

AMERICAN INDUSTRIES.—No. 41.

THE BRASS MANUFACTURE.

This department of metal working has, for several years past, been showing a steady and most wonderful growth, as a consequence principally of improvements made in machinery. The great ductility and malleability of brass—the ease with which it can be rolled, drawn, and hammered when cold—render it possible to use with great advantage, in working it, all kinds of modern punching and draw presses, and it is now employed in the making of an almost endless variety of articles in which its use was formerly unknown, or so small as to be quite insignificant.

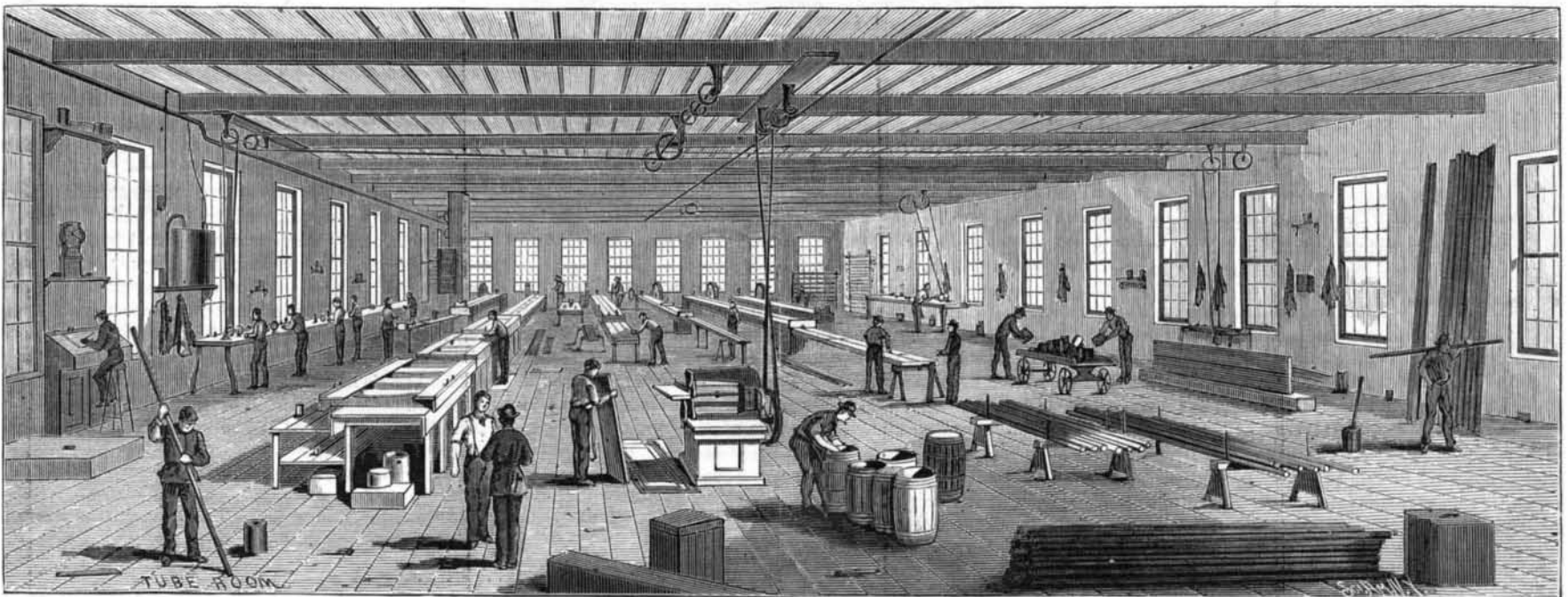
Ordinary commercial brass, as now generally made, consists of two parts by weight of copper and one of zinc, though the proportions vary according to the quality of the brass. Zinc is a good deal the cheaper of the two elements, but it melts more readily, and burns off to some extent in the fusion. Copper melts at 2,200° Fah., and zinc at 770° Fah. The best quality of brass is that known as “low brass,” which has a greater proportion of copper than the “high brass,” which is the cheaper grade. “Low brass” now sells at four cents a pound more than high brass. With still less copper, and proportionately cheaper, we have “yellow metal” for bottoming vessels, etc. The composition of the latter varies as much as does that of brass, the proportions being from thirty-seven parts zinc to sixty-three parts of copper to equal parts of each. What is known as “German silver” is made by melting nickel, one-sixth to one-third in amount by weight, with brass. A small percentage of lead is sometimes used in brass, diminishing its ductility and increasing its hardness, one to two per cent, rendering the brass capable of being readily worked on the lathe, or filed, without clogging the teeth of the file. A tough brass for engine work is composed of twenty parts

