THE WATERBURY BRASS MILLS.

The Scoville Manufacturing Company.

To the seeker after mechanical information, or to those who are curious in matters relating to the inventive genius of mankind, no place offers a more extended field for investigation than the town of Waterbury, Connecticut. What Lowell in Massachusetts and Manchester in New Hampshire are to the cotton-spinners' avocation, Waterbury is to those who follow metal-working for a livelihood; and if the reader is interested in the manufacture of brass buttons, thimbles, brass wire, sheet brass, &c., he cannot spend time more profitably to himself than by strolling through the large factories devoted to those articles in the town just mentioned.

There are very many warehouses and workshops in Waterbury, all of which occupy spacious premises, and employ large numbers of men the year round. We will enter one of those factories—that of the Scoville Manufacturing Company—and relate what fell under our observation in the tour. The process of making military buttons, thimbles, hinges, and other wares will be briefly touched upon.

BUTTONS.

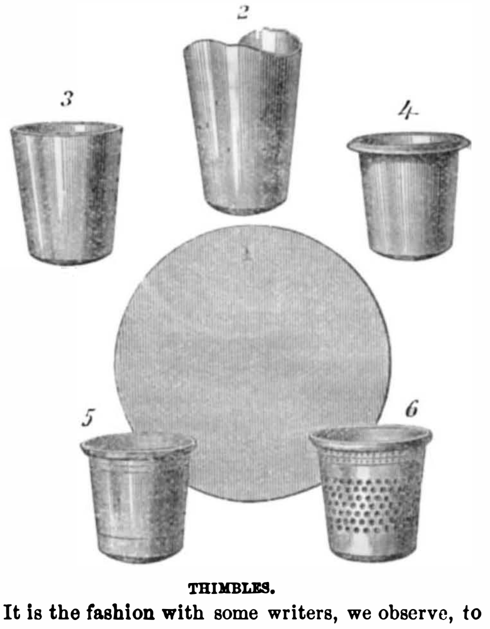
The parent of these useful articles is a large brass ingot about twenty inches in length by six inches in width and two inches in thickness. The reader will imagine a long roughly-paved room, wherein are a number of ovens or muffles, acid baths, pickle tubs, &c., for restoring the color of the brass lost while going through the various operations to which it is subjected. On one side of this room is a smaller one, wherein there is a set of furnaces in which the brass is mixed and melted. There are crucibles in these furnaces, and as we enter a workman has just removed one of them from the fire and is engaged in pouring the contents of it into an iron mold. With much effusion of gas and loud sullen breathings, as though protesting against such treatment, the brass finally settles down slowly into the mold. In due time it is turned out, and it is then a long brass ingot of the size previously mentioned.

The ingot just made is now taken to a pair of rolls where it is to undergo what is technically known as the "breaking-down" process. This is simply reducing its thickness; the rolls are of chilled cast-iron about eighteen inches in diameter and four feet long, and are accurately turned and polished. They are driven by huge gear wheels from the main water wheel in the center of the apartment. The ingot is presented to these rolls and as they revolve slowly they seize one end of it and gradually draw it in. When the ingot enters the rolls, it is about two inches thick; as it issues from them on the other side, it is reduced to about half an inch, and is of course much extended in length. This strip, or rather these strips (for we shall see many of them made) are now very hard, and must be taken to the muffle and annealed or softened before anything further can be done to them. This muffle is simply a huge oven heated to a high temperature, and while the bars are softening therein, we will say that sometimes the "breaking-down" process is reversed, and instead of the brass ingot passing through the rolls properly, it snaps them asunder in the midst and they fall out on either side. At one time an intractable ingot cost the company an outlay of $3,000, solely by its obduracy and stubborn spirit. After the brass has been properly annealed it is carried to the rolls and put through them again until it has been reduced to the required thickness. It is then taken to a bath and immersed for a while until the grease and scale and change of color, which the rolling and heating has effected in it is removed and it then issues bright and clean. If it is to be carried to other towns it is coiled up into compact rolls. In our case, however, it is to be made into brass buttons and we will follow the strip we have just seen manufactured into another room, where there are a number of presses running continually, at a high rate of speed. The workmen take our strip of brass and insert one end of it under the die, which as it comes down, punches out a round thin piece of metal; the strip is fed along continually until the surface is punched full of holes. The thin blanks cut out of these holes are taken to another machine and "drawn up," as it is called, into a shell or button-top, remotely resembling the finished article. This is the first process of making buttons.

