E. MAERTENS.

MAKING METAL TUBES AND SIMILAR ARTICLES.

APPLICATION FILED MAY 5, 1906.

1,039,065. Patented Sept. 17, 1912.

Fig. 1.

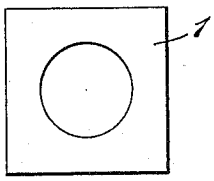


Fig. 2.

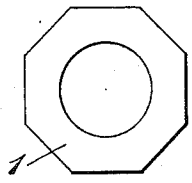


Fig. 3.

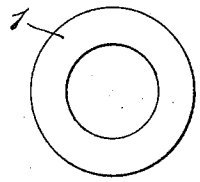


Fig. 4.

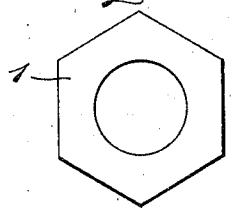


Fig. 5.

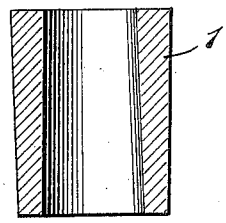


Fig. 6.

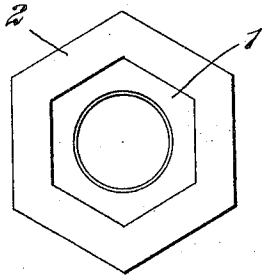


Fig. 7.

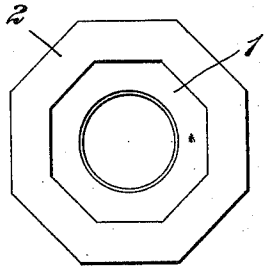


Fig. 8.

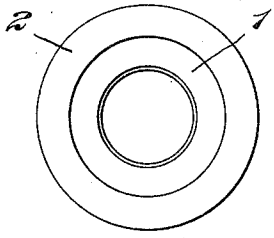


Fig. 9.

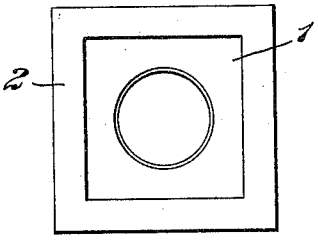


Fig. 10.

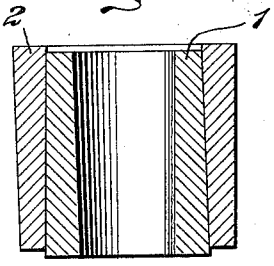


Fig. 11.

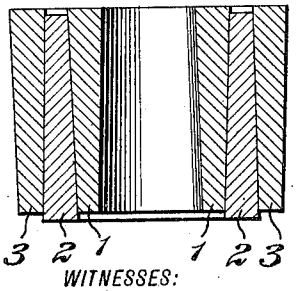


Fig. 12.

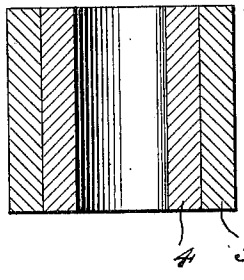
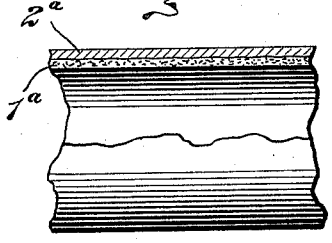


Fig. 13.



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MAKING METAL TUBES AND SIMILAR ARTICLES.

1,039,065. Specification of Letters Patent. Patented Sept. 17, 1912.

Continuation of application Serial No. 52,015, filed March 20, 1901. Renewed March 25, 1902, Serial No. 99,921. This application filed May 5, 1906. Serial No. 315,416.

To all whom it may concern:

Be it known that I, EMILE MAERTENS, a citizen of the United States, residing at Providence, in the county of Providence and State of Rhode Island, have invented certain new and useful Improvements in Making Metal Tubes and Similar Articles, of which the following is a specification.

The invention relates to the manufacture of metal tubes, or similar articles, and, more particularly, to piles or blooms from which such articles may be produced.

The object of the invention is to produce such articles, particularly tubes, of superior quality, with the fewest possible number of handlings and heatings, from the puddled or cast metal to the completed article, thereby minimizing the cost of production, and materially reducing this cost over any methods heretofore suggested or employed.

In the processes now employed in making tubes from piles, it is the practice to roll a plurality of trough or similar shaped sections, assemble a number of them to form each of the two concentric members comprising the pile, heating the pile on its side, and then rolling it to produce a tube. This method results in an article having a large number of welded surfaces, and in view of the number of such surfaces, it is very difficult, if not almost impossible, in practice, to produce tubes free from defective welds. Furthermore, the process is expensive on account of the many operations incident to carrying it out, the special rolling and trimming machinery required in making the trough-shaped sections, the necessary loss of material, and the extent of plant required.

With the foregoing, and other objects, in view, one feature of the invention consists in assembling a plurality of tapering hollow masses of metal into a pile for the purpose of making a tube therefrom, the walls of each of the said hollow masses being continuous in transverse cross section.

