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E. F. KENNEY
IRON AND TUBE MAKING
Filed July 11, 1923

Fig. 1.



Fig. 2.

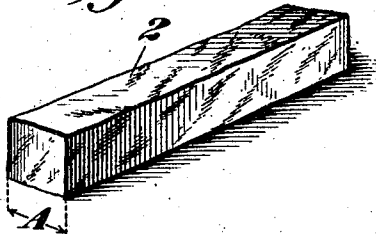


Fig. 3.

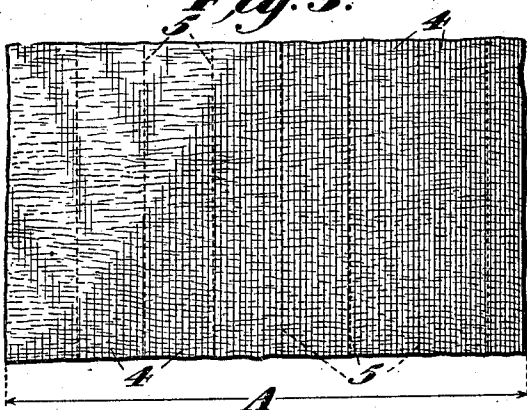


Fig. 4.

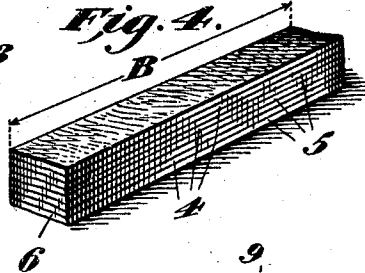


Fig. 6.

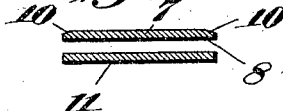


Fig. 5.

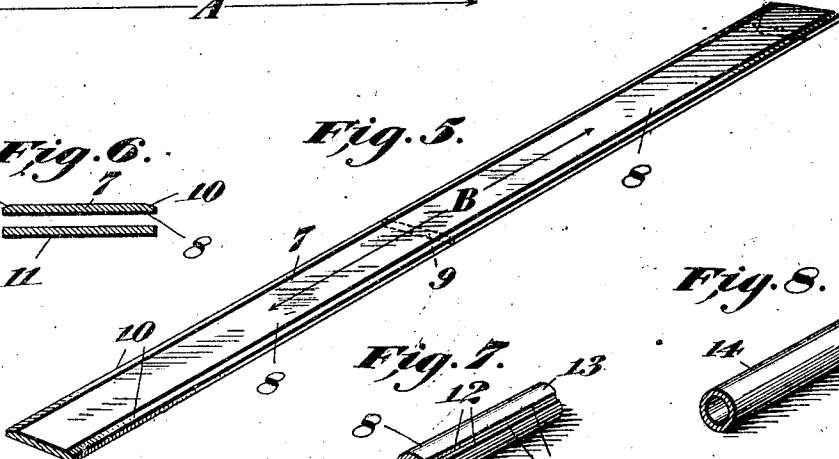


Fig. 7.

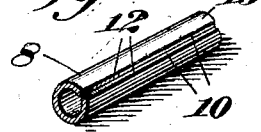
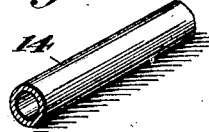


Fig. 8.



INVENTOR

Edward F. Kenney.
BY *Geo. E. Shackray*
ATTORNEY

UNITED STATES PATENT OFFICE.

EDWARD F. KENNEY, OF BETHLEHEM, PENNSYLVANIA.

IRON AND TUBE MAKING.

Application filed July 11, 1923. Serial No. 650,776.

To all whom it may concern:

Be it known that I, EDWARD F. KENNEY, a citizen of the United States, and a resident of the city of Bethlehem, county of Northampton, and State of Pennsylvania, have invented certain new and useful Improvements in Iron and Tube Making; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

My invention relates to making wrought iron in the form of plates, bars or other sections, which wrought iron is first preferably rolled or hammered from a ball or loup which may be produced in a knobbling fire, in a forge, by puddling or otherwise, thus first forming a rough bloom from the conglomerated particles of iron which particles are surrounded with oxides or scale, etc., as is usual in such products.