In its present state the shell is unattractive in appearance, and altogether dead and dull; this unsightly exterior is removed by men at lathes. The comparatively rough brass is stuck on to a receive revolving wooden chuck, and burnished by having a blood-stone set in a wooden handle brought into contact with it (these tools cost from $5 to $50, and are brought from Derbyshire, England); the brilliant lustre, so universally admired, is thus given to the shells and they are then ready to receive the design. The rapidity with which this process is executed defies description; so perfectly has the workman educated his hand to its duty that the eye can scarcely follow his movements and the buttons come whirling and dancing off the chuck and fly in all directions. They are now ready to receive the design, and we will follow them into another room where there are a number of stamps devoted to this use. These stamps are simply ponderous weights suspended by a strap, and running between guides. They fall some six or eight feet. The shell we have just seen made is placed in a matrix below the weight, the die on which the design is cut is secured in the same, when therefore the weight is drawn up and detached from its support, it comes down with a force like a pile-driver and a noise like thunder, and at one fell swoop imprints the eagle, claws and all! This operation also, like all others wherein the cost of an article depends very greatly upon the degree of mechanical skill attending its production, is very rapidly performed. With a dexterity acquired only by long practice the workman slips in the blanks and takes good care that his fingers are out of the way when the weight falls, else some unlucky miscalculation would stamp his digits into useless fragments. The huge weights rise and fall monotonously in the exercise of their functions; and we turn from this scene and seek another room, wherein the other half of the button—the back—is being made ready for use; as yet we have seen only the top or shell. The back is also a brass disk and has two holes perforated in it for the insertion of the eye. Like Polyphemus the button-back has but one eye, and this is firmly secured to the plate by solder and riveting or clenching the eye where it protrudes internally. The solder is applied by young women who sit at a long table, and the analogy between their mechanical occupation and similar household occupations is striking to the imaginative reader; provided with a doughy-looking paste or solder and a small scoop they dip out a portion of the former and place it about the eye of the button already inserted and riveted in another room. As fast as the operation is performed, the button-backs are placed in sheet-iron pans. These pans are then entrusted to certain heavy-eyed and slow-footed youths who carry them gingerly away as though they contained some delicacy which they were loath to part with. Once deposited in the furnace the genial glow fuses the amalgam in one mass and they are then ready to be cleaned and prepared for the final operation of closing them on to the shells or button-tops, previously mentioned. The cup shaped top completely encloses the back to which the eye is fastened and leaves a flange sticking up all around. In this condition the button is placed in another machine and has its flange closed over by a die provided for the purpose. This part of the work may be likened to the operation of riveting a common eyelet in a piece of cloth or paper. The button is now finished and ready to be packed, if we clean it a little, and rub off the slight tarnish it may have received while undergoing the processes described. Some of the buttons, as for instance those intended for the coats of officers of high rank, are heavily coated with gold, "fire-gilt," so that they retain their pristine glory for a long time. This class of button has its design worked in very high relief, and three separate and distinct operations are needful to bring out all the strong points fully and clearly.