The copper used is principally from the Lake Superior ore. The company have a high reputation for the excellent quality of their metals, as their long experience in the business has enabled them to overcome many difficulties which formerly existed in making just the desired combinations. They have some workmen in this branch of the business who have been in their employ upward of a third of a century.

The large illustration across the top of the page shows the department where both the slabs for sheet brass and the flat bars for wire are rolled. The first operation here is to trim off the edge left rough from the mouth of the mould, and for this purpose immense shears are used, the working arm of one pair of which will weigh as much as a ton; this is worked with a powerful leverage, so that the thick bars and slabs of brass are trimmed off as easily therewith as a paper doll would be cut out with ordinary scissors. The huge rollers, arranged in gangs, are of different sizes, sixteen pairs being in operation. They work in iron frames of the greatest solidity, the motion being given by a loose or flexible joint, to admit of the upper roller being set at varying heights for the different thicknesses to which the brass is to be rolled. In some of the rolling one hundred and fifty horse-power is at times required to drive a single pair of rollers, and, strongly as they are built, they sometimes break under the great pressure they have to bear. Little streams of water are constantly pouring over them when in operation, and the first “squeeze” which the slab or bar of cast brass receives reduces its thickness by about a sixteenth of an inch, or rather more than is effected by each successive rolling thereafter. This operation, the metal being successively passed through the rollers, is continued, for sheet brass, until the plates are reduced sufficiently thin for any purpose desired, but the bars intended for wire are only

from each other by almost imperceptible gradations, and they are tapering or slightly conical in form. The end of the rod of metal, having been put through one of these holes, is seized by pincers operated by machinery, and pulled through far enough to be made fast to an iron cylinder or upright roller, turned by power from the main shafting. The wire is in this way drawn through a series of smaller and smaller holes until it is reduced to the required degree of fineness, the wire being coiled up on the roller as it is drawn out. What is known as the “old English gauge” is the one by which wire is generally sold, while sheet metal is usually graded according to the “American” scale. In the latter the sizes run smaller in most of the numbers than in the former. The sizes of the “American” scale are graded on a uniform variation from No. 0000, which is 0.46 of an inch in diameter, to No. 40, which is 0.003444 of an inch thick. Other sizes than these are made to order when required.

The large view on this page, showing where tin, brass, and copper tubing is made, illustrates an important branch of the business done at Waterbury. Seamless tubes are now being much more generally used than they formerly were, and their greater strength and durability are obvious. In the other kinds of tubes the sheet metal is cut into strips of the required width and passed through formers, which fold the metal over so the edges are just ready to make a joint, and then a seam is brazed. For the seamless tubing the metal is cast in the form of a cylinder, about five feet long, with a core, so as to leave an inside diameter of about four inches. These hollow cylinders are then put through one drawing machine after another till they are drawn down to the required size, a steel arbor forming the inside of the tube as the draw plate shapes and finishes the outside. For beaded and ornamented tubing, round, square, octagon, etc.,



BENEDICT & BURNHAM MANUFACTURING COMPANY.—BRASS MANUFACTURE.

of copper to three of zinc and three of tin, while for heavy bearings a brass is made of thirty-two parts of copper to one of zinc and five of tin. “Pinchbeck” has generally about four parts of copper to one of zinc, and a white metal largely used for cheap table furniture, etc., has ten parts of copper to eighty of zinc and ten of tin.

