

PUEBLO ARTS AND INDUSTRIES.—III.
BY COSMOS MINDELEFF.

Although blanket and textile weaving is the art product which has made the Pueblo Indians most widely known, the allied or antecedent arts of basketry and pottery have equally developed. The conditions under which these people live are so simple and their methods are so primitive that the connection between the three industries is still apparent, even to the casual investigator. The elaborate blankets are a development from the simple baskets, and the fine pottery, easily the best made by any tribe in the United States, are little more than baskets of clay.

Of all the Pueblo tribes, the Mokis, or Hopi tribe, in Western Arizona, excel in making baskets. They have them of all kinds, varieties, and sizes, from the roughly made panniers of twigs designed to carry heavy loads upon the back to the fine plaquesso closely woven that they will hold water, and ranging through all degrees of ornament. The introduction of beasts of burden, horses and burros, occurred at a much later date in Moki than on the Rio Grande, and even at the present day much of the carrying is done on the backs of men. As the villages are located on the tops of the mesas, 500 or 600 feet above the valleys where the cultivated fields lie, all the products, as well as wood and water, must be carried up to them. Constant practice has made the people perfect in the carrying of loads, and long strings of women can be seen any morning winding their way up the devious and difficult trails to the mesa summit, each loaded with a water jar filled from the wells below; while at the harvest season it is not unusual to see an old man loaded with two dozen or more watermelons in a huge pannier on his back, slowly toiling up the trail. One would think that such work would produce great muscular development, but it does not. The average Indian has no apparent chest muscles, and many a man climbs the trails to the villages loaded with over 200 pounds of field produce, and does it without distress, notwithstanding that he has no visible calves to his legs. A white man would break down at once under such work, but the natives are apparently inured to it.

Food products of all kinds are stored in the houses in baskets, most of which are bowl-like or tray-like in form, like the examples shown in the illustration. These are usually made of the split leaves of the yucca, which are flexible but very tough, and in use last for many years. In making the basket the work is commenced in the center, as in the example shown on the left of the woman in the illustration, and the ends of the split leaves are turned over to form the finished edge, as in the finished specimen shown on the right. The pleats form a design like that seen in the picture. They are the everyday working baskets of the people and are seldom ornamented in any other way.

Notwithstanding the pre-eminence of the Pueblo

tribes as makers of pottery, they do not use nor have they any knowledge of the potter's wheel. The largest specimens are formed like the baskets by coiling upon itself a fillet or rope-like piece of clay, pressing the coils together, and finally smoothing the sur-

print of the basket in which the jars were moulded can still be seen upon the bottom.

Ordinarily no such marks are to be found. As the coils of clay are laid on they are pinched together with the finger and thumb, and the surfaces, interior and exterior, are rubbed smooth. Wonderful uniformity of thickness, seldom exceeding an eighth of an inch even in a large piece, is obtained in this very primitive way. In one type of jar, common in antique specimens but still made to-day, the exterior surface is not smoothed, but shows all the thumb marks. Sometimes these are arranged so as to form geometrical designs, but usually all such marks are carefully obliterated and the surface is smoothly polished with a hard pebble. An elaborate design, usually geometrical in character, and closely similar to those on the baskets, is painted on the smooth surface, commonly in black, sometimes in black and red, rarely in complex patterns in other colors. The pots are burnt in the open air, a good day being selected, and careful attention is given to them until the operation is completed.



PUEBLO POTTERY MAKING.

face and polishing it with a small pebble. The illustration shows the regular water jar in various stages of manufacture.

There is an abundance of fine clay throughout the Pueblo country, and practically every village makes its own pottery. The work is usually done by the old women, who break up and work the clay, mixing with it a small percentage of fine sand and a proportion of pulverized potsherds, obtained preferably from some ruin in the vicinity, where bushels of pottery fragments can be picked up. When the clay has been put in good condition, it is rolled out into fillets and coiled upon itself like a rope. The base or commencement of the coil is placed in one of the flat baskets before

Very few pots are lost in burning.

What the ancient practice was in burning pottery has not yet been determined. At the present day compacted sheep dung is the material used, and this is taken from the corrals where the sheep are placed every night. In course of time a well compacted layer of the material is formed in the corrals. This is taken out, dried, and stored for future use. When the vessels are ready to burn, they are stacked up in some place, away from the village, well sheltered from the wind, and the dung is placed below and around them. It burns slowly, with a steady heat, and the fire is carefully attended by the old women, who spread blankets and screens on the windward side, until the operation is completed.