There are but few persons who cannot recall the earlier years of life when they felt a yearning for a jacket with brass buttons, that would not be appeased unless their desire was gratified. The longing does not cease with youth, if we may judge from "Patrick," newly landed from some emigrant-ship and clad in the full glory of shining brass; and others—not foreign, but to the manor born—who ostentatiously flout their brazen glories in the observer's face. These buttons, which tempt alike the fancy of young and old, are not made by machinery so far as the design is concerned. They are chased by hand; that is to say, the workman sits at a bench whereon is a small steel block on which the work in hand is placed. In addition there are a number of minute punches whose faces are impressed with an endless variety of patterns; some star-shaped, others like "the crescent moon;" some with leaves, angles, corners, in fact the varieties cannot be repeated here. From these punches the artist (so we may not inaptly call him) selects such as he deems desirable, and, with a small hand-hammer, drives them into the burnished button blank on the bench before him. The combination of punches produce the pattern. At the time we visited this room there were several patterns ready for the inspection of the foreman. This person examines them all, decides upon what is suitable for the market, and makes his selections accordingly. We have said elsewhere that machinery could not be used on this part of the button business. The reason assigned is that the constant percussion on the brass dims the brilliant finish of the punch and destroys its effect on the work. To renew this polish the workman has a small piece of chamois leather before him, charged with rouge powder, on which he, from time to time, rubs the punch and restores the lost gloss. If the punch were fixed in the died this would be impossible, and if we examine the military button we shall see that all the "struck" portions are originally dead or dull. The operation is performed very quickly, and while we have been writing this description the workmen—about twenty in one room—would have produced buttons enough for a regiment. The rapid clip, clip, of the hammers prevents monotony, and the impression produced is rather enlivening than otherwise. The buttons are all packed in paper boxes; and we are assured that the factory is capable of turning out 1,500 gross, or 86,400 buttons per day; on occasions, over 200,000 have been produced, but this is not by any means the working rate of the factory.

Let us turn from this item of the brass-working business and examine the manufacture of—



THIMBLES.

It is the fashion with some writers, we observe, to furnish their readers with full details of the ancient manner of doing this or that branch of business; no matter whether the subject be a prize-fight or a treatise on the Copernican system. We shall not follow those examples; and whether Lot's wife had a thimble in her pocket when she was turned into the pillar of salt, or if a gigantic thimble was used in connection with Cleopatra's needle, are matters which must remain profound mysteries. We shall not attempt to unravel them. Let those who will, kick up a dust among the moldy records of the past; be it our task to present the process of the day and the hour.

Thimbles are made out of all kinds of materials; but in this instance we shall revert only to those manufactured from brass and German silver. Here are some thimbles illustrated in the various stages of their construction. The flat disk, No. 1, is the

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beginning of the thimble; No. 2 is the blank as it appears after being "drawn up," in the same general way as we have seen the button-top produced; No. 3 is the third stage where the rough edges are trimmed off by a man at a lathe; No. 4 is still another shape, having the bead turned at the lower end; No. 5 is the bead completed, and No. 6 is the thimble ready for a lady's use. There are other operations performed upon each, as all the foregoing are distinct and separate; but we forbear mention of them. The indentations are formed by placing the thimble on a mandrel and causing it to revolve between steel disks which have a number of minute points in them corresponding to the punctures. The German silver thimble is usually esteemed the best for wear, as the metal is much tougher than brass; brass thimbles are generally silver-plated, and are also durable. When the thimbles are plated there is a small wire coiled about them so that they will not slip into each other and become united by the silver deposited on them. These processes are also extremely rapid; and although each thimble goes through many hands, it is by the reason of this very fact that they can be afforded at so low a price. These wares, however, are by no means the only ones made in this factory, and if we desire to see others we must leave the room we have just examined and enter another; as for instance that one wherein are manufactured—

HINGES.

Many thousands of hinges are annually turned out here. Their numbers would literally exceed belief. Brass hinges are made from a long strip of sheet-brass. Each individual hinge consists of two leaves, as the reader well knows; and these are both made at one operation. The press first cuts out a square piece of brass, very little larger than the intended hinge. This blank, or rather these blanks (for they are made in great quantities at a time) are taken to another machine, which cuts one leaf out of the other in such a manner that no metal whatever is wasted. In fact so exact is the separation that the parts cannot be fitted together again by hand without some filing. In the process described there have been small tongues left projecting from the side of the leaf, these are to form the joint or joints, of the hinge through which the wire passes. The joint is made in another machine by rolling up the brass tongues in a circular form; after this the joints are trimmed, have the wire inserted and are riveted by young girls, and are otherwise made ready for market. We must not omit to notice one machine, however, which would seem, to the uninitiated, to be unnecessary; that is the one for opening and closing the hinge. After they have been fitted up some slight inequalities, and the stiffness of the joint, makes it difficult to open them. This trouble is removed very speedily by the apparatus in question. With a duplicity of purpose and apparent simplicity of design, which would do credit to a veteran politician, the machine seizes the hinge presented to it, thrusts a steel point between the leaves, opens it completely, and passes it on to the other end, where a different movement completely reverses the previous operation and closes the hinge up again like a jack-knife; here it drops into a box and is carried away by an attendant, to be drilled and countersunk. Some hinges are polished; others are left in a rough condition, and all classes and patterns are made here, from those designed for a rough box or marine work, up to the silver-plated ones for pianos.