In our illustrations to-day we show the principal operations of the brass manufacture, as conducted in one of the oldest establishments of this kind in the country, and one of the largest in the world, that of the Benedict & Burnham Manufacturing Company, at Waterbury, Conn.

The “casting” is the first operation, as illustrated in the middle of the first page at the right hand side, where an interior view of the foundry is given. The foundry building is 50 by 100 feet in size, and across the middle, from side to side, runs a bank of small, low furnaces, twenty-one on each side, giving facilities for the melting of forty-two crucibles of metal at a time. The casting done here consists almost exclusively in the making of small slabs for rolling into sheet brass, flat bars for rolling and then drawing into wire, and hollow cylinders from which seamless tubing is made. Comparatively few articles are now cast in brass, as the metal can otherwise be worked with such facility that the old methods of manufacture are mostly done away with. The crucibles are of a size to hold from one hundred to one hundred and thirty pounds of metal each; in these are placed the desired proportions of copper and zinc, by weight, or of old metal or scrap, great care being taken to maintain the exact relative proportions of each, which requires close attention, as the zinc burns off rapidly at the heat required to melt the copper. The crucibles, when charged, are covered with charcoal and set in the furnaces, which are fitted with sliding plates to close the top, each furnace having an aperture at the back communicating with a tall stack, which carries off the volatile results of combustion and fumes of zinc. When the metal has been properly fused it is poured direct from these crucibles into the moulds, which are of iron, held together by clamps.

rolled down to about half an inch thickness, the size from that point being diminished by the drawing.

The “annealing,” as shown in the view on the left in the middle of the page, is conducted in six large ovens heated by wood. The fires are on each side of a space about five by eighteen feet, where the bars and slabs of metal are laid, after each successive rolling, until heated to a red heat, and thence drawn out to cool slowly in the air. The metal, by the compression of the rolling or drawing, becomes comparatively hard and brittle, but the annealing restores its former softness and pliability. Chestnut wood is used for heating the annealing ovens, some four thousand cords a year being consumed in this way. After each process of annealing the metal is subjected to a bath of dilute sulphuric acid, the acidity to the tongue being about equal to that of lemon juice, which removes the tarnish given by the heating.

The “overhauling” or scraping, as shown in the view in the middle of the page, is something of an “inspecting” operation for all roll and sheet brass. This is done only before the final rolling, and is intended to remove all spots or imperfections, so that the brass, as it comes from the rollers the last time, will be as nearly perfect as possible. A great portion of this work is done by hand, but our representation shows some machines for this purpose, in which small scrapers are guided by the hand of the operator to scratch over and clean the surface of the metal where necessary.

Wire drawing is shown in the large view at the bottom of the page. The bars, having been rolled until they are about six inches wide by eighteen or twenty feet long, and something less than half an inch thick, are passed between rollers with interlocking sharp edged ridges and grooves, by which the metal is cut into rough square rods. One end of each rod is then made slightly smaller, so that it may be put through a hole of the size to which the whole rod is to be drawn down. The draw plate is a thick plate of the finest steel, perforated with holes of the various sizes from that of the largest to the smallest wire required. The holes differ

the metal is passed through draws of the required shape, and in which the pattern is cut in wheels to act as dies. A great many boiler tubes are drawn at this establishment, but the work includes every variety known to the trade, from tubes having a 4½ inch inside diameter down to those of small wire with an inside aperture which the finest thread would fill.

The principal productions of the Benedict & Burnham Company are sheet and roll metal, and brass, copper, and German silver wire and tubing, but they make beyond this a great variety of other work. A large department is devoted to the manufacture of kerosene lamp fixtures, and here nearly all the work is done by punching and drawing presses. In this line of goods they export large quantities to every part of the globe. The establishment has, at different times, executed many large orders for the government. They regularly turn out rivets and burrs, chains, butts and hinges, drop handles and knobs, escutcheons and ornaments, etc., and have, since January 1, been making about 500 watches a day. This is a comparatively new branch of business with them, but their watch is made to sell at a very low price, and has met with so large a demand that they are now constructing additional machinery to enable them to greatly increase their production.