In the Indian system of belief, animate spirits inhabit inanimate objects, and, in the manufacture of such objects, the idiosyncrasies of the spirits must be considered. Thus, in burning pottery, certain things must be done, or the process will result in failure. Practically, every jar or bowl which is decorated has a line about its neck or mouth. But this line must never be complete; it must be broken somewhere to permit the egress of the spirit of the pot. If this is not done, the spirit, in struggling to escape during the burning, will rend the piece to fragments. Similarly, in the coiled baskets, the end of the coil must be left unfinished, or serious trouble will result.

When a pot is no longer wanted for use, as, for example, when it is placed upon a grave, it is "killed" by punching a hole in the bottom. The variety and detail of this belief is



HOPi BASKET MAKER.

described, and the pot remains in this basket until it is dry enough to handle. In some antique specimens of pottery obtained from ruins which were inhabited at the time of Coronado's expedition, and which are the finest specimens of aboriginal pottery so far found, the

almost infinite, and can only be alluded to here.

In Brussels, Belgium, the payment of a special fee of 3 cents secures immediate delivery of a letter, postal, or parcel by a bicycle postman.—Umland's Wochenschrift.

Gold Beating.

BY O. G. HOLT.

Imagine a $\frac{5}{8}$ inch cube of pure gold that could rest on one's thumb nail being hammered and expanded until it would cover the floor of a room 12 feet square, or an area of 144 square feet—or a mite of the precious metal of the size of a pin's head being flattened and extended to 25 square inches—and some idea may be gained of the wonderful ductility of this most beautiful and costly of all the metals. Few, perhaps none, of the arts have come down to us from mediæval periods with so little change as that of gold beating. Three thousand years ago it was practiced in all essentials as it is to-day, for the coffins of Egyptian mummies are ornamented with gold leaf as thin and fragile as that of modern days. Machinery has never been able to successfully supplant the time-honored process of hand work.

It is supposed by some that an alloy of the baser metals is essential to a great reduction of gold, but this is not so. On the contrary, alloys tend to lessen its malleability. Hence, as gold leaf is sold by superficial measurement rather than by weight, there would be little or no advantage in using an alloy simply on the score of economy; but it imparts to the metal greater rigidity and lessens the liability to adhesion to the leaves of parchment or paper between which it is beaten. The alloy is also essential in giving a desired color. Taking 1,000 as the standard of purity, the gold used in the beater's art is from 960 to 985, or about $22\frac{1}{2}$ carats, 24 carats being taken as the standard of purity.

The alloys used are silver and copper, in varying proportions, according to the color desired: for red gold, copper is freely used as an alloy; for pale yellow, a small quantity of silver, etc. The workman having decided on the color desired, places the gold with its alloy, together with a small quantity of borax and sometimes corrosive sublimate, in a small crucible and fuses the mass, subjecting it to greater heat than is necessary to merely melt it, in order to increase its tenacity. When sufficiently heated it is poured into a small cast iron mould coated with what is technically termed "brime," being usually burnt talc, which prevents the gold from adhering to the mould when removed. This ingot is usually 1 inch wide, 5 inches long, and $\frac{1}{8}$ of an inch in thickness and weighs about 50 pennyweights, or $2\frac{1}{2}$ oz. Troy. In some establishments in this country the ingots weigh 55 pennyweights. The ingot is next annealed by being hammered on an anvil and then placed in a coal fire and brought to a red heat and allowed to cool, after which the laminating process follows, which consists in passing the gold through steel rollers several times, the rolls being gradually brought closer together to reduce the thickness of the metal until the little ingot is transformed into a ribbon from 7 to 8 yards in length, the width remaining 1 inch, as at first. The workman then, with his shears, cuts the ribbon into little sections 1 inch square.

These pieces are next placed between small sheets of very tough paper, manufactured chiefly in France and Germany. These sheets or leaves are $3\frac{1}{2}$ inches square and from 180 to 200 in number. The package is known to the trade as a "kutch." The small pieces of gold are placed exactly in the center of the paper, so that the edges form a vertical line. This is essential to a uniform expansion of the metal in the process of beating. Next, a "band" or case of tough parchment, open on two sides, is drawn over the packet and another case over this, covering the two edges left exposed. An anvil of marble or granite, 9 inches square, with its base resting on a foundation, sunk 2 feet in the ground to secure firmness, is employed in the beating process. The face of this anvil is surrounded by a hard wood table with raised edges on three sides, while in front, next to the workman, is a leather apron with an expanded pocket for catching waste particles of gold. The hammer used has a circular and slightly convex face, 4 inches in diameter, and in the first or "kutch" process its weight is 18 pounds. The blows, which fall with absolute regularity, are first directed to the center of the packet and then with lessened force toward the edges, until, on removing the bands, the little films of gold are found to have reached the edges of the "kutch," when the beating is discontinued. This process occupies about one-half an hour. The next operation is called "skewing," that is, the gold leaf is removed from between the leaves of the "kutch" by means of delicate wood pincers, wood being used because gold in this reduced state would adhere to metal. Each gold leaf is next divided into four equal parts, being cut by a tiny cane or bamboo appliance, having sharpened edges, called a "wagon." These subdivided pieces of gold are next placed between the leaves of a "shoder," similar in construction to the "kutch," except that the leaves composing it are vellum instead of paper; it is also somewhat larger, being 4 inches square and $\frac{3}{4}$ of an inch thick. It will be noted that now the original leaves of gold, say 180 in number, have been increased by cutting to four times that number, or 720.