MISCELLANEOUS ARTICLES.

At one time large quantities of daguerreotype plates and metallic borders or "mattings" for the same were made here; but the introduction of photographs or card-pictures and ambrotypes, has materially lessened the consumption of them. The number still made, however, is far from being insignificant; and we will inform our readers how the plate is produced on which their graceful features are sometimes imprinted by the skillful fingers of the sun. A copper ingot of suitable fineness, having been selected, is placed in a lathe and faced off true on one side. This corrected surface is first coated with pure silver, and the ingot is then rolled out into a long strip, just as we have seen the brass worked. As the copper is reduced, the silver follows it, until the desired attenuation has been reached. But daguerreotype plates, thimbles, and hinges are only a part of the articles here produced; in addition there are a number of others which we are unable to describe in this connection for want of space. Of late years a highly ornate style of pill-box has been introduced, made out of thin sheet-brass, silvered over, and stamped with an appropriate design. We did not learn that the flavor of the pills was at all benefited by the improved method of preparing them for market; but we heard that one enterprising son of Esculapius circulated a quantity of his pills enclosed in the new style of box among a desirable class of customers, and the result—as briefly and tersely set forth by our informant—was that "They liked 'em so well, they came back for more." Kerosene lamp-burners are also produced in large quantities, and the manufacture of them involves no less than 111 distinct operations! We shall reserve a description of this branch of the brass business for another article.

The Scoville Manufacturing Company occupy large and commodious buildings, and contemplate extending their works still further at an early period. They afford employment to about 300 persons, and indirectly maintain a much larger number. At the time of our visit the great rush of the spring trade was nearly over, and the factory was having a "breathing spell," so to speak, before commencing for the summer. The packing-rooms resounded with the bustle and hurry of the workers therein, engaged in shipping the goods; and the motions of those individuals were characterized by a spirit of energy refreshing to witness. It is with reluctance that we close our article without adverting to other interesting details; but our readers must forego further progress over the Scoville Manufacturing Company's premises, and wait patiently until the appearance of our next article of this series, in which we shall conduct them through the large establishment occupied by Benedict, Burnham & Co. All of the work which we have described in this account was excellently made, and needs no praise at our hands; the company have been in active operation for a period extending over fifty years, and during that time it is quite possible that the reader himself may have worn out some of the hinges, or lost some of the buttons made by the busy wheels, the quick working presses, and the skill of the workmen employed by the Scoville Manufacturing Company, whose warerooms, at 37 Park Row, this city, are full of the products of their labor.

VALUABLE RECEIPTS.

BLACK ON GUN-BARRELS.—The following mode of producing a black coating on gun-barrels is taken from Mr. Wells's "Annual of Scientific Discovery" for the present year:—First, take chloride of mercury and sal-ammoniac; second, perchloride of iron, sulphate of copper, nitric acid, alcohol and water; third, perchloride and proto-chloride of iron, alcohol and water; fourth, weak solution of the sulphide of potassium. These solutions are successively applied, each becoming dry before the other is used. No. 3 is applied twice, and a bath of boiling water follows Nos. 3 and 4. The shade of color is fixed by active friction with a pad of woolen cloth and a little oil. The shade thus obtained is a beautiful black of uniform appearance. This process is used in the manufacture of arms at St. Etienne, France. We regret that the proportions of the different ingredients are not given. Several of our gunsmiths have made many inquiries as to the mode of producing the blue-black coating on the Whitworth and other English rifles. Perhaps the above solution will effect the object. The alcohol is used to make the application dry quickly. The perchloride of iron and the sulphate of copper in No. 2 should be used only in a moderately strong solution, and only about 10 per cent of nitric acid added to the water. We hope that our gunsmiths will meet with success in using these solutions. No. 2 applied in three or four coats, will form the common brown coating for gun-barrels. After the last application has become dry it is rubbed with a wire scratch brush, washed with warm water, then dried, and afterwards rubbed down with a composition of bees-wax dissolved in turpentine.