The State of Connecticut has been for many years “head-quarters” in the brass manufacture, and the Benedict & Burnham Manufacturing Company dates from the very commencement of the business. The house was established in 1812 by Aaron Benedict, father of Mr. Charles Benedict, the present head of the company. In 1824 Mr. Benedict introduced the first machines ever used in this country for rolling brass; they were imported from England, the rollers being 11 inches in diameter by 30 inches long, and elicited no little comment at the time. With the aid of this machinery they were able at once to commence supplying all brass workers with sheet brass, and their business grew rapidly. In 1835 they began rolling German silver, to be manufactured into spoons, forks, etc., and from

that time to this their field of operations has been steadily enlarged. They now employ over 600 hands, and their buildings cover about six acres of ground. They have one 400 horse power engine, and two water wheels; for one of the latter they obtain the water from the Mad river, and for the other from the Naugatuck, their works being beautifully situated along the left bank of the latter, just below the entrance of the Mad. The present company was incorporated in 1843; but even the extensive business which it conducts hardly tells the full story of its success, for the company or its members have at different times started several other manufacturing industries, which are properly only offshoots, as it were, of the parent business, but which have now grown to be of large dimensions.

The company have stores at 78 Reade street, New York; 57 Oliver street, Boston, and 17 North Seventh street, Philadelphia. Mr. Charles Benedict is President and Treasurer of the company, and Mr. Charles Dickinson, Secretary.

A NOVEL SHADING PEN.

The annexed engraving represents a new instrument for plain and ornamental lettering, and is adapted to the use of bookkeepers, artists, markers, clerks, and penmen generally. The manipulation of the pen being purely mechanical and automatic, any person writing an ordinary hand can use it successfully and with satisfactory results. Its use familiarizes the eye with uniform design, so that the regular hand writing is rapidly improved. Shaded letters may be produced as readily as the plainest, and of such quality as to compare favorably with steel engraving or lithographic work. Several widths of this pen are made—one eighth, three sixteenths, and one fourth—each of which will make any width of line, from that of a hair line to the full width of the pen. They are made entirely plain throughout their entire width, or arranged to shade one side of the line produced according to the taste of the writer.

These pens are inexpensive and must prove very useful in nearly every branch of business. Bookkeepers, with slight practice, can make ledger headings so uniform and artistic in appearance as to be quite beyond the comprehension of persons unfamiliar with the simple manner of their production. Any kind of ink may be used. The inventor informs us that more than seventy distinct and brilliant shades of color may be produced with the several colored inks adapted to this pen and in common use. The construction of the pen will be understood from the engravings, the larger view showing the pen in actual use, the smaller views showing the different sizes of pen.

Further particulars in regard to this useful invention may be obtained by addressing the patentee, Mr. J. W. Stoakes, Milan, Erie County, Ohio.

NEW WALL TENT AND STOVE.

A stove is often a necessity and always a desirable comfort in camp; for even in mid-summer there are chilly mornings and evenings and rainy days, when the comfort of a little heat in the tent is greatly to be desired. All who have had experience in camping know that the proverbially unmanageable stovepipe is most unmanageable in a tent. After ripping a hole in the tent, and getting the stovepipe in place, it is no uncommon experience to replace it again and again, after the wind has detached it from the stove and caused it to tumble; and should the pipe be permanently attached to the stove, the matter is made even worse, as not only the pipe but the stove also must sooner or later come down. These difficulties are not by any means all that can be brought as objections to the ordinary camp stove and its accessories. It is a cumbersome addition to the equipage, and takes up a great deal of valuable room in a tent where there is very little room to spare.

The Hobbs tent frame and stove overcome the difficulties enumerated, and afford a compact, light, and efficient cooking and heating apparatus, well adapted to the wants of military men, sportsmen, surveyors, and engineers, for camp meetings, pleasure camps, and for all who dwell in tents during a portion of the year. It is particularly well fitted for cooking, and its application to kitchen tents will not be among the least valuable of its uses.

The invention consists in substituting for the ordinary tent poles a frame composed of a ridge and hollow upright of galvanized sheet iron, and a wooden pole of the ordinary form.