The filling of a "shoder" requires one hour. Then the

beating is continued with a hammer of lighter weight, usually about 12 pounds, for two hours. The sheets of paper and vellum, between which the gold is placed, are invariably coated evenly with the finest talc, or some similar material, to prevent the adhesion of the metal. During the beating process the workman changes the hammer from one hand to the other, and shifts the packet, but never varies the regularity and precision of the stroke. He also frequently "riffles" the leaf during the process, that is, he removes the bands or cases and bends and manipulates the package to prevent the gold from sticking to the sheets with which they are in contact. When the gold in this operation has been expanded to the edges of the "shoder" it is again subdivided, each leaf being cut into four parts, being now sixteen times thinner than it was in the first process; in other words, instead of the original 180 leaves of gold, there are now 2,880, but trimming and imperfect leaves reduces the final output of the "beating" to 2,000. These reduced pieces are placed between the leaves of moulds similar to the "kutch" and "shoder," except that the sheets are made of a skin of great tenacity, fine texture, and perfectly smooth surface. These skins are made from the large intestine of the ox: They are stripped off in lengths of 2 or 3 feet and treated to an alkali solution to free from grease, then thoroughly cleaned, and doubled by placing the two mucous surfaces together, which causes them to unite, after which they are treated to various chemical applications to increase the toughness and the better adapt to the purpose intended. This is the most expensive part of the gold beater's art, as no less than 350 to 500 oxen must be slaughtered in order to obtain enough skins for one mould. A mould can only be used for about 200 beatings, after which the skins are used for the "shoder," which does not require a membrane of such perfect texture. These moulds are more expensive than the gold they contain, each mould costing not less than \$45. The contents of one "shoder," when divided as indicated, will fill three moulds.

The gold leaf having been placed in the center of the mould, as in the former operations, it is beaten for four hours with a 7-pound hammer; also during this process it is frequently annealed without removing it from the mould. When the final beating is completed, the gold is reduced to about $\frac{1}{1000}$ of an inch in thickness, or at least 1,000 times thinner than ordinary printed paper—truly a marvelous result. The above is about the standard thickness of gold leaf employed for decorative purposes; for dentistry it is much thicker and without alloy.

Following the final beating of the gold is another operation called "booking," done by girls, as their fingers are supposed to be more deft and delicate than those of boys. In some establishments the leaf for "booking" is sent to the homes of the girls, where the work is done, but this is not general. The finished leaf is taken with the slender wood pliers and placed between leaves of tissue paper coated with red chalk applied by a soft brush; the chalk prevents adhesion. Gold leaves to the number 25 constitute what is technically called a "book," and 20 books make a "package"—that is, 500 leaves. The standard weight of a book is exactly $5\frac{1}{2}$ grains of gold. Thus the original ingot weighing say 50 pennyweights ($2\frac{1}{2}$ oz. Troy) has been manipulated for thirty hours, or three working days, and the final product is 80 books of 25 leaves each, with a rebate to the workman of the leaf trimmings, more or less, according to his expertness, for which "scrap" or trimmings he receives credit at the rate of \$1 per pennyweight if in excess of a specified amount, and with a debit in a like sum if there is a shortage. The standard for a "beating" is 80 books. The most skilled workman rarely produces more than 160 books (two beatings) per week.

As gold leaf is not sold by weight, it is to the interest of both employer and employé to carry the expansion of the gold to the greatest limit, and now and then a workman becomes quite proficient in this direction; but the compensation at best is small, \$3.20 per beating being the present standard of wages in the United States. This would only yield the best workmen \$6.40 per week, which, of course, would be supplemented by the credit for scrap returned; but \$15 per week is understood to be about the maximum compensation, while many workmen less proficient eke out scarcely more than \$1.50 per day.

The business in the United States is confined chiefly to New York and Philadelphia, there being some 20 or 25 establishments in the two cities, employing some 200 workmen. While London, Paris, and Florence are important centers of the industry, Germany is the chief competitor. The most relentless foe to the gold beater's product is a cheap and spurious substitute known as "Dutch metal," which is imported in great quantities, which, however, contains no gold, being composed chiefly of copper subjected to a treatment which gives it great brilliancy and a resemblance to genuine gold leaf; this inferior metal is used for stamping books, gilding picture frames, wall paper, interior house decoration and many other purposes for which genuine gold leaf was formerly employed, and the only apology for its use is its cheap price. The retail price of Dutch

metal in the United States is about \$1.25 per package (20 books of 500 leaves), while that of genuine gold leaf is \$7 for the same quantity.