Another feature of the invention consists in assembling a plurality of tapering hollow masses of different metals, whereby composite tubes may be made.

A further feature of the invention consists in assembling a plurality of tapering hollow masses of metal into a pile, in such manner that the weight of one of the masses is sustained by the mass adjacent to it, so that when the pile is brought to a welding heat, incipient welding takes place between the masses automatically. With this particular object in view the exterior form of each hollow mass or section is preferably that of a frustum of a cone or pyramid, the walls of each mass being, usually, of uniform thickness. If desired, the walls of each section may taper in thickness from one end to the other, which tapering may be produced in several ways, as in casting, or by gradually contracting the outer surface and expanding the inner surface of each tubular section.

It is not essential that the hollow masses of metal employed should be circular in cross-section, as to either their interior or exterior surfaces, though, preferably, the interior of the inner tubular mass is so formed. The exterior surfaces of all the sections or hollow masses may be circular, or of any other desired polygonal form in cross-section.

In the preferred form of pile, the proportions of adjacent hollow sections are such that the one can be inserted within the other far enough to bring the ends of the sections nearly, but not quite, even with each other, so that if the pile is stood on end, as it will be when placed in the furnace to heat it preparatory to elongating it to produce a tube, or other article, one of the hollow sections will not touch the floor of the furnace, but will have its weight sustained by reason of its contact with an adjacent section. The result of this arrangement is that, when the pile is raised to a welding heat, the pressure of one tubular section upon the other automatically produces a partial welding together of the elements of the pile, and when they are withdrawn from the furnace they form a coherent hollow tubular mass of metal, such as iron or steel, that may be easily and rapidly handled in the operations incident to elongating the pile to produce the finished tube, or other article.

In the accompanying drawings I have illustrated certain embodiments of the invention, but such drawings are to be understood as illustrative, only, and not as defining the limits of the invention.

In said drawings: Figures 1, 2, 3 and 4 are plan views of hollow masses of metal illustrating some of the forms which may

be adopted for one element of the pile; Fig. 5 is a vertical section of one element of the pile; Figs. 6, 7, 8 and 9 are plan views of assembled piles resulting from the employment of the several forms illustrated in Figs. 2, 3, 4 and 1, respectively; Fig. 10 is a vertical section through one of the piles as shown in Figs. 6, 7, 8 or 9; Figs. 11 and 12 are vertical sections of other forms of piles; and Fig. 13 shows a completed tube, partly in section.

One practical method of carrying out my invention is as follows: I form hollow masses 1, 2, of iron, steel, or other metal, in any suitable manner, as by casting, or pressing, in molds. The hollow mass 1, which is designed to be the interior element or member of the completed pile is, preferably, formed circular in cross-section, and gently tapering from end to end, while its exterior may also be circular in cross-section, as shown in Fig. 3, or have any other form desired, as, for example, such as shown in Figs. 1, 2 and 4. I form the exterior surface of section 1 in the shape of a frustum of a cone or of a pyramid, with a gentle taper, as will be understood from an inspection of Fig. 5, and I form the section or member 2 with an interior shape substantially similar to that of the exterior of the member 1, but very slightly smaller, so that the member or section 1 may be slipped nearly, though not entirely, within the section or member 2, as shown in Figs. 6, 7, 8, 9 and 10, leaving the ends of the two elements in different cross-sectional planes. If the pile, as thus assembled, be stood on one end, the entire weight of both sections will be sustained on the lower end of section 1 (as in Fig. 10), and, if the pile be stood on its opposite end, the entire weight of both sections will be sustained on the then lower end of section 2. The exterior of the section or member 2 may be of any shape or contour desired, though I prefer to so form it that the thickness of the walls of the pile are the same throughout. In the construction shown, I accomplish this by slightly tapering the walls of the member 2 from top to bottom on the outside, so that the walls grow thinner from the top downward in proportion as the walls of the member 1 grow thinner from the bottom upward. By inverting the pile, as shown in Fig. 11, a third section or member, 3, may be slipped over the outside of section 2, so that three, instead of two, hollow masses of metal enter into the construction of the pile. When the pile thus formed, with two or more elements, is placed in the welding furnace, it is stood on end, as shown in Fig. 11, and as the metal is brought to a welding heat the weight of the exterior mass or element causes it to press on the outer surface of the inner member, and the two become partially welded together. The pile may then be removed from the furnace and freely handled without any danger of separation, thereby greatly facilitating the manipulation of it to produce a tube, or other hollow shape. It is to be understood that the hollow masses 1, 2 and 3, need not be allowed to entirely cool after they are cast or molded, but may be assembled, as shown in Figs. 10 and 11, while yet hot and placed immediately in the welding furnace, thereby enabling the pile to "soak," or to be raised to a welding heat, with the least possible consumption of fuel. The finished tube or article may thus be made, without employing more than two heating operations, including that of puddling or casting from the puddled or cast metal.