After the bloom is formed as above indicated this is then rolled laterally or in the direction of its width or thickness to form a plate. It has heretofore been the practice to roll such bloom in the direction of its length, but by rolling it laterally according to my method a plate is produced which is afterwards cross-sheared into sections, each of which may be of any predetermined width, and then these sections are piled on top of each other to produce a pile of any desired size after which the pile is heated to welding temperature and passed through rolls in the direction of its longitudinal axis to thereby produce a plate or so-called skelp from which latter, wrought iron tubes may be formed. The iron is therefore expanded or rolled in two directions substantially at right angles to each other thereby forming a plate which is equally strong in all directions thus obviating the defects of iron produced by previous methods which on account of working mainly in one direction is weak longitudinally and cannot withstand the tests prescribed therefor.

Having thus given a general description of my invention I will now, in order to make the matter more clear refer to the annexed sheet of drawings which forms part of this specification, and in which like characters refer to like parts.

Figure 1 is a perspective view of the ball or loup of wrought iron which may be made

in any manner. Figure 2 is a perspective view of a bloom which may be hammered, rolled or otherwise produced therefrom while in a heated condition. Figure 3 is a part of a plate of wrought iron which is rolled from the bloom of Figure 2, the direction of rolling being done in the direction indicated as —A— on the drawings. Figure 4 is a perspective view of a pile formed of sections of plates cut from the plate of Figure 3. Figure 5 is a perspective view of a plate or skelp rolled longitudinally from the pile of Figure 4. Figure 6 are cross-sections of the plate of Figure 5 which is provided with bevelled or scarfed edges, and a similar plate with substantially rectangular edges as shown. Figure 7 is a perspective view of one of the plates of Figure 5 or 6 which is bent as shown prior to welding into a tube and Figure 8 is a perspective view of a finished tube which may be welded and formed from the bent plate of Figure 7 by any of the usual methods of tube making.

Referring now to the characters of reference on the drawings:—

1, is a ball or loup of wrought iron. 2 is a bloom hammered or rolled therefrom. 3 is the plate which is produced from the bloom 2 by rolling in a rolling-mill in the direction —A— as indicated by the arrows, and after this plate is rolled it is sheared into pieces 4, by cutting it on the lines 5. After this is done, any desired number of pieces 4 are superimposed on each other as indicated in Figure 4, to produce the pile 6 and after the pile is thus formed it is heated to welding heat and rolled preferably in grooved rolls in a rolling mill into the skelp or plate 7 and then this skelp is cut into lengths 8, suitable for making tubes, these cross-cuts being indicated at 9. This skelp 7 may be rolled with bevelled edges 10, or another form of skelp or bar 11 may be rolled with substantially rectangular edges.

After the skelp is rolled and cut as above described it is bent in any suitable manner, the bevelled edges thereof being indicated as at 12, this bent skelp being generally indicated as 13. After this is done it is again heated to a welding heat and the edges are welded in welding rolls or otherwise to form finished tube 14.

A loup or ball of knobbed charcoal or wrought iron consists of a plurality of co-

hering granules of iron and between or around them are layers of slag or cinders, and oxides, and in accordance with previous practice, the bloom is hammered therefrom
 5 and elongated in one direction producing elementary fibers in the metal and also elementary fibers of slag or cinder, or oxides between the fibers of metal which are further and greatly elongated by successive
 10 longitudinal rollings producing lateral discontinuities or breaks in the metal, as the fibers thereof are separated by fibers of the occlusions, so that skelp so made while strong longitudinally is weak laterally,
 15 thus resembling a rope of wires and when such skelp is formed into a tube it will not stand the circumferential tests applied to it nor the actual tests of the various uses to which it will be subjected.

20 I obviate this by my invention, as above described by piling and rolling in various directions so that the slag, etc., no longer forms longitudinal breaks or fibers between the fibers of the metal but is more uniformly
 25 distributed in very small particles or thin laminae, thus producing iron which is stronger in all directions.