The hollow upright, forming the stovepipe as well as one of the supports of the tent, is of a special patented

construction, securing great strength and rigidity, and at the same time being very light. It sets in from the end of the tent a sufficient distance to prevent injuring the canvas by heating, and its upper end is provided with a chimney cap or cowl, which projects over the canvas. Near the lower extremity of the hollow upright a stove is attached in such a way that it accompanies the tent in all its swaying motions. The stove is supported by the upright and a single hinged leg, and is readily and easily placed and as readily detached and put aside when not in use.

Referring to the engraving, A is the stove which is

subjected to acid bath, for cleaning, and then buffed to render the surface smooth and bright. It is then boiled in a tin or other metallic solution. The solution will deposit evenly over the entire surface, and the polished portions will be left brilliant, thereby forming a fine contrast with the unpolished surface and giving a fine polish and effect. The polishing previous to the electroplating, and the buffing subsequent thereto, are essential steps in the process, and by the boiling in a metallic solution the desired color and a bright clean finish are obtained without further labor.

An improvement in the class of automatic car couplings

in which a bar is employed as the connecting device in place of the link, and is made to engage with spring jaws or catches located within the draw heads, such jaws or catches being operated by levers and connecting rods for the purpose of withdrawing them from engagement with the bar when it is desired to uncouple, has been patented by Mr. James H. Henley, of Leadville, Col.

A simple, convenient, and effective device for stretching wires along posts in the making wire fences, has been patented by Mr. Joshua Fowle, of Iowa City, Iowa. The invention consists of a clamp provided with devices for adjusting and holding it upon a post, and provided also with crank and crank-shaft for stretching and tightening the wire.

An improvement in the class of invalid beds having adaptation and attachments for elevation of the head and shoulder portion, and for introduction of a bed pan beneath a removable section of the mattress, has been patented by Mr. Chambers M. Campbell, of Nashville, O.

An improvement in the class of ironing machines in which the clothes or goods to be pressed are carried between heated rollers or plates by means of endless traveling aprons, has been patented by Mr. Morris Steinbock, of New York city.

A simple, durable, and easily actuated alarm attachment for doors has been patented by Mr. Charles F. West, of Philadelphia, Pa. The invention consists of a peculiar arrangement of lever, striker, and trigger that render the alarm especially durable and of easy operation.

A safety appliance for releasing horses has been patented by Mr. Benjamin F. Strange, of Corvallis, Montana Ter. This invention consists in a hitching appliance so connected with the horse's halter that the halter will be cut if the animal should become entangled in it.

Mr. Mortimer Shea, of Nashville, Tenn., has patented an improved device for attachment to gas meters, to guard against any adjustment of the meter that will cause gas to pass through without being registered, and to indicate to the inspector if there has been any attempt to tamper with the meter.

An improvement in window sashes, patented by Mr. Alphonse Friedrich, of Brooklyn, N. Y., relates to lead sashes, such as are used in illuminated or ornamental windows. As heretofore constructed such windows have been strengthened by iron rods placed at intervals diagonally across the lead frames, and secured thereto by small wires twisted around the bars and soldered to the lead cross strips. Such bars are unsightly. They disfigure the designs, and in large windows the lead sash between the bars is not protected. The object of this invention is to strengthen the lead sashes where required by metal wires, which will be soldered to and hid by the sash.

An improvement in cannon has been patented by Messrs. Patrick P. Brannon and Thomas B. Bunting, of New York city. The invention relates to improvements in breech-loading cannon, and particularly to the construction of the breech, the breech block or wedge, and the manner of loading and firing the gun.

A simple device for stretching carpet's on the floor, patented by Mr. John B. Eddy, of Stevens Point, Wis., consists of a T-head, with claws for taking hold of the carpet, attached to a ratchet bar spliced to another bar carrying a lever, with which the first bar is moved out from the other, and a pawl or dog which engages the ratchet and retains the bar in the position into which it is moved by the lever.