In the construction of pile shown in Fig. 12, the elements 4, 5, are provided with parallel or non-tapering walls. In this construction incipient welding cannot be produced in the manner described with reference to the piles wherein the members or elements have tapering sides; and in order to effect this function or result, the section 5 may be shrunk onto section 4. This may be accomplished in any desired way, preferably by heating section 5, so as to expand the same and then slipping it over section 4. The pile may then be further heated to produce the incipient welding, whereupon it is ready for the subsequent operation of elongating.

In Fig. 13, I have shown a finished tube, and for illustrative purposes, only, have shown it as composed of two different metals, or alloys, 1^a and 2^a, respectively, it being understood, of course, that I may make the tube from one metal or several metals as desired. It will be observed that the tube as thus constructed is free from transverse welds, and, also, substantially free from longitudinal welds, for the reason that in manipulating a pile as described, the metal or metals of the several elements are so closely blended as to produce, practically, a homogeneous article.

It will be observed that in my method of heating the assembled elements of the pile, the adjacent surfaces of the sections or elements are in such close contact as to preclude any material oxidation of the metal on such surfaces, thereby permitting of a very perfect union or blending of these surfaces.

It will be understood that while the invention is particularly applicable to the manipulation of iron and steel the invention is not limited to the employment of these metals, but is broad enough to include and does include the use of any other metals or alloys when manipulated in the manner herein described. A tube of most remarkable strength is obtained by forming a pile having one member of nickel steel and the other

member or members of common iron or steel or other inferior metal. Preferably, I form the inner member of the most expensive metal as less of it is thus required. For example, in the construction of the pile shown in Fig. 10, the inner member 1 may be made of nickel steel, and the other member 2 is of any desired metal that will readily weld with the nickel steel. In such cases the inner member may, if desired, be made thinner than the outer member and the cost thereby reduced.

My method not only produces a better and stronger tube than those made heretofore, in that the tube is free from the transverse welds incident to tubes made from piles employed prior to my invention; but I, also, make the tubes more economically for the reasons that I operate, preferably, on piles made directly from cast or puddled metal, generally soft castable steel or puddled iron, and preferably, by directly manipulating the pile to produce a tube without material loss of the heat present in the metal incident to the casting or pressing operation, thereby saving heat, labor, waste in material, floor space and machinery.

My process of rolling, or otherwise manipulating the hot hollow ingots, blooms or piles into tubes, or similar articles, subjects the metal to a working similar to what puddled iron or cast steel gets by hammering or rolling into bars, plates, or sheets, as now commonly practised. Instead of forging or rolling the solid ingots or bars into plates and sheets, however, and subsequently making tubes therefrom, I elongate hollow ingots or piles into tubes or similar articles directly. The working which the puddled metal or cast steel gets in this operation converts it, or tends to convert it, into wrought metal; in other words, into metal which has been wrought or made tougher and closer in texture than it was before the rolling or equivalent manipulation.

The pile employed in my process, wherein the elements are integral or unitary, can be more expeditiously and readily handled than one composed of a plurality of members such as those heretofore employed.

It will be apparent that slight changes in the process as described, or in the particular materials referred to, as employed therein, may be made without departing from the spirit of my invention.

In a prior application filed by me on March 20, 1901, Serial Number 52,015, I have disclosed, substantially, the invention described and claimed in this application, and as to the subject-matter disclosed in said prior application, the present application is a continuation of said prior one.

Having thus described my invention, what I claim is:—

1. A pile for rolling tubes consisting of an interior tubular mass of metal having a tapering exterior surface, extending the full length of the said tubular mass, and a second tubular mass of metal surrounding and making contact with said exterior surface of the said interior tubular mass, the end of one of said tubular masses projecting beyond the end of the other tubular mass.

2. A pile for rolling tubes consisting of a plurality of telescopically arranged tubular masses of metal having tapering exterior and interior surfaces respectively contacting one with another and with their ends in different cross sectional planes, said tapering surfaces extending the full lengths of said tubular masses.

3. A pile for rolling tubes consisting of two tubular masses of metal one telescoping the other, the inner tubular mass tapering externally from end to end, the outer tubular mass tapering internally from end to end the ends of said tubular masses being located in different planes, and the tapering surfaces making an angle with the common axis of the tube, whereby on the application of a welding heat the two contacting surfaces will be partly and automatically welded together so that the pile may be readily handled.

4. A pile for making tubes consisting of a plurality of telescopic hollow masses having tapering welding surfaces, one end of the outer mass extending beyond the corresponding end of the inner mass and the opposite end of the inner mass extending beyond the corresponding end of the outer mass.

5. A pile for making tubes consisting of a plurality of telescopic integral hollow masses with tapering and contacting welding surfaces, one end of the outer mass extending beyond the corresponding end of the inner mass and the opposite end of the inner mass extending beyond the corresponding end of the outer mass, whereby, when the pile is stood on either end, the weight of one mass is carried by the other.

In testimony whereof I have hereunto signed my name in the presence of two subscribing witnesses.

EMILE MAERTENS.

Witnesses:
OWEN STABLER,
MARY F. DONAHUE.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."