Although I have, for the purpose of simplicity of illustration and description, described my invention in connection with
 30 making boiler tubes I wish it to be understood that it also relates to making wrought iron bars, plates and other shapes by successive rollings in different directions, the bars
 35 being cut between the rollings and placed together to form piles which are heated preparatory to rolling, the last rolling being preferably in a direction longitudinal of the last pile. The side edges of the pile
 40 which, after rolling into skelp, form that portion thereof which is welded, are composed of clean solid metal sheared from the interior of the plate and because of this they have not been subjected to the oxidizing
 45 flames from the furnace and produce a cleaner and stronger weld, especially at the edge portions where this is most needed on account of the following welding of these edges to form a tube.

50 It should be noted that the stresses which cause failure in tubes are generally circumferential and are resisted by the transverse strength of the skelp so that my proposed method of manufacture will increase the
 55 transverse strength of the skelp and therefore the resistance of the tube to the usual types of failure.

My method will also reduce the liability of the tubes to be damaged in the regular
 60 operation of expansion and flanging when these are placed in position in the boiler or elsewhere, as the fibers of the material are so arranged that such expansion can take place without causing cracks or failure.

65 Although I have shown and described my

invention in considerable detail, I do not wish to be limited to the exact and specific details thereof, as shown and described, but may use such modification in, substitutions
 70 for, or equivalents thereof as are embraced within the scope of my invention, or as pointed out in the claims.

Having thus described my invention, what I claim and desire to secure by Letters
 75 Patent is:

1. The method of making wrought iron which consists in first forming a heated ball thereof, then compressing the same laterally while extending it longitudinally, thereby
 80 forming a bloom, then reducing the cross-section of said bloom while extending it laterally thereby forming a plate, then cutting said plate transversely into sections and placing said sections together to form a pile, then heating said pile and reducing
 85 its cross-section while extending it longitudinally in a direction different from the first extension, thereby forming a plate or skelp.

2. The method of forming tube skelp consisting of first forming a wrought iron bloom then rolling the same transversely, thereby forming a plate, then cutting said
 90 plate laterally into sections, then superimposing said sections on each other, thereby forming a pile, then heating the same to a welding heat and rolling a skelp longitudinally of the pile.

3. The steps in the method of making tube skelp consisting of transversely rolling a
 100 wrought iron bloom, then transversely cutting the plate formed thereby, then piling the cut sections and heating and rolling the same longitudinally to form a skelp.

4. The steps in the method of making iron
 105 tubes which consists in first forming a heated loup of wrought iron intermingled with slag and oxides, then compressing the same to a bloom, then rolling said bloom transversely thereby producing a plate, then cutting
 110 said plate transversely into sections of predetermined width, then placing a number of said sections together thereby forming a pile, then heating said pile to a welding heat and rolling it in a direction longitudinally of its length, thereby forming a
 115 plate or skelp.

5. The method of forming a tube, which consists of heating and transversely rolling a wrought iron bloom to form a plate, then
 120 cutting said plate transversely into sections, then forming a pile of a number of said sections placed together, then heating the pile to a welding heat and rolling it longitudinally to form a skelp, then bending said
 125 skelp with its longitudinal edges overlapping, then heating it to welding temperature and welding its edges together in welding rolls or otherwise.

6. The method of forming a wrought iron 130

tube which consists in first making a heated
loup of wrought iron intermingled with
slag and oxides, then compressing the same
to a bloom, then rolling said bloom trans-
5 versely thereby producing a plate, then cut-
ting said plate transversely into sections
of predetermined width, then placing a
number of said sections together thereby
forming a pile, then heating said pile to a
10 welding heat and rolling it longitudinally of
its length thereby forming a skelp, then
bending said skelp with its longitudinal
edges overlapping, then heating it to a
welding temperature and then welding its
edges together and forming the same in 15
welding rolls or otherwise into a tube.

In witness whereof I have hereunto af-
fixed my signature.

EDWARD F. KENNEY.