DYEING GLOVES.—MESSRS. EDITORS:—If you have lady readers, and I assume so, they must have occasion for a lively and beautiful drab color upon white or light-colored fabrics of cotton, silk, linen or wool, such as gloves, stockings, &c. They can produce a dye, which is quite permanent in its character, in five minutes, as follows:—To a pint of rain water add six or eight grains of nitrate of silver; when it is dissolved stir it well and immerse the perfectly clean fabric. See that it is well and evenly saturated, for which use a stick, not a spoon nor the hands. When thoroughly soaked it may be quickly wrung out with the hands, they being instantly washed. In a pint of water dissolve one quarter of an ounce of sulphuret of potassium, place the goods in it and saturate well, then wash in clear water and it is finished. It is better that the first-named solution should be hot, and a little time taken for wool. Glass vessels must be used.—R. H. A., Baltimore, May 11, 1863.

A Few Hints on Dyeing.

To those who wish to have certain fabrics dyed, the following information will be found useful, as regards the colors they will take. Thus, if the material be *black* it can only be dyed black, brown, d. green, d. crimson, d. claret, and d. olive. (*d.* stands for "dark" in all cases.) *Brown* can only be dyed black, d. brown, d. claret. *Dark green:* black, d. brown, d. green, d. claret, d. olive. *Light green:* d. green, black, d. brown, d. crimson, d. claret, d. olive. *Dark crimson:* black, brown, d. crimson, d. claret. *Light crimson* will take the same as dark crimson. *Claret:* black, brown, d. crimson, d. claret. *Fawn* will take d. crimson, d. green, black, brown, d. claret. *Puce:* black, brown, d. olive, d. crimson, d. claret. *Dark blue:* black, brown, d. crimson, d. green, d. claret, d. olive, d. blue. *Pale blue:* d. crimson, d. green, black, brown, claret, puce, d. blue, d. olive, lavender, orange, yellow. *Olive* will dye brown, black, d. green, d. crimson, d. claret. *Lavender:* black, brown, d. crimson, claret, lavender, olive. *Pink:* d. crimson, d. green, black, brown (as all tints will take a black and brown, these colors will not be repeated), pink, olive, d. blue, d. puce, d. fawn. *Rose,* same as *pink,* but also orange, scarlet and giraffe. *Straw, primrose* and *yellow* will dye almost any color required; as also will *peach* and *giraffe.* *Grey* will only dye, beside brown and black, d. green, d. claret, d. crimson, d. fawn, d. blue. White silk, cotton and woolen goods can be dyed any color. As cotton, silk and wool all take dye differently, it is almost impossible to re-dye a fabric of mixed stuff any color except the dark ones named. It will be observed by the above list that pale blue will re-dye better than any other color.—*Septimus Piesse, F.C.S.*

What Inventions have done.

The New York *Tribune,* in presenting from *Hunt's Magazine* a series of tables showing the increase of property in this country from 1800 to 1863, says:—"There has been an accumulation of very nearly $16,000,000,000, with an increase of income from $86,000,000 to nearly $2,000,000,000. In fact, it appears that three-fourths of this accumulation and increase of income have been made during the last 20 years. It is evident, therefore, that the power of production has received an immense impulse in the present century, in great part owing to the application of steam to transportation (which has virtually multiplied capital by causing its more rapid conversion), and the invention of labor-saving machines, with which, as the cotton-gin for instance, one hand can now do the same work that required four hundred hands formerly."

BURNING AND EXPLODING OF GASES.—Sir H. Davy, in his important and interesting experiments, found that light carbureted hydrogen, the most powerfully explosive of the gases, required about seven times its bulk of atmospheric air to be mixed with it to produce the greatest explosive effect; practically, it may be calculated that from eight to nine times its bulk of air will produce the most explosive mixture of coal-gas; but, the air and gas must be mixed previously to inflammation. No matter how rapidly the air may be supplied when the gas is burning, it will merely increase the fierceness of the combustion; there will be no explosion. To form an explosive mixture, the gas must be present in quantity varying from about 7 to 25 per cent of volume; if it fall short of, or exceed, that proportion, it will burn away quietly and not explode.

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