of jewelry worn on the wrist. Some bracelets have hinged or sliding size adjusting devices. In the early twentieth century, flexible bracelets were available.

Brooches are a clasp-like piece of jewelry with pin and catch for fastening to a lady's garment, especially at the throat. Brooches are of both circular and bar shape and are almost always elaborate, often incorporating gem or glass insets (Anonymous 1971a:84).

Chains, including at least vest chains, locket chains, and guard chains, are made of a variety of materials and in several styles. Styles include rope, snake, curb, square cable, Boston link cable, and Roman chased. Fastening devices such as snaps, swivels, and guards are used in association with chains. Styles of watch chains are also recognized (Anonymous 1971a:68-74; Shipley 1950:5a).

Cufflinks, sometimes called sleeve links or sleeve buttons, were used in place of buttons for fastening sleeve ends at the wrist. Pins were also used for this purpose, especially on women's garments. In the early nineteenth century, cufflinks were usually buttonlike, consisting of two identical button elements attached by a wire link. These frequently feature glass insets. Later in the century, links feature one fancy button and a plainer bar attached with an S-shaped hook. Post cufflinks with a hinged bar appear in the twentieth century. See Figure 22.

Figure 22. Cufflinks



Earrings. During the nineteenth century, earrings were made to insert in the pierced ear lobe. The most common means was by a wire loop, which clipped behind the ear. Usually a semiprecious stone was affixed to the front of the loop by means of a small ring. Post type earrings with screw backs were also available as well as hoop earrings. Earrings for nonpierced ears with screw and clip attachments apparently did not become widely available until the twentieth century.

Finger rings either as simple wedding bands or elaborately decorated with filigree work and inset precious and semi-precious gems as well as glass imitations were available throughout the nineteenth century. These are often made of gold, silver, or their alloys. Rings

are sized from 000 to No. 13 with an interval of about .032 in between sizes and .016 between half sizes (Shipley 1950:3a).

Hat Pins. This category includes all long pins, including besides hat pins, scarf pins and stick pins; these are usually highly decorated.

Pendants are ornaments that hang, usually from a chain. Charms, lockets, emblems, and bangles are included. Locketts in the form of hearts, locks and crosses are the most common pendants.

Other adornments is the code category for a huge variety of adornment articles. Examples include watch fobs, shawl pins, cuff pins, hair pins, baby pins, medals and badges, lace pins, lapel buttons, collar buttons, and studs.

(3) Arms and Ammunition

This category is reserved for all firearm and firearm parts, gun hardware and accoutrements, shells, cartridges, and projectiles. For general reference, the reader is referred to Barnes (1980), Gluckman (1965), Lister (1964), and Smith (1973).

Ammunition refers to projectiles fired from guns, rifles, and shotguns, their casings and detonating devices.

Ball. Molded balls of lead, including those made for a variety of base sizes as well as shot, was in common use during the eighteenth century and well into the nineteenth for small arms. Most lead balls are between 28 and 32 caliber but show variation from between 14.29 mm and 18.9 mm.

Bullets refers to the projectile portion of centerfire and rimfire cartridges. Bullets are conical but if used or spent may be misshaped by impact. The earliest practical development of the conical bullet with grooves and a concave base was by Minie in 1846. This development was adopted by the U.S. Army in 1855 and bullets of the Minie type were used predominantly during the Civil War (Barnes 1980:333). Early "lead" bullets for jacketed cartridges were developed with both plain and hollow bases, with gas check types appearing shortly after 1900. The latter type has a small copper or brass cup crimped to the base (Barnes 1980:334).

Cartridges are devices that contain an explosive charge for the purpose of propelling the ball or bullet. Before the nineteenth century charges were administered through the barrel by hand but during the nineteenth century other systems employing caps, percussion primers, paper cartridges, and metal jacketed cartridges were developed. Caps, though not technically a cartridge, should be coded here. Percussion pieces are small thimble-shaped metal cups containing a charge for ignition of the barrel load. This system was short lived; invented by 1807, percussion ignition was adapted by the U.S. Army in 1842 but was obsolete shortly after the Civil War (see Herskovitz (1978:52-53) for a discussion of primers and percussion caps). Paper cartridges containing both the charge and bullet were developed at about the time of the Civil War and were used in the early breech loading firearms. This cartridge type was in use through the 1880s (Barnes 1980:313). Metal jacketed rimfire and centerfire cartridges were patented in the late 1850s and were in commercial production by 1868. Improved gun powder in 1887 by Nobels gave great impetus to jacketed cartridges but these were not really problem-free until the development of noncorrosive powder in 1981 (Barnes 1980:319).

Cartridge Cases are the metal jackets that contain the primer and powder charge. Spent cases are a frequent artifact of late nineteenth century sites. The base of the case is either rimmed, rimless, semi-rimmed, or flanged (Barnes 1980:11) and the neck may be of either the straight or necked type. Cartridges in common use range from 22 caliber with a diameter of .225 in to 56 caliber cartridges with base diameters of .560 in. Headstamps on the base usually indicate the caliber of the case and manufacturer. Herskovitz (1978:48) illustrates a collection of head stamps from Fort Bowie (1862-1894) (see Figure 23).

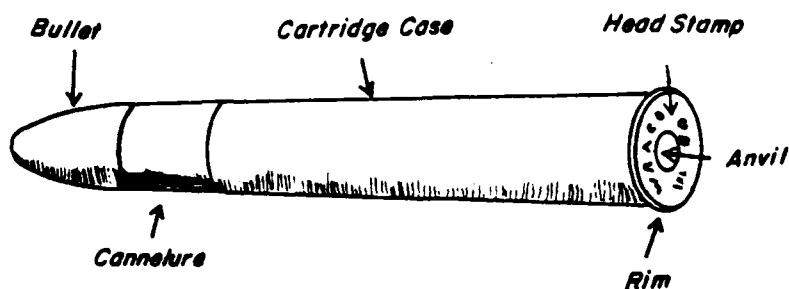


Figure 23. Cartridge

Shot. Until 1769 shot was made by passing molten lead through a brass colander into water by a process developed by Rupert. Rupert shot has a pronounced dimple on one face. After this date it was discovered that dropping molten lead for a distance of 200 ft produced perfectly spherical shot (Hamilton 1980:132). In the nineteenth century, larger shot called buck or swan shot was made in a gang mold and shows evidence of spew marks. Shot gage ranges from No. 12, which is .05 in in diameter, to No. 2, which is .15 in in diameter. Buck shot is gaged from No. 000, which is .36 in in diameter, to No. 4, which is .24 in in diameter. This category also includes grape shot and other shot used in cannons.

Shot gun shells are designed to fire multiple small pellets or shot. Early shotguns were muzzle loaded but after 1851 improved centerfire shotgun shells came into use (Barnes 1980:300). However, muzzle loaders were in use until at least 1900. Center and pinfire shotgun shells ranging from 4 to 20 gage were in use in the last several decades of the nineteenth century. Shotgun balls of appropriate gages were also in use during the nineteenth and early twentieth centuries. Gage and Manufacture and load brand names appear as head stamps of shotgun shells and this same information often appears printed on the paper cartridge body.

Gun hardware refers to the metallic parts of firearms, including lock mechanisms, butt plates, guards, barrels, sights, and other furnishings. Screws and decorative tacks should be coded in the hardware category.

Lock parts are those that are a portion of the triggering and firing mechanism. Examples include springs, trigger, tumbler, jaws, frizzen, bridle, and hammer. Other furnishings include barrel, ramrod pipe, trigger guard, stock keys, breach plug, stock plate, etc.

Other arms is the category for coding all other identified metallic artifacts relating to firearms; examples include BBs and BB gun parts, other firearm accoutrements, swords, and bayonets.

(4) Clothing

This category includes all metal artifacts of garments.

Buckles generally include three or four parts that may or may not be attached. These are a frame, a hinge bar, which is either movable or cast as part of the frame, a hook, which is a movable part attached to the hinge bar and used to secure the belting material, and a tongue or prong, which temporarily secures the belting material to the buckle. Buckles appear in a wide variety of sizes and decorative styles, reflecting their use on shoes, spurs, belts, hats, suspenders, and overalls. The last two types are usually fastened by means of multiple prongs rather than a hook and frequently bear a manufacturer's name.

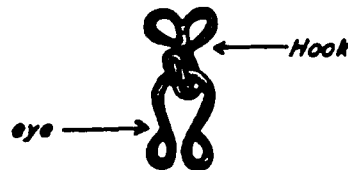
Buttons. The various button types have been described for category I(3) to which the reader is referred for the coding of metallic buttons. Brinckerhoff (1972), Campbell (1965), Ludington (1889), Olsen (1963), and South (1964:113) provide typological and chronological information concerning specific button types.

Footwear refers to the metallic parts of shoes and boots; this includes as examples button hooks, eyelets, and heel or toe plates. Eyelets are the metal grommets through which the back is passed. Shoe hooks are small metal tabs bent at right angles to fix the shoe or bootlace (see Anderson 1968:56). Heel and toe plates are flat, moon-shaped or plano convex pieces of metal to prevent wear either at the heel or toe (see VIII (1)).

Eyelets are small metal grommets attached to clothing.

Hook and eyes consist of two parts, the hook, which is tongue shaped and usually made of a looped wire with recurved ends that are attached to the garment, and an eye, which is also made of bent wire in the shape of the Greek letter omega (see Figure 24).

Figure 24. Hook and eye



Rivets consist of two parts and may be found singly or in combination. The first is a grommet or ring through which the second element, a post, is passed, which then is crimped in both places to close the rivet. In 1873 rivets were introduced by Levi-Strauss Company to secure the corners of trouser pockets (Herskovitz 1978:42). Clothing rivets are frequently made of copper and often stamped with a manufacturer's mark.

Snaps are self-contained fastening devices used primarily to fasten waist bands and overalls. They are composed of two pieces, a ball and a socket. The heads are either silvered or japanned. Snaps were not in popular use before the very late nineteenth century.

Suspenders. This category includes trouser suspenders as well as hose supports and side garters. The metallic elements of these systems, excluding buckles, which are coded elsewhere, consist of a hinged or pronged adjustment mechanism, bridles, alligator snaps, and swivels.

Other clothing includes all other metallic clothing parts. Some examples include hat band ornaments, metal dress and corset stays, collar springs, and hat ventilators.

(5) Coinage

Coinage includes all publicly or privately issued metal coins or tokens that have exchange value.

U.S. currency means any coinage issued by the United States. A complete listing of U.S. coins is to be found in a Guide Book of United States Coins (Yeoman 1981). This guide is updated annually.

Foreign currency includes all coins publicly issued by governments other than the United States, including those issued by States and by the Confederate States of America. A complete listing of nineteenth century foreign coins can be found in Raymond (1953) while State issues are shown in Yeoman (1981).

Tokens are currency substitutes issued by individuals, corporations, banks, and occasionally by the U.S. government. Tokens could be redeemed for currency or for supplies or services (Yeoman 1981).

(6) Communication

This category is reserved for metallic devices or parts used in communication of written or spoken word.

A bell means a door bell, table bell, or tower bell used as a call. These artifacts feature a cast sounding frame or bell and a clapper which is moved either mechanically or electrically. Mechanical door bells often have fancy cast turning knobs and face plates.

A pen point is the removable tip for writing pens. These were available for much of the nineteenth century in a number of sizes and styles. Common points sold in gold and steel were available in graded series from No. 1 to 8 in both "long nib" and "stubs."

The pens and pen parts category includes metal pen holders as well as fountain pens which were commercially available in the 1890s (DiNoto 1979:124).

Pencil ferrules are the metal eraser clasp mounted on the end of wooden pencils.

Other communication artifacts include mechanical pencils which were available in limited quantity throughout the nineteenth century,

door knockers, telephone, telegraph, radio, and victrola parts.

(7) Containers

A container is any metal vessel or vessel part.

Barrel bands are strap iron fasteners made to secure barrel stays. These are fastened at each end by rivets.

A bucket or pail is a deep metal vessel made to hold and transport liquids. Sides of buckets are slightly outsloping to straight.

Kettles are metal containers used in cooking and rendering. These appear in a wide variety of forms but are usually shallow with outsloping sides. Cast iron rendering kettles with straight or even insloping sides are an exception; these may also be footed (Tyler 1971). Bail refers to a wire handle for a bucket or kettle. Bails are almost always made of iron. Body refers to the side or bottom of a kettle or pail. Lug refers to the metal tab riveted to the opposite sides of the kettle or pail in order to secure the bail. Lugs are frequently "eared" that is, the upper corners are turned down. See Figure 25.

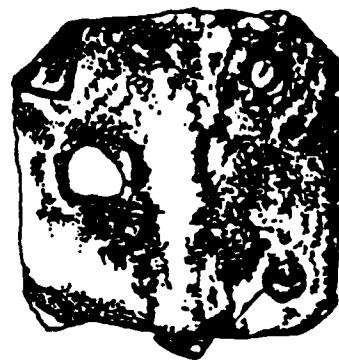


Figure 25. Lug

Tin Can. The history of the tin, or more accurately tinned can, has been described by Clark (1977) and by Busch (1981), who both present chronological and bibliographic information. Fontana et al. (1962) provides an excellent treatment of archaeological can material.

The preserving of perishables in metal containers was rare during the first half of the nineteenth century but became extremely popular in the last half of the century. This shift was in part due to the extensive use of canned foods by both armies during the Civil War. The development of mechanical means of producing cans as well as preservation technology also stimulated the popularity of canned food in the third quarter of the nineteenth century. Landmark developments included the invention of the pendulum press for cutting can tops and bottoms in 1847, mechanical tinning pots in 1882, a semiautomated body maker in 1883, and a fully automated can making machine in 1904 (Clark 1977:11).

Cans can also be dated by the mode of decoration. Paper labels have been in use since the eighteenth century but other means of decorating and labeling directly on the can are more significant in chronology. In the first quarter of the nineteenth century, embossing was the common labeling device (Clark 1977:31). Stenciling and transfer printing were common during the third quarter of the nineteenth century until the invention of the color lithograph, which could print a color on a colored background, in 1870. Chromolithography came into wide use in the early 1880s. This process was not replaced until the introduction of photolithography at the end of the first quarter of the twentieth century (Clark 1977:31-32).

Hole in top body. During the nineteenth century tin plate cans were formed by soldering cut pieces to form the container. Tin plate was heavy and edges show evidence of soldering. Hole in top lid/base cans were filled by packing the contents through a small hole in the top which was covered with a disc. The disc contained a pin hole which could be sealed by a drop of solder during the cooking process (see Figure 26).

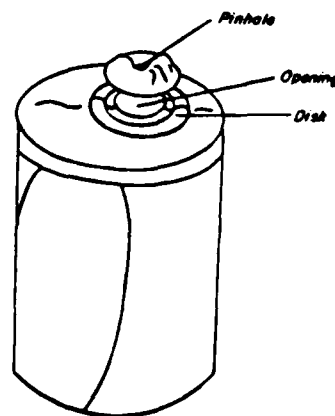


Figure 26. Hole-in-top can

In 1904 the Sanitary Can Company was formed and began producing hermetically sealed cans by completely mechanical means. The body was joined by a lock and lap seam and the top and bottom afised by crimping (Clark 1977:18). Sanitary body and Sanitary lid/base refer to cans made by this process. These are generally made of light tin plate and by the 1920s have an enameled interior. In 1927 steel replaced tin plate for food and beverage cans (Clark 1977:11).

Unidentified body and unidentified lid/base are self-explanatory. The heavy tin plate cans of the nineteenth century were difficult to open and were often supplied with a can key designed to turn off a preweakened strip of metal in order to free the lid. Crown caps were invented in 1892 and were in general use by 1900 on bottles (Holscher 1965:35) (see Figure 27). In 1935 the first cone top carbonated beverage cans closed with crown caps appeared (Clark 1977:32). Slip on lids are formed to fit snugly over the rim of the can. Screw on lids appeared between 1880 and 1883 and became the predominate type after 1910 (Holscher 1965:35). Screw on tops show the negative impressions

of interfacing threads. Pressure seal tops, held in place by a vacuum, were invented in the early 1920s (Holscher 1965:35). Although various pull tabs were in limited use in the 1930s, the metal pull tab did not become extremely popular until the 1960s when they were adopted for use on beverage cans (Clark 1977:33). The earliest types snapped off but since 1975 remain attached to the can. South (1979:213) treats pull tabs in archaeological contexts.



Figure 27. Crown cap

Japanned tinware was produced by applying asphaltum, a tar based substance which could be painted with opaque oil based paint after it was dry (Coffin 1953). Enamel wares were popular for utilitarian purposes through the nineteenth century into the twentieth century. The enameling process consists of painting a thin layer of silica, potash, and a flux to a metal base. The enamel may be made opaque by adding calx and colored by adding metallic oxides. White enamel ware is made by adding stannic and arsenious acids to the flux. Firing is very rapid and produces a shiny vitreous surface (Anonymous 1973:353).

Other containers refers to metal containers of other forms, such as basins, boiler pans, and tubes, made of a variety of metals, including iron, steel, and copper. Also included are silver, pewter, and some tin vessels, although these are relatively rare in archaeological contexts due to their durability or value. Wyler 1937 provides an extensive guide to silver marks.

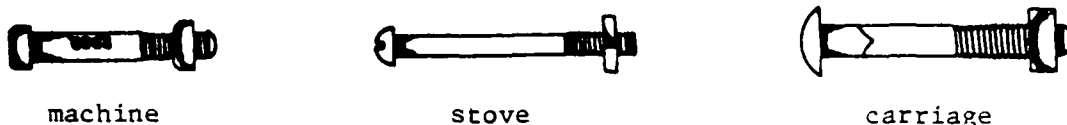
Unidentified containers are self-explanatory.

(8) Hardware--Construction

The Hardware--Construction category includes all metal fastening and securing devices used in wood and metal construction. Most of these devices had been in existence long before the nineteenth century but bolts, screws, and other fasteners with helical grooves were hand made and very expensive. Further, there was little standardization of sizes. The mechanization of the machine industry after the American Civil War brought not only standardization but mass production of these products. The major impetus for these developments was the invention of automatic lathes by C. M. Spencer just after the Civil War (1865) and the improvement of milling machines by Brown and Sharp Co. in 1862, which eliminated hand filing of helical grooves (Galloway 1958:646-653).

A bolt is a fastener used with a nut. According to size listings for one supplier in 1884, bolts of various major types were available in lengths from 1-20 in and in diameters from 3/16 to 1 in (Anonymous 1886:57-67). Carriage bolts have round heads with a squared upper shank to keep the bolt from turning. These bolts are threaded from one third to one half of their length and were available in lengths from

1 in to 16 in and diameters from $3/16$ to $3/4$ of each. Machine bolts have either square or hexagonal heads, smooth shafts, and are threaded for about one-half of their length. They were available in lengths from 1.5 in to 20 in and in diameters from $1/4$ to 1 in. Stove bolts have round or cone shaped slotted heads and may be partially or fully threaded. These were available in lengths from $3/8$ to 7 in and diameters from $5/32$ to $3/8$ in. Other bolts mean any of a variety of special use bolts including, for example, tire bolts, sleigh shoe bolts, cutter shoe bolts, and plow bolts. These all have conical heads for counter-sinking. Unidentified bolts are those for which specific types cannot be determined (see Figure 28).



machine

stove

carriage

Figure 28. Bolts

Nuts refer to fastening devices with helical threads used to fix bolts. Hexagonal nuts are six-sided, square nuts are four-sided and square in shape, and wing nuts have flanges for tightening with the fingers. Other nuts include at least flat nuts that are four-sided and low. Unidentified nuts are those whose function or type is not apparent.

Screws are of a great number of varieties and materials, depending on function. See Battison (1964) and Dickinson (1946) for summaries of the historical development of screw making technology. Lag screws have a square head, pointed tips, and are driven with a wrench. These were available in lengths from 1.5 in to 12 in and in diameters from $5/16$ to 1 in. Machine screws have round slotted heads and are threaded for a nut. Set screws are similar but usually have small conical heads for countersinking and rounded or cup points. Wood screws commonly have flat heads for countersinking but are also available in oval and round heads. In either case, they are slotted to receive a screwdriver. Wood screws are sized by gage or diameter and length. Common gages run from No. 0, or $1/16$ of an inch, to No. 24, or $3/8$ of an inch, and lengths are available from $1/4$ to 6 in. Other screws include, for example, coach screws, dowel screws, and other special types. Unidentified screws include, those whose type or function cannot be identified (see Figure 29).



set

lag

Figure 29. Screws

Brace-bracket is an L-shaped supporting device that is fastened at each end. Decorative braces are used on furniture and shelving but a wide variety of round and flat braces were used to secure machinery and vehicle parts.

Rivets were available in both iron and copper and in a large variety of head styles (Anonymous 1886:54). The most common type is a flat headed rivet that came in lengths from 3/32 to 6 in and diameters from 3/16 to 3/4 in. Rivets were used to patch flat metal (see Figure 30).



Figure 30. Rivets

Spikes are large nails, usually with a heavy square cross section and with either square, round, or L-shaped heads. Spikes are in excess of 3 in in length and may be as much as 12 in long. Cut spikes are made by shearing a flat piece of iron (see cut nails(11)), and wrought spikes are hand made and show traces of forging marks. Wire spikes are rare and have a round cross section. Unidentified spikes are those of unknown variety.

Staples are U-shaped fastening devices that are pointed on both ends. They are used for such purposes as securing fence or electrical wire to wood. They may be coded as cut, wrought, wire, or unidentified, as with spikes.

Tacks are very small nails with flat or dome shaped heads. The points of nineteenth century tacks are made by cutting and they are therefore extremely sharp. Tacks are used for nailing upholstery and fabric and where very small fastening devices are needed. Varieties include gimp tacks, lace tacks, looking glass tacks, as well as lining and tufting nails. Tacks were sold in sizes from No. 1/2 to No. 24, which range in length from 3/16 of an inch to almost 2 in in length. Tacks are most commonly manufactured of either brass or iron.

Washers are made to ride above the nut on a bolt to prevent the nut from damaging or impinging the wood. Early washers were the simple disc type but lock washers characterized by an offset break were introduced in the second quarter of the twentieth century. Square washers are also available but uncommon. Other washers include those with internal or external teeth. Unidentified washers are those for which type cannot be determined.

Other construction refers to a variety of fastening devices used in construction; examples include clips, hooks, and studs.

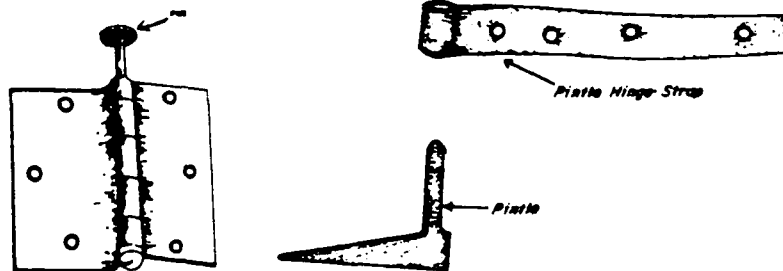
(9) Hardware--Door/Window

Door hinge refers to two piece movable devices that permit movement of one of the hinged elements. A fast-joint butt hinge is a one piece rectangular hinge made to insert between the stationary and

the movable elements. A hinge pin is the pin that joins the two pieces of a loose-pin butt hinge. Hinge pints usually have a round knob on one end. Leaf hinge strap is a one piece hinge with long wings used to attach abutting elements. Loose-pin butt hinges are two piece rectangular hinges that are attached by a hinge pin and are inserted between the hinged elements (see Figure 31). A pintle is one piece of a hinge that consists of a pointed shank with a right angle protrusion (hinge pin) which is driven into the stationary element and serves to support the hinge strap element which is affixed to the movable part. The pintle hinge strap is a long strap with a loop on one end. The loop is passed over the pintle hinge pin and the strap is made fast to the movable element (see Figure 31). Spring hinges with both single and double springs to keep light doors closed seem to have become available in the late nineteenth century. Unidentified hinges are those which cannot be placed into one of these types.

Figure 31. Hinges

loose-pin butt hinge



Door keys. During the nineteenth century, most locks were of the warded type. That is, the keys operated by fitting corresponding notches or wards in the lock. These keys are commonly known as skeleton keys. The key has a bit, neck, shoulder, and bow. Cylindrical disc tumbler and locks were also becoming available in the late nineteenth century and keys for these locks feature notches cut on one face and grooves run parallel to the shaft. Metal door knobs were widely available in plain and fancy varieties through most of the nineteenth century.

Door locks of the earliest type were called warded locks but in the late nineteenth century level tumbler and disc tumbler locks became popular. The door lock category should also be used to code padlocks. Door lock parts may be identified by referring to Crichton (1969).

Hasps are two piece fastening devices consisting of a strap with a slot, which is fixed to the movable element, and a loop, which is fastened to the movable element. The slot is passed over the loop and the two parts are secured with a padlock or latch.

Hooks are combined with an eye screw to join a catch by inserting the hook into another eye screw, which is attached to the fixed element.

Keyhole covers are small protective plates that are affixed over keyholes by means of a swivel.

Keyhole escutcheons are plates, usually of fancy iron work, which are mounted over a keyhole for decorative purposes.

Bar latches are flat metal bars that are mounted on a door and may be slid or lifted into a bar latch catch, which is mounted on the door frame.

A latch bolt is a spring loaded door latch that slides into a catch mounted on the door frame. These are sometimes furnished with a safety chain.

Window latches are mounted between the panes of double hung windows or on the sill below the window to secure the sash. These are

composed of two elements, a catch (see Figure 32), and a semicircular latch.

Window pulleys are pulleys inserted into the casings of double hung windows to facilitate the use of sash weights. See Figure 33.

Figure 32.

Window latch catch

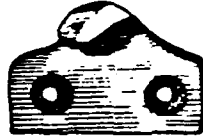
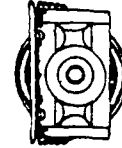


Figure 33.

Window pulley



All other door hardware such as thumb lifts, no slams, and springs are coded as other door.

Other window includes all other window hardware; for example, window lifts and sash weights.

(10) Hardware--Electrical

During the first half of the nineteenth century, there was a great deal of experimentation with the basic principles of electricity. This led to a plethora of electrical inventions during the third and fourth quarters of the century and the practical applications of these inventions in the last quarter of the nineteenth century and early twentieth century. Thus, late in the century we find incandescent filament lamps, the telegraph, and the telephone rapidly gaining popularity (Jarvis 1958:208). These inventions and many more produced a market for electrical hardware that was, however, still in its infancy at the turn of the twentieth century (Cook and Ferro 1983).

Batteries were developed early in the nineteenth century but were not perfected until its last quarter. Wet and dry cell batteries were in use in this period, as well as storage batteries developed in 1878 and perfected in 1881 (Jarvis 1958:206). The 1902 Sears Catalogue advertizes gravity batteries for use in the telegraph and multipurpose and sized dry cell batteries (Anonymous 1969). Herskovitz (1978:56) and Schroeder (1971:205) illustrate battery parts recovered at Ft. Bowie.

Insulated wire is electrical wire covered with cloth, paper, or bitumen. In 1852, Physick patented a method for insulating wire with cloth to carry tar based insulating materials. In 1854 he also began color coding wire in a multicore cable (Jarvis 1958:223).

Light bulb bases featuring a screw cap have been used in the United States since the development of the bulb by Edison in 1878. These have been manufactured in quantity since 1880 although bayonet type sockets were also available.

Other electrical hardware consists of sockets, shades, fuse parts, switches, and other electrical accoutrements.

(11) Hardware--Nails

Nails are fastening devices consisting of a head, shank, and pointed end which are driven into softer materials, mainly wood.

Hand wrought nails are hand made and show forging marks. The shanks are square and taper on all four sides, and the heads are

of several forms of which rosette heads are the most common; points are flattened on opposite faces. Up until the early quarter of the nineteenth century, nails were almost exclusively hand wrought.

During the first quarter of the nineteenth century a large number of machines were patented to produce cut nails from flat sheets of iron. Nelson (1963) presents a chronology based upon the morphology of nails produced in these machines. In general, however, cut nails may be distinguished by the fact that the shank is square but tapers on only two opposing sides, being thickest at the head. The two opposite sheared sides show striations caused by the cutting machine. Early cut nails may have hand wrought heads; these date prior to 1825. The earliest stamp head nails are thin and lopsided but are regular after 1830 (Mercer 1976:10).

Machinery for making wire nails was not perfected until the 1870s and these round shanked nails did not become dominant in construction until the 1890s. In fact, cut nails were used in conjunction with wire nails for special purposes until well into the twentieth century (Nelson 1963).

Nails are sized by the penny, abbreviated (d), which originated from the penny price per hundred. The larger the penny size, the larger the length and diameter of the nail. Cut nails were available in graded sizes from 2d, which is 1 in in length, to 60d, which is 6 in long. Each size increase represents a 1/4 in increment. The same sizing is used for wire nails. These came in a large variety of types depending on head form. Finishing nails with a small round head and casing nails with a conical head are most common.

Unidentified means those whose type penny sizing cannot be determined, while unidentified nails means those nails that cannot be identified as to type.

(12) Hardware-Plumbing

Plumbing hardware refers to all hardware used to move water or steam for the purposes of supplying water, heat or power or for the elimination of waste. Generally these tasks were accomplished using iron, lead, copper pipes, and brass fittings. Neither public nor private plumbing was common through most of the nineteenth century. Central heating and ventilation systems were used in public buildings by the second quarter of the nineteenth century and in domestic structures by the third quarter. Domestic heating systems were predominantly steam systems before 1880 when a massive shift to hot water occurred (Ferguson 1976:168). By the beginning of the twentieth century, running water and domestic plumbing was fairly common in non-rural American homes.

Faucets include basin cocks and bibbs used to control water flow.

Fittings are valves, nipples, flanges, clamps and other connecting or subsidiary plumbing elements.

Pipes include all lead, iron or copper pipe or linings of wooden pipe. Metal bands for wooden pipe should be coded as miscellaneous hardware.

Other includes all metal plumbing items not included above. Examples include radiators, vents, tanks and heaters.

(13) Hardware - Miscellaneous

This category includes all hardware not specifically identified in previous categories.

Bar stock includes all cast, drawn or extruded metal stock used in the subsequent manufacture of other items. Bar stock is of specific dimensions and is usually in either round, square or flat form.

Chain was generally sold with either straight or twist links in black or bright metal. Link sizes range from 3/16 of an inch to 1 inch. Log chains, wagon chains, tongue chains and stretcher chains were sold with specific combinations of link, hook ring and swivel elements.

Corrugated/sheet metal. Includes all flat metal used for roofing or siding. Tin plate, zinc and galvanized iron were all available as roofing material by the beginning of the second quarter of the nineteenth century (Waite 1976) and copper was used much earlier. Corrugated iron was available during the third quarter of the century.

Gears are round toothed machine parts of a variety of sizes.

Grommets are rings of metal, usually brass, which are sewn into fabric so that this material can be secured with a rope.

For definition of hooks, keys and locks see (9).

Rings and loops are forged for attachment to chains.

Spigots are cocks made to insert into barrels and kegs for the purpose of tapping. These are generally made of brass and may require the use of a special key (see Figure 34).

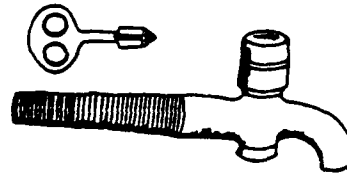


Figure 34. Spigot and spigot key

Wire is extruded in standard diameters from No. 20 which is 1/32 of an inch in diameter to No. 0000 which is 7/16 of an inch in diameter (Anonymous 1886). It was made in a variety of material including most commonly brass/copper or iron/steel; wire made of other material is coded in that category.

Barbed wire which is multiple stranded wire with sharp points interwoven, was patented in 1886. By 1897 over 600 types of barbed wire were being manufactured (Munsey 1970:292). Barbed wire types have some chronological significance and the reader is referred to McCallum and McCallum (1965).

Other miscellaneous hardware is coded here.

(14) Machinery

This category refers to any of the complex primary parts of machines. It does not include bolts, screws, brackets and other subsidiary parts.

Farm machinery includes those items which can be demonstrated to be parts of plows, harrows, planters, cultivators or harvestors. Since the nineteenth century saw a revolution from hand methods of farming to the widespread use of horse drawn mechanical equipment and steam

tractors this category is very complex. In archaeological contexts, however, parts of these implements are frequently encountered in circumstances which make specific identification difficult. Johnson (1976) and Partridge (1973) provide detailed descriptions of agricultural equipment. The most common archaeological manifestation of cultivator parts are the tines or teeth from the spring tine and section harrow which was first mass produced in 1877 (Partridge 1973:83). Disc harrows were also in wide use during the last half of the century. Plow parts include furrow and land wheels, the coulter shoe and mouldboard. Shores, beams and coulters are the most common specimens found in archaeological context. Other includes parts of planters, rakes, cultivators and harvesting machinery.

Gears are defined in section (13).

Bearings are machine parts in which one surface moves upon one another.

Shafts are bars, round or square in cross section, which transfer power or connect moving parts.

Unidentified machine parts are those which function as part of agricultural implements of unknown function.

Other includes parts which are not gears, shafts or bearings.

(15) Furnishings

Furnishings include metal artifacts and parts which are related to the room furnishing.

Brace/brackets include all L-shaped or corner fitted hardware used in the support of shelves or to strengthen jointed wood elements.

Clock parts are the hands, wheels, dials, springs, spindels and cases of clocks. Up until the time of the war of 1812, most clocks were foreign made. After this time, however, the American clock and watch industry began to develop rapidly. Greater use of machinery and production line methods enabled manufacturers to lower prices to the point that by the late 1830s America was exporting clocks to English and European markets where they were sold at lower rates than those locally produced (Dworetzky and Dickstein 1972:xi). The Watch and Clock Encyclopedia (deCarle 1977) provides detail for the identification and terminology of watch and clock parts including 91 specific names for styles of watch hands as well as an illustrated table of all types of watch parts. Dworetzky and Dickstein (1972) provide detailed information on nineteenth century clocks and Crossman (n.d.) details the history of various nineteenth century watchmakers and watch manufacturing companies.

Drawer pulls used on furniture include flush, shelf, loop and ring drop types.

Knobs used on furnishings as well as bar pulls should be coded as other handles. See Nutting (1976) and Woodhouse (1976).

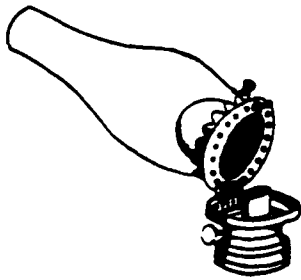
Fireplace furniture includes metal implements used in and around the fireplace. Examples are fire dogs, spit dogs, hearth trivets, skewer holders, flippers, pokers or toddy irons, toasters, pot holders, cauldron hoops and grease calibers (Lindsay 1964).

Furniture casters are any pin or cleat mounted movable ball which is affixed to furniture legs.

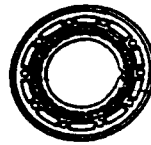
Furniture hinges are butt, leaf or sliding hinges used on furniture.

Furniture lock/hasp include not only hasps but catches and bolts used to secure furniture doors or lids.

Lamp parts include components of table lamps and gas lamps, either wall, table or hanging varieties. The lamp base serves as its support, the burner holds the mantle or wick, and the font contains the fuel supply. Pipes, cocks, adjustment screws, shade or globe holders and oriental work are coded as other (Russell 1976) (see Figure 35).



lamp parts articulated



globe ring



burner



globe holder

Figure 35. Lamp parts

Stove parts include all elements of cast iron stoves or furnaces; legs, plates, tops, covers, doors, grates and ash floors and liners. Waite and Waite (1976) provide a list of the numerous stove makers at Troy, New York, which was a major stove making center during the nineteenth century.

Other furnishings include all other metal items associated with household furnishing.

(16) Kitchen/Tableware

This category is for coding implements used in the preparation and consumption of food. As a general reference, the reader is referred to Lantz (1970) and to Anonymous (1971a).

Cutlery refers to knives, forks and spoons used on the table or in the kitchen. Two, three and four-tined forks were made with both composite and all metal handles. As a general rule, two-tined forks were most popular in the eighteenth century and four-tined forks in the twentieth. All three varieties occur in the nineteenth with a trend toward greater numbers of tines later in the century. Table knives and kitchen knives are generally of the case knife variety. That is, they have non-folding or retractable blades. Like forks, knives were manufactured with both composite and all metal handles. Other knives refers to specialized knives, such as, butter knives or cheese knives. Peterson (1958) provides the terminology for knife parts. Metal spoons were made of a variety of metals but primarily iron. Sizes include

Sizes include large table or serving spoons and the small teaspoon. Specialized spoons such as preserve spoons, ladles, skimmers and dippers also appear and should be coded as other.

Handle elements from kitchen or table knives, forks or spoons are coded as unidentified handle, either composite or metal.

Openers include can and bottle openers (Lantz 1970:50).

Other cooking implements includes a huge variety of iron and tin pots, pans, skillets and kitchen machines, such as extractors, parers, beaters and grinders (Lantz 1970). In the last quarter of the nineteenth century, enamel ironware became very popular. This ware was variously called "enamelware, granite ironware, glazed ware and "agate ware", and its use persisted well into the twentieth century. After 1886 when the process of using electricity to melt aluminum was invented, cookware of this material began to appear on the market. It was not, however, until the 1890s that it became popular (Lantz 1970:176).

Other tableware includes such items as trivets, condiment dishes, candy dishes, metal plates, cups and glasses, and napkin rings.

(17) Maintenance/Repair/Craft

All items used primarily in the making of articles of cloth and leather are coded in this category.

Awls are pointed pieces of metal for piercing leather. These may be bipoined and offset for the use of a handle.

Needles were available in a variety of sizes and for many purposes. Aside from common serving needles, machine needles, harness, socking, soil makers and shoemakers needles appear on nineteenth century sites.

Straight pins were generally purchased in bulk and were available in either adamantine or brass, with plain and colored heads available. Early in the century, pin heads are predominately round, but by the end of the century are flattened.

Punches used in leather work, especially in making and repairing harnesses, were available with a cylindrical head holding several punch sizes.

Scissors have had their modern form since at least the eighteenth century. Nineteenth century scissors were available in several special forms including those used in trimming, shearing and making button-holes.

Thimbles in silver, gilt and aluminum were popular during the nineteenth century and could be ordered in a variety of sizes. They were also pierced at the apex to use as ornaments in the Indian trade.

Other may be used to code such items as thread holders, darners and pleating machines and safety pins.

(18) Personal Effects

Artifacts associated with personal use and grooming are coded in this category.

Eyeglass frame style underwent a shift during the nineteenth century. Eighteenth century eyeglass lenses were predominantly round but early in the nineteenth century, octagon, square and rectangular lenses became popular. By mid-century, oval or Oxford spectacles with blue wire frames were the predominant type and by late century, the pince-nez glasses which appeared in the 1840s with cork nose pieces

were the craze. Lorgnettes or hand held stalked glasses were popular in the first third of the nineteenth century and at mid-century, quizzies or hand held monocles became popular. The reader is referred to Corson (1967:107).

Grooming artifacts include brushes, combs and razors of metal. Razor blades are hollow ground and heavier at one end. Safety razors using separate blades did not appear commercially until the first decade of the twentieth century. Other include such items as manicure implements, hair clippers and shaving brushes.

Penknives are very small clasp knives used for sharpening quills.

Pocket knives are larger and during the nineteenth century were commonly carried as a jewelry item. These artifacts are usually multi-bladed clasp knives with bone, pearl and horn handle insets.

Other knife parts include bolster linings, side center scales, springs, shields, bolsters and end rivets (Peterson, 1958:4) (see Figure 36).

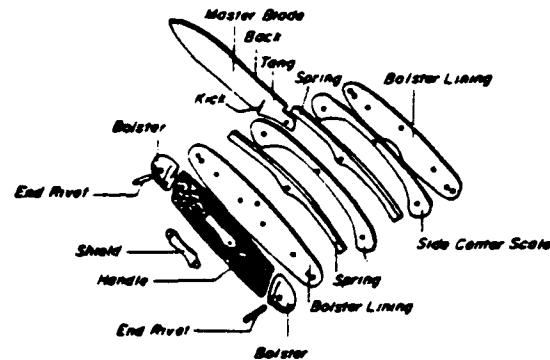


Figure 36. Knife parts

Cloth and leather clutch and change purses were commonly made around a metal purse frame which featured a catch latch as a fastener.

Pocket watches were widely available during the last half of the nineteenth century in both cheap and very expensive models (Crossman n.d.; deCarle 1977).

Other personal effects include such items as hair pins, nail buffers and files and toiletry items.

(19) Tools

All metal tools or tools made primarily of metal are to be coded here.

Anvils were available in a variety of weights from 5 pounds to over 800 pounds. Specialized anvils such as saw and plow anvils were available. A large variety of specialized tools made to fit into anvils, such as swags, headers, and stakes, should be coded under other tools (Anonymous 1980:224-226).

Auger parts include braces and brace parts and bits. Before the mid nineteenth century, braces were made primarily of wood with metal bearings. In the last half of the century, metal braces predominated. Geared hand and breast drills were available at least by the early 1880s. Wood and metal boring bits are coded here as well as reamers and gimlets.

Axes/hatchets are wood cutting tools where the cutting blade is mounted parallel to the handles, which are long and short respectively. These tools appear in a variety of forms, including felling, broad and hewing axes, lath, shingling coopers and carpenters hatchets (Hill 1975:8-10, Sloan 1964:10-21).

Chisels are used in both wood and metal working. They were available in a variety of widths. Wood chisels are beveled on one face and metal working chisels for cutting either cold or hot materials have a short bevel on both faces.

Files are made for working both soft and hard materials and were available in flat, triangular and partially rounded cross sections in various lengths and in degrees of coarseness from smooth to bastard. Rasps or very course files were used in woodworking and by farmers.

Hammers were available in a huge variety during the nineteenth century as they were made to fill a great many special functions. Some examples include claw, tack, stone, ball pein, riveting, farriers and coopers hammers as well as mallets and sledges (Anonymous 1886; Lyon 1976).

Measuring devices are those instruments used to scale wood or metal construction. Examples include calipers, marking gauges, rules, trammels and squares as well as scales, balances and the components of these instruments. All spreading scales are coded as compass/divider; straight edges are coded as rules. Beams, scales, hooks and weights are coded as scale/weight and other includes such tools as scribing and timber scaling devices (Lyons 1976:26-33).

Miscellaneous blades include tools with cutting blades, such as hay knives, sickles, scythes, reaping hooks, corn knives, draw knives and froes (Sloan 1964:100-103).

Early nineteenth century planes were predominately made of wood with metal blades and adjustments. Both wood and steel planes were available during the last half of the century. Some types include smooth, jack, bore, jointer, block, rabbit, grooving and dado planes (Lyon 1976:38-45; Sloan 1964:56-65).

Saw blades include saws for cutting both wood, metal and other materials. Crosscut, rip saws were available in edges from 4 1/2 to 12 points per inch. Other types of wood working saws include, for example, pit, crosscut, buzz, buck and keyhole saws. Circular and band blades were also available. Hack saw blades for cutting metal were sold in several gauges and lengths and specialized saws such as those used to cut ice were widely available.

Screwdrivers, unlike most nineteenth century tools, were relatively simple. These were sold with blade lengths from 3 to 10 inches. Mechanical or Yankee screwdrivers with interchangeable blades were available late in the century. Philips screwdrivers were not in use until well into the twentieth century.

Shovels/spades have a socketed iron blade on a long wood handle. Spades have flat blades and are designed for turning the soil while shovels are made for moving various materials. Among the types available in the nineteenth century are the square and round pointed shovel, coal scoops, grain scoops, mow shovel and nursery, ditching and drain spades (Lyons 1976:68-75).

Other tools include a huge variety of tool and tool parts, including unidentified tools and parts. Examples are hoes, adzes, gauges, pullups, anvil tools, saw sets, cants, nippers, snips, tongs, spuds, pliers and vices.

(20) Transportation

This category includes artifacts related to animal drawn and motor driven transportation. The common mode of transport throughout the nineteenth century for moving both people and freight were animal drawn vehicles. Wagons, buckboards, surreys, carts, buggies, runabouts, sulkies, spring wagons, cutters, sleighs and coaches are included. The invention of the self-propelled vehicle took place in the third quarter of the nineteenth century and by the last quarter, automobiles were developed to the point of practical use. It was not until the first two decades of the twentieth century that automobiles driven by gasoline engines became common place on American roads. Except for small parts such as bolts and screws, metal parts relating to both motor and animal driven transport are coded here.

Automobile parts include artifacts relating to the body, frame, drive train and engine of self-propelled vehicles. Body parts include side panels, roofs, hoods, fenders, bumpers and running boards. These are generally made of plate steel and are painted on at least one face. Other automobile parts include such accessories as lights, steering wheels, seat parts and bumpers.

Harness/saddle trappings include all metal parts associated with harnesses and saddles. For example, a stirrup and snaps would be coded here. Bits of several styles, bit chains and curbs are included in this category (see Figure 37). Buckles include those used on tack, including bridle, rein, stirrup, cinch, breast and back straps buckles. Hame hooks and hame tugs are coded here. Ring/loop and cinch are rings, half rings, harness loops, overcheck loops, Martingale rings, cinch rings and brass spreaders and are included here (Schroeder 1971:140-141).

Horse/mule/oxen shoes and associated items such as the weights and ice cleats are coded here. Ox shoes are of course made for a cloven hoof and are semi-circular. Mule shoes differ from horse shoes in that the heels are straight rather than curved as in the case of horse shoes (see Figure 38).

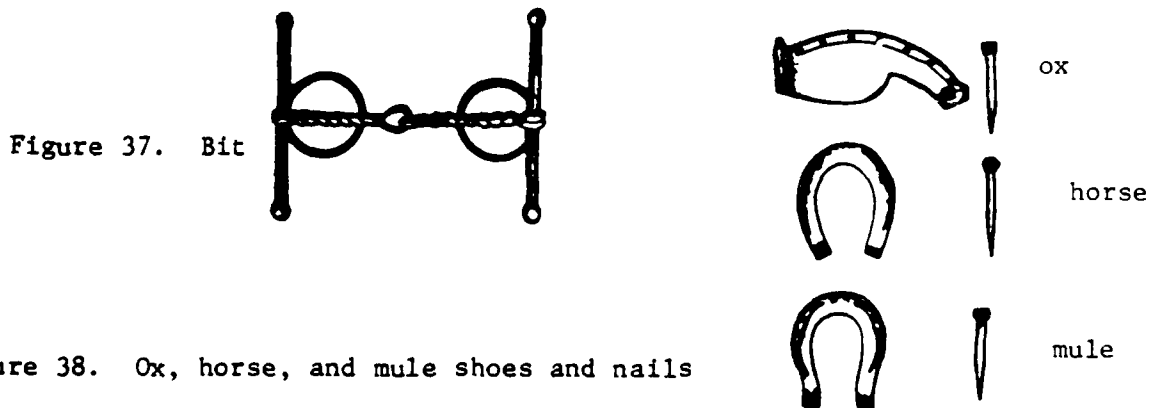


Figure 37. Bit

Figure 38. Ox, horse, and mule shoes and nails

Wagon parts include all metal hardware associated with animal powered transportation vehicles. The reader can refer to Downing (1970) for an illustrated catalogue of carriages manufactured by G and

D Cook and Company in 1860, to Vince (1975), for a history of carts and wagons, and to Sturt (1948) for a discussion of wheels and wheel making. Shumway, Durrell and Frey (1966:165) present the nomenclature for wagon parts and illustrated wagon hardware. A great many metal wagon parts are illustrated in the Kelley, Mans and Company catalogue for 1886 (Anonymous 1886). Perhaps the best single source for wagon hardware is Spivey (1979).

Axles were made of wood with iron bands and hub pins and iron axles both complete as well as axle stubs. These latter types were supplied with collars for mounting the wheel. Singletrees, double-trees, triple trees and four horse equalizers were generally made of wood with iron bands, a heavy iron ring, and hooks. Trees made of tubular steel were also available. Springs were widely used on carriages and coaches. These were generally elliptical or cross leaf springs. Other includes a wide range of wagon hardware. Some examples include spring shackles, fifth wheels, block plates, king plates, end ties and stays, body loops, couplings, step pads, axle clips, gear irons, rail pieces, slat irons, tap stays and whip sockets.

Other transportation refers to bicycles, airplanes, trains and street cars and their parts.

(21) Unidentified Metal

This category includes metal pieces which cannot be identified as to function. Such metal is coded as to type with the exception of foil. Composite or plated metals or those not specifically listed are coded as other.

IV. Bone

This category includes all artifacts made of bone or primarily of bone or horn.

(1) Brush back - (3) Brush back and Handle

Brushes were generally made in two parts, a back (1) containing the bristles and a handle (2), which were glued together. Early in the century, these were generally made of bone or a combination of wood and bone.

When recovered intact, these elements should be coded (3) brush back and handle, if either element is made of bone.

(4) Button

Buttons were commonly made of bone in the early half of the nineteenth century. Composite buttons with bone backs were also common.

Sew through buttons have either two or four holes for attachment.

Collar buttons include composite forms made primarily of bone or other forms such as stalked buttons.

Unidentified includes button fragments.

(5) Button blanks

Button blanks are flat, smooth, circular pieces of bone which have not been drilled for attachment.

(6) Comb

Combs were often made by sawing parallel cuts in one or both sides of a flat piece of bone. Fine toothed or lice combs were common early in the century. Combs made of tortoise shell should be coded here.

(7) Gaming Piece

Bone gaming pieces, especially dice were frequently made of pieces of square cut bone. Ivory die are also coded here.

(8) Handle

Handles for assorted tools were sometimes made of bone. Examples include punch, fork and awl handles.

(9) Handle plate

Handle plates were commonly used on pen and clasp knives and on tableware. These may be made of bone, horn or antler.

(10) Stud

Studs made of bone are similar to collar buttons.

(11) Other Modified

This includes all bone which show cut, saw or turning marks.

(12) Unmodified

This means bone, horn or antler which shows no use marks.

(13) Unidentified

This is part of an artifact which cannot be identified as to type or function.

V. Shell

Shell artifacts are those which are made of either fresh or saltwater molluscs. Pearls are coded under part XI (11).

During the nineteenth century, the pearl button industry was very active, turning out countless buttons made of the inner or nacreous layer (mother of pearl) of the shell of the freshwater clam, which has an iridescent sheen. Button blanks were cut from the shell and then smoothed and drilled.

Categories (1) and (2), Button types, and button blanks, are described in previous sections. Pearl buttons were sold in several grades, fine white, superfine clear white and smokes and in both flat and dome-shaped varieties. Sizes ranged from 12 line or 1/4 in buttons to 24 line or 1/2 in buttons.

(3) Stud

Studs of either the fixed or hinge post types are made to insert and to fasten opposing "button" holes. Frequently the face of the stud is shell and the post of another material.

(4) Other modified shell

This includes such items as handle plates for cutlery.

(5) Unmodified shell

This does not show indications of cutting, sawing or turning.

(6) Unidentified

Unidentified means shell parts which have been modified but which are not identifiable as to type of function.

VI. Wood/Vegetal

This category includes all items of material culture made from wood or wood products, including fiber, fruits, seeds, bark, or gum of woody trees or shrubs. Complete means items which are present in whole or nearly whole condition while fragmentary specimens are those from which diagnostic aspects are missing.

(1) Construction

This category is for coding all wood products used in building construction. Boards are usually cut and sometimes planed to specific dimensions so that length, width, and thickness measurements are consistent over the entire specimen. The abundance of wood in seventeenth and eighteenth century America led to framing construction in which massive peg joined timbers were used in most building construction. By the nineteenth century, however, such timbers were becoming scarcer and more costly. Balloon framing with dimension cut lumber began to be the dominant mode of construction--especially for domestic structures (Hudson 1972:72). This type of framing, apparently developed around Chicago in the 1830s (Hamilton 1958:467), was made possible by the development of machines for the production of cut nails in the first half of the nineteenth century and for wire nails in the second (see nails). By the beginning of the twentieth century, balloon framing was by far the dominant construction form with the exception of barns, commercial buildings, and bridges.

Board includes all lumber cut or sawn to dimension with the exception of heavy posts, beams, or trusses which should be coded as other. Examples including framing lumber, flooring, siding, and sheathing.

Lath is thin strips of wood nailed to the interior of studding as a foundation for plaster. Early lath was usually of the accordion type. That is, thin, wide boards were repeatedly split alternately from opposite ends and then pulled out to form the lath. Later cut lath strips were nailed to the studding in parallel rows. This type of lath varies in length but is approximately 1.5 in wide and a 1/4 in thick. Lath was in use throughout the nineteenth and well into the twentieth century.

Molding includes all milled trim material of wood. Molding usually exhibits multiple concave, convex, and plano surfaces on one face and an unmodified or beveled surface on the other.

Pegs are fastening devices used in framing. These are generally cut in tapering fashion and show evidence of pounding on one end. Pegs vary greatly in dimension.

The other category includes all other wood construction materials used in framing. Posts, beams, trusses, and other large cut and sawn dimension lumber should be coded here as well as shingles.

(2) Cordage (2.00 - 2.00?)

This category includes all twisted or braided plant fibers of any dimension or type of material. With exception of specialized cordage such as sewing thread, most was made from tropical fiber such as jute or hemp. In the nineteenth century, some American barks and plant

fibers were used for cordage; cedar, basswood, and Indian hemp are examples.

(3) Cork

The thick porous bark of the cork tree provided the most common source of bottle closures during the early nineteenth century. With the development of glass and closure systems featuring other materials during the last half of the nineteenth century, cork stoppers were used less frequently. Wine bottles are of course an exception.

Cork closures including cork wrappings, jar glass stoppers, and cork gaskets, should be coded as sealers.

Other cork products such as floats and decorative items are coded as other.

(4) Gaming piece

Wooden dice, discs, and balls used in games are coded here. This includes wooden pieces from checker and chess sets, pawns and talley pieces from other games, balls, bats, and racquets.

(5) Handle

Handles were most commonly made of wood in the nineteenth century and came in all sizes and shapes depending on the function of the tool to which they were attached. Hickory, oak, ash, and osage orange were the woods commonly used for handles. Handles were both hand carved and produced on lathes.

(6) Handle plate

Plano-convex pieces of wood were often affixed to each side of the tangs of knives, forks and spoons by means of metal rivets. These pieces are handle plates.

(7) Pencil

During the last part of the nineteenth century, wood came into use as a bracketing material for writing slate and later graphite. Two half round or faceted sections were bound around a thin cylinder of writing material to keep it from snapping under pressure. Pencil parts such as erasers and eraser brackets are not coded here.

(8) Other Modified Wood

This category is reserved for single or composite wood elements modified for purposes of construction. Dimension lumber used in furniture manufacture or parts of furniture, such as turned legs, or wood finials, plywood, or veneers, should be coded as other modified wood. Plywoods were invented in the mid-1840s and was in use after the Civil War but not in wide use until World War I. Knife cutting veneer machines were available after 1890 and veneers were widely used in furniture manufacture in the early twentieth century (Hudson 1972:77).

(9) Other Unmodified Wood

Woods which are unsawn, that is, cut but not modified to dimension, were often used in construction or fabrication. Posts, beams, rafters still in the round, fence posts, stump sections, and sill supports are all included.

(10) Unidentified Wood

Wood or wood products modified or unmodified which cannot be identified as to function are coded here. Gum, rosin, and fiber are also included.

(11) Nuts/Pits/Seeds

Fruits and seeds of plants regardless of use are coded here. These may include buttons and beads made of these materials or discarded food items.

VII. Stone

The stone category is reserved for artifacts made exclusively or primarily of natural geological products. This does not, however, include composite mineral materials (asphalt) which are manufactured nor geological materials which are not artifactual. These are coded in section XI.

(1) Grinding Wheels

Grinding wheels or stones were available for both wet grinding, (Berea, Ohio stones), or dry grinding (Huron, Michigan stones). These were available in sizes from 50 to over 200 pounds. Much larger stones with cut faces were available for milling. Corundum wheels in sizes from 1 in. in diameter to 36 in. were available for power driven grinding wheels.

(2) Gunflints

Gunflints were in use through the early half of the nineteenth century. Predominately they were imported from England and were made of Brandon flint. These flints are the blade or prismatic type (Barnes 1980:160).

(3) Marble

Marble includes marbles made of stone. These were made by grinding spheres from limestone, agate or onyx. Marbles of this type were available throughout the nineteenth century and show small facets as a result of the grinding process (Randall 1979:11).

(4) Tile

Tile made of fired clay was commonly used for both roofing and drainage. Hearth tiles, usually 6 in square and glazed were also in wide use.

(5) Whetstone

Whetstones are hand held sharpening stones used to sharpen tool edges. These may be small and rectangular or long and cylindrical.

(6) Slate board

Slateboards are ground and cut pieces of slate used as hand held "blackboards." Slate boards were bound in a wood sheath to protect the edges.

(7) Slate pencil

Slate pencils were rounded pieces of soft slate used for writing. By at least the last quarter of the nineteenth century, the slate writing material was being bound in wood.

(8) Other modified

Other modified stone artifacts include, for example, roof and billiard table slate and stone pipes.

(9) Unidentified

Unidentified stone means stone artifacts which are not identifiable to type of function.

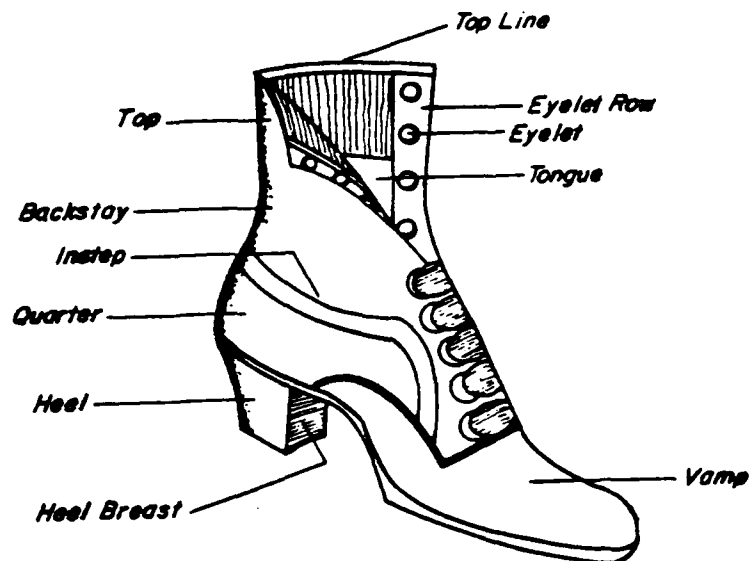
VIII. Leather

(1) Footware

The evolution of footware in the nineteenth century is quite complex but has been well reviewed by Anderson (1968:56), who provides both a chronology of technological developments and a bibliography. Chronologically four shoe types are important; hand sewn and wooden pegged shoes of the first half of the nineteenth century, machine stitched shoes of the last half of the nineteenth century, and turned shoes in early twentieth century. Cemented shoes became possible with the development of improved adhesives in 1926 (Anderson 1968:64). Lasts for right and left shoes appears in the early 1860s and standard sizes in 1888 (Anderson 1968:64) (see Figure 39).

Figure 39.

Shoe parts



Heels made of leather were used extensively after the invention of the Goodyear stitcher in 1875 and the automation of heel attachment lid to woman's high heels in the 1880s (Anderson 1968:61). Soles are of the four types as described above. Eyelet row is the thin strip of leather which contains the gromets, hooks or button holes for lacing or binding the shoe. Other includes welts, tongues, vamps, insteps, tops and other shoe pieces.

(2) Harness strap

Harness straps occur in a variety of widths and thicknesses but are generally about one in in width and 1/8 in thick. Harnesses occasionally show tongue holes, buckles or rivets.

(3) Other strap

Other strap includes such items as belts, hat straps and razor straps.

(4) Other leather

This includes all leather items and scrap which cannot be identified to type.

IX. Rubber

Rubber was used in a limited way in the eighteenth century and during the first quarter of the nineteenth century. During the second quarter of the nineteenth century, Robert Hancock developed a mechanical masticator which permitted the production of a wide variety of rubber products (Pickles 1958:752). These however became brittle in the cold and melted in the heat. The rubber industry expanded rapidly in the last half of the century with the invention of the vulcanization process by Charles Goodyear in 1841. Vulcanized rubber is permanently elastic and not subject to climatic deterioration (Pickles 1958:768).

(1) Brush back

Brush backs were made of rubber and were used to fix the bristles.

(2) Brush handles

This category is used to code hard rubber handles which affix to the back made of another material.

(3) Brush back and handle

This refers to a rubber brush of single piece construction.

(4) Button

Button here refers to buttons made of rubber. These include those made with self shank, shank, sew through, other, and unidentified. These styles are defined under the glass button categories.

(5) Comb

Hard rubber combs replaced bone and tortoise shell combs in the third quarter of the nineteenth century. These were subject to breakage in temperature extremes.

(6) Fabric

Waterproofing fabric was one of the earliest uses of rubber and this practice dates to the eighteenth century. (Pickles 1958:756).

(7) Footwear

This includes all shoe parts made of rubber, boots made or coated with rubber, and overshoes.

Heels made of rubber were first introduced in 1895 (Anderson 1968:59).

(8) Gaskets

Gaskets made of rubber have been in wide use since the middle of the nineteenth century.

(9) Jar seal

This includes rubber gaskets used in the Hutchinson Stopper, patented in 1872, as well as the large rubber gasket used in conjunction with Lightning type closures, patented in 1882 (Lorrain 1968:42). The latter type were very popular through the first half of

the twentieth century until they were gradually displaced by pressure sealed lids.

(10) Tubing

Tubing made of rubber was available by the mid nineteenth century.

(11) Washers

Rubber washers have been in common use since the mid nineteenth century.

(12) Other rubber

This includes a wide variety of hard and soft rubber items, for example, bulbs, spring cushions, sponges, elastic, pipe stems and after 1900, auto tires.

(13) Unidentified

This includes any rubber items which cannot be identified to specific type.

X. Plastic

The first use of "plastics" was based on the discovery by Alexander Parks in about 1862 that nitrocellulose could be dissolved with camphor to produce a moldable resin. This material was known as celluloid and went into production in 1870. It was soon followed by resins made from shellac and bituminous compounds (Cook 1964:12-16). The Eastman-Kodak Company produced the first celluloid film in 1884 and began to market flexible, very flammable film using the name celluloid (Gait and Hancock 1970:7). The real Age of Plastics was ushered in in 1909 with the development of bakelite by Leo Baekeland, a Belgian chemist. Baekeland's resin was based on the chemical fusion of phenol and formaldehyde, which could be thermostit to produce hard, stable and durable items of many varieties (Cook 1964:20). Once introduced, plastics found many uses and were widely available on the American market. See Kaufman (1968) for a detailed explanation of the technology of plastics and synthetic fiber and rubber.

(1) Bead

Molded plastic beads occur in a wide variety of forms and colors. These usually show mold marks.

(2) Button

Plastic buttons rapidly replaced those made of natural materials during the second quarter of the twentieth century. Button forms however were similar to those previously described. The reader is referred to Category I (3).

(3) Closures

Plastics were probably not used for closures before 1925 when phenolic plastic closures became popular (Holscher 1965:35). After 1932 molded compounds were used for closures and could be made in white and light pastel colors (Holscher 1965:38).

Cap liners were used as early as 1930 and in 1935 screw caps of this material were introduced; these were first used on tooth paste tubes (Holscher 1965:38).

Fitment closures or soft plastic snap cap and stoppers were not introduced until after 1945 (Holscher 1965:35).

Other plastic closures refer to such devices as stoppers and plugs secured with snap devices.

(4) Toy

During the second quarter of the twentieth century toys molded of plastics became very popular. Toy soldiers, doll parts, cars and trucks are examples.

(5) Gaming piece

Plastic gaming pieces include counters, dice, chips and gaming pawns such as chessmen and checkers.

(6) Grooming

The principle examples of plastic grooming devices are combs and brushes. These were available in celluloid and other plastics by the turn of the century.

(7) Other plastic

This refers to a wide variety of devices made of a equally wide array of plastic materials. Electrical components were among the earliest twentieth century applications of plastic along with dentures, knife handles, billiard balls, ping pong balls, and eyeglass frames (Kaufman 1968:12).

(8) Unidentified

This refers to plastic pieces or parts which cannot be specifically identified.

XI. Mineral/Composite/Miscellaneous

Included in this category are items which are made of several materials or are parts of larger artifacts of mineral or biological composition.

(1) Asphalt

Asphalts are black to dark brown solid cementitious material that gradually liquifies with heat. The primary constituent of asphalt is bitumen, which occurs in nature but is now refined from petroleum. See Forbes (1958:102) for a discussion of the developing technology of the petroleum industry. Most asphalt is used for paving.

(2) Caulking

This is a semiliquid material which hardens after contact with air in order to form a seal. Tar or petroleum products used alone or impregnated into rope or twine was the common caulking product of the late nineteenth and early twentieth century. These were gradually replaced by latex and plastic products after World War II.

(3) Charcoal/Coal

This category includes carbonized wood or wood products as well as fragments of coal.

(4) Cinder

This is the fused impurities produced by the burning of coal. It is a light porous "rock" which is frequently used for paving or fill.

(5) Concrete

Concrete is a composite mixture composed of portland cement or finely crushed limestone, sand and gravel. It is mixed with water and laid in a viscous state but becomes hard as the water is bounded in chemical reaction. Portland cement, the main ingredient of concrete, was first produced in the United States in 1876 but output was not significant until the invention of the rotary kiln in 1899 (Reiman 1983:156).

(6) Cordage/Rope/Twine

This category includes twisted or braided cordage made from "bast" fibers which are the cellulose cells which support the stems of upright plants. Hemp, jute and cotton are examples. The principle types of cordage include ropes made of six or more threads formed into three or more strands. The threads or yarns are twisted together to form a strand and three or more strands are laid together to form a rope. Twine is made of one or more yarns twisted together. Hawser laid is made from three strands, each consisting of a number of yarns, twisted together to form a rope. Shroud laid is made of four strands, each consisting of a number of yarns, twisted into a rope. This type of rope is generally used to run over pulleys. Cable laid rope is three complete ropes laid together to form a rope of great elasticity, such as required for towing (Jenkins 1972:19-20).

(7) Eggshell

Eggshell is the thin calcium coating which surrounds the ova of avian and reptilian species. Nearly complete eggshells of nondomestic fowl can usually be identified as to species on the basis of color and shape.

(8) Fabric

Fabric includes all woven textiles. Emery (1966) provides a detailed description of primary fabric structures.

(9) Gemstones

This refers to precious and semiprecious stones which are cut or polished. Styles and methods of gem cutting are formalized and have changed over time. Shipley (1950) provides illustrations of both modern and older cuts.

(10) Graphite

Graphite is an opaque black to gray form of carbon which is characterized by a soft metallic luster. Its most familiar use is as pencil "lead".

(11) Hair

Hair includes both human and animal hair. Various animal species have very distinctive microscopic structure and keys are available which permit their identification.

(12) Limestone

Limestone is calcium carbonate which is widely used for building and in making mortar and cement.

(13) Linoleum

Linoleum is a durable floor covering made of oxidized linseed oil, rosin, kauri gum and pigments. The first linoleum was produced in England in 1864 and reached a peak in popularity in the late 1940s when its production declined in favor of vinyl floor covering (Nitz 1983:536).

(14) Mortar

This is used to bind individual masonry units. It is composed of one or more cementitious materials (cement or lime, sand and water). For a discussion of the physical properties of mortar see Olin, Schmidt, and Lewis (1975:205-23).

(15) Paint

Paint is a liquid material applied to a surface to form a hard continuous film. Until the end of the nineteenth century most paints had an oil base and used colored earths as pigment. A commonly used water based paint of the nineteenth century was white wash, formed by mixing burned lime with water and milk curds. In the 1920s casein paints became popular but were soon replaced by alkyd resin paint and water based paints which were emulsions of synthetic resins (Radcliffe 1983:107)

(16) Paper

Paper is made of a matted sheet of fibers, usually vegetable, formed on a screen from a water suspension. Until the mid nineteenth century most paper was made from beaten cloth. The invention of a machine for grinding wood into fibers in the mid nineteenth century led to the rapid expansion of the paper industry and the wide use of paper products (Parsons 1983:261).

(17) Plaster

Plaster is composed of powdered calcined gypsum, an aggregate, mineral or organic fibers, and/or lime (Olin, Schmidt, and Lewis 1975:218-3).

(18) Shingles

This refers to small pieces of water repellent materials which are applied in an overlapping fashion (Olin, Schmidt, and Lewis 1975:411). The principle types include hand split shakes, wood shingles, asphalt shingles and asbestos-cement shingles. Each type occurs in a variety of named forms.

(19) Slag

Slag refers to the solidified impurities which are the by products of the manufacturer of a wide range of products requiring the production of molten ingredients. The most common examples are iron and glass slag.

(20) Tar paper

Tar paper is a roofing product made by saturating absorbent felt with oil rich products such as asphalt or coal tar to form a water repellent sheathing material.

(21) Wax

Wax is produced from plant and animal as well as synthetic sources. Generally waxes have a slippery or tacky, opaque and water repellent surface. The most common waxes are beeswax and paraffin, a distillate of petroleum.

(22) Other

This includes all other mineral or composite materials.

XII. Prehistoric(1) Lithic

This refers to any artifact of Indian manufacture made from igneous sedimentary or metamorphosed rock.

Chipped stone artifacts are divided into the classes modified, which represent useful tools and debitage, which is the unused chippage resulting from lithic reduction.

Ground stone refers to artifacts made by pecking and grinding. Axes, adzes, banner stones and gorgets are examples.

Fire cracked rock includes rock which exhibit angular fractures due to exposure to fire.

(2) Ceramic

Ceramic is a fired clay product of Indian manufacture.

Decorated ceramics are those which show decoration by application of cords, the use of instruments for incising or engraving or a carved paddle. Decoration should not be confused with surface treatments such as burnishing or cord wrapped paddle application.

Ceramics showing only surface treatment should be coded as undecorated.

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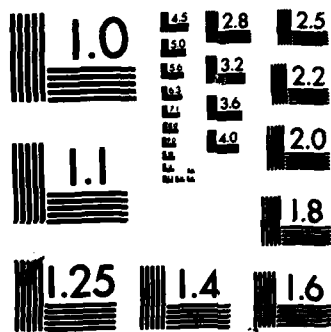
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