A wash bench susceptible of being raised in height and of being compactly folded has been patented by Mr. Abram Severson, of Auburn, N. Y. It consists of a tripod, two of the legs

whereof are fixed to the head and provided with casters, while the third is pivoted in the head and can be folded around near the other two.

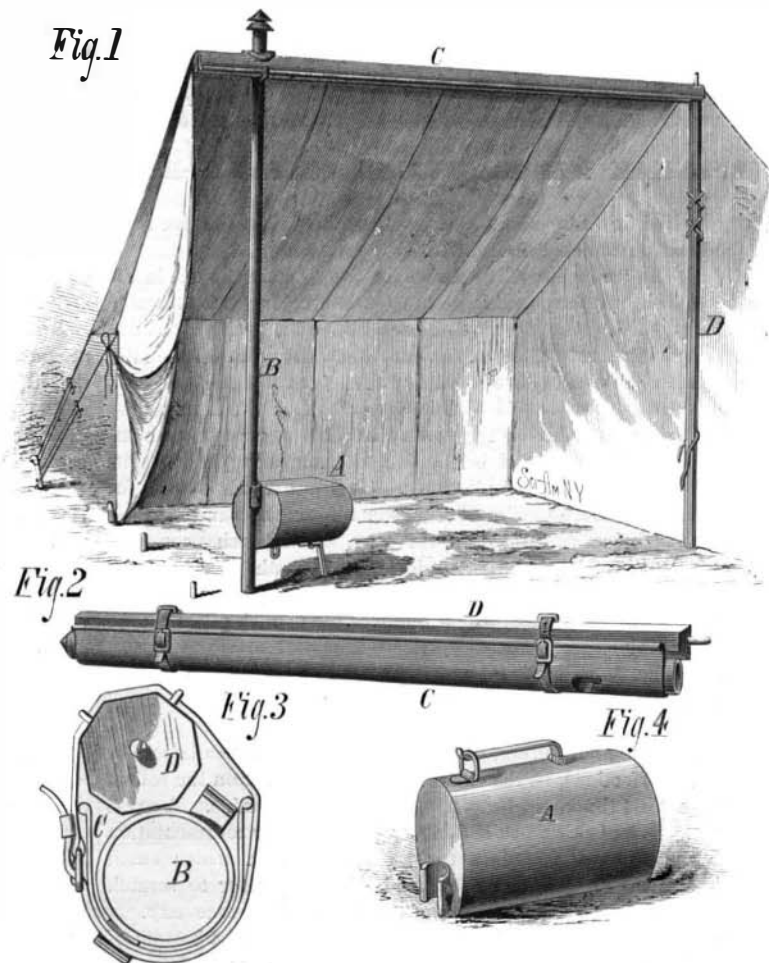
Mr. John A. Hollem, of New York city, has invented an improved trap for catching rats, mice, gophers, and other animals, which is so constructed as to catch an unlimited number of animals in succession. It is simple in construction and convenient in use.



STOAKES' AUTOMATIC SHADING PEN.

attached to the vertical pipe, B, and the latter extends upward through the hollow ridge, C. The other end of the ridge is supported by the pole, D. The frame folds compactly together, as shown in the perspective view, Fig. 2, and transverse section, Fig. 4, and is secured by means of straps attached to the wooden pole, D. The chimney cap is carried in the stove, and the leg of the stove is converted into a handle, as shown in Fig. 3.

It will be seen that nothing is added to the bulk of the tent fixtures, but the stove, and the frame is more compact and portable than the ordinary poles. This useful invention has been covered by two patents by Capt. Charles W. Hobbs, of the U. S. Army. Mr. William A. Percy, of Plattsburg, Clinton county, N. Y., is agent and manufacturer. The inventor may be addressed in care of Mr. Percy.



HOBBS' WALL TENT AND STOVE.

MISCELLANEOUS INVENTIONS.

Mr. Joseph Kintz, of West Meriden, Conn., has patented an improved process for giving an ornamental surface or finish to iron castings, which process is as follows: The casting is first rolled or tumbled in the usual manner, and polished on the portions of the surface that are to have a polish on the finished article, and then the casting is coated with copper or other metal by electroplating. It is next