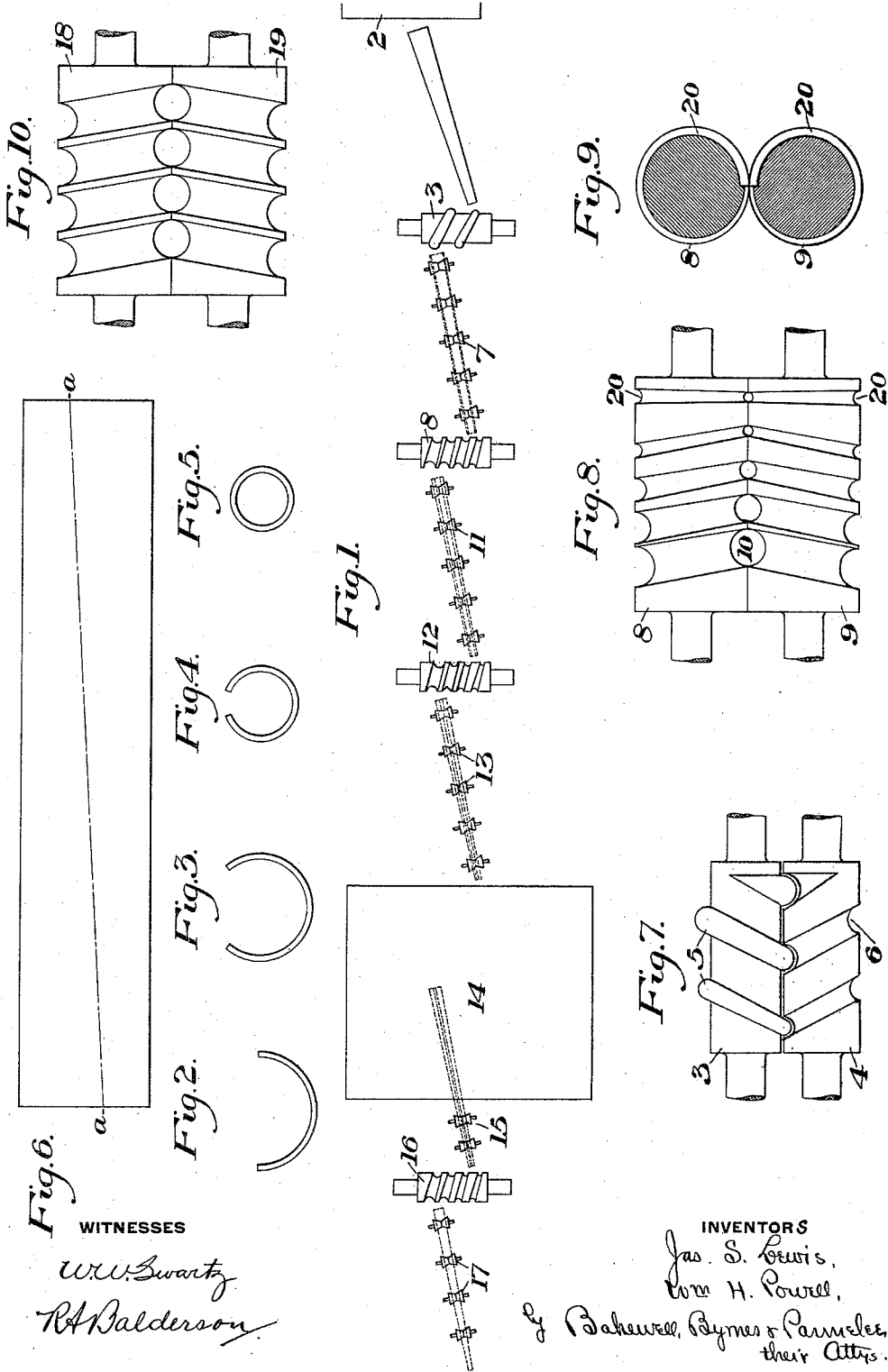


J. S. LEWIS & W. H. POWELL.
 APPARATUS FOR THE MANUFACTURE OF TUBES.
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UNITED STATES PATENT OFFICE.

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1,018,670.

Specification of Letters Patent.

Patented Feb. 27, 1912.

Application filed June 12, 1908. Serial No. 438,078.

To all whom it may concern:

Be it known that we, JAMES S. LEWIS, of McKeesport, Allegheny county, Pennsylvania, and WILLIAM H. POWELL, of Ford City, Armstrong county, Pennsylvania, have invented a new and useful Improvement in Apparatus for the Manufacture of Tubes, of which the following is a full, clear, and exact description, reference being had to the accompanying drawings, forming part of this specification, in which—

Figure 1 is a diagram showing in plan one general arrangement of apparatus carrying out our invention; Figs. 2, 3, 4 and 5 are end views illustrating the successive steps of the tube-forming operation; Fig. 6 is a plan view of the initial blank; and Figs. 7, 8, 9 and 10 are views showing the forms of rolls employed.

Our invention has relation to the manufacture of tubes, and other hollow shapes, from iron plates or skelp iron, and is designed to provide a simple and efficient method for making such tubes or shapes, either tapered or straight, without the use of a bell or ball.

The precise nature of our invention will be best understood by reference to the accompanying drawings, which will now be described, it being premised, however, that the invention is susceptible of various changes and modifications by those skilled in the art without departing from the spirit and scope of our invention.

In making a tapered tube in accordance with our invention, we first shear an elongated rectangular blank of the form shown in Fig. 6, on the oblique line *a, a*, thereby forming two separate blanks, each of which is adapted to the formation of a tapered tube. These blanks are heated in any suitable furnace, such as indicated at 2, and are then fed to a pair of rolls 3 and 4. One of these rolls, as the roll 3, is provided with a continuous helical rib 5, which fits a corresponding helical groove or pass 6 in the roll 4, as clearly shown in Fig. 7. This rib and groove are of gradually decreasing size from one end toward the other, corresponding to the taper to be formed in the tube. By means of this pair of rolls, the blank is shaped to approximately the semicircular form shown in Fig. 2. This blank is then carried by any suitable conveyer, such as indicated at 7, to a second stand of rolls 8 and

9 (see Fig. 8), which are formed with complementary helical grooves or passes 10, which shape the blank into the form shown in Fig. 3. The blank is then transferred by a suitable conveyer 11 to a third stand of rolls 12, which are similar to the rolls 8 and 9 except that the diameters of the respective passes formed by the spiral grooves are slightly smaller, so that the blank in passing therethrough is still further closed to the shape approximately indicated by Fig. 4. This blank is now transferred by a suitable conveyer 13 to a reheating furnace 14, and from said furnace is carried by a suitable conveyer 15 to a fourth and final stand of rolls 16. These rolls are also similar to the rolls 8 and 9, except that the passes are of still smaller diameter so that the blank is closed into the form shown in Fig. 5 and the weld of its edges is effected by the action of the roll passes. The finished article is received from the final stand of rolls upon any suitable conveyer, such as indicated at 17. The operation of forming a straight tube is the same except that a blank of equal width at both ends is employed and the passes of the several stand of rolls are of the same diameters.

18 and 19 in Fig. 10 illustrate a pair of rolls such as will be used for the last three stands of rolls in making a straight tube. The length of the rolls and the length of the spiral passes will be varied, depending upon the length of the tubes to be formed. As shown in Fig. 8, the rolls may be provided with tapered cylindrical passes 20 for the formation of tapered tubes the length of which does not exceed the circumference of the rolls.

It will be understood in making a tapered tube, that the small ends of the blanks are introduced at each stand of rolls into the pass of least diameter, and that the blank is delivered by the pass of greatest diameter. If, however, the tube is of less length than the total length of the spiral grooves, the tube will of course be delivered at one of the intermediate passes.

The advantages of our invention will be readily apparent to those skilled in the art, since it provides a simple and efficient method and means for the formation of tubes and other hollow shapes, either straight or tapered, without the use of a bell or ball, or other former or mandrel over

which the tubes or other shapes are formed. The series of operations can be rapidly carried out, and by the reheating of the blanks before passing them through the last or finishing set of rolls. In some cases, however, this step of reheating may be omitted, since, especially with short tubes, the blanks will retain sufficient heat to enable the welding to be performed without reheating.

10 We