It would seem in a country like this, where the product of gold mines has reached such enormous proportions, the business of converting it into articles of staple commercial value would take foremost rank; but such is not the case, because we have not yet practically solved the problem of cheap labor.

The art of gold beating requires years of apprenticeship; it also requires intelligence, skill, and deftness in the use and care of tools. The tools must be free from moisture and of uniform temperature to insure success in the varied manipulations of the precious metal with which they come in contact. It is hoped the day is not distant when the gold beater's profession will receive the recognition it seems to so justly merit.

Spain's Loss of Empire.

On his accession to the Spanish throne in 1556, Philip II. found himself ruler of the greatest empire the world had seen since Rome was at the zenith of its power. Its navies were famous for their greatness and they ruled the ocean, its armies were famous for their prowess, she swayed the destinies of Europe, had possessions in all the continents, and may be said to have owned the Americas, North and South. Samuel Johnson, writing as recently as 1740, when complaining of the poor people's hardships, said:

Are there no regions yet unclaimed by Spain?
Quick, let us rise, those happy lands explore,
And bear oppressions' insolence no more.

The Spanish empire was the result of marriages, conquest, and discoveries; its decline and fall may be ascribed to the ruthless character of the Spanish people. When Columbus discovered San Domingo, it had a population of 2,000,000; in 1530 this population had dwindled to 350,000. Cortez in Mexico and Pizarro in Peru were ideal Spanish conquerors.

In the latter part of Philip's reign [he died in 1598] Spain lost all, or nearly all, of her dependencies in north Africa, and early in the next reign, Burgundy, Naples, Sicily, and then Milan. In 1609 the Netherlands were lost; in 1628, Malacca, Ceylon, Java, and other islands; in 1640, Portugal; in 1648 all claims were renounced to Holland, Brabant and parts of Flanders; in 1649 were lost Maestricht, Hertogenbosch, Breda, Bergen-op-Zoom, and many other fortresses in the Low Countries, in which year the crown tacitly surrendered supremacy on the seas to northern Europe; in 1659 Rousillon and Cardague were ceded to France, making the Pyrenees the boundary between the two countries; in 1668 to 1672, the last of Flanders was given up; in 1704, Gibraltar was lost; in 1791, the Nootka Sound settlements; in 1794, San Domingo; in 1800, Louisiana; in 1802, Trinidad; in 1819, Florida; from 1810-21 were lost, Mexico, Venezuela, Colombia, Ecuador, Peru, Bolivia, Chile, Argentina, Banda-Oriental, Paraguay, Patagonia, Guatemala, Honduras, Nicaragua, San Salvador, Haiti, and numerous islands pertaining to the American continent, all the possessions in the Western Hemisphere, in fact, save Porto Rico and Cuba, which already apparently are as good as lost. The future of Spanish Morocco, and of the Philippine, Caroline, Sulu, Ladron and Canary groups has yet to be settled.—Memphis Commercial.

The Launch of Our First Torpedo Boat Destroyer.

The torpedo boat destroyer "Farragut" was launched at the yards of the Union Iron Works, San Francisco, on July 16. This is our first vessel of the type, which is considered so valuable by foreign navies and which proved so worthless to the Spaniards. The "Farragut" was authorized by the act of 1896, and it is built on the lines of the British torpedo destroyer "Desperate," but, in building the vessel in America, the British boat has been enlarged and improved upon. The vessel is 210 feet long; beam, 20 feet; draught, 6 feet 3 inches. The displacement of the "Farragut" is 273 tons, and, like the "Desperate," it is classed as a 30-knotter. The coal capacity of the "Farragut" is about 80 tons. She is built of the best nickel steel, and is unarmored. She has a battery of 6-pounders. The contract price of the "Farragut" was \$227,500. Great Britain has six vessels almost like the "Desperate." The engines of the "Farragut" are of the vertical expansion type, operating twin screws.

Rearming of the "St. Louis."

The converted auxiliary cruiser "St. Louis" is now furnished with four 5-inch guns. These are installed one amidships forward, one amidships aft, and one on each side. The forward and aft guns are stationed so that their range of fire will extend through an arc of 270 degrees each. By this arrangement the "St. Louis" now has as formidable a broadside fire as the "St. Paul," "Yale," or "Harvard," each of which has six 5-inch guns distributed along its sides. In addition to her 5-inch guns, the "St. Louis" still retains her secondary battery of eight 6-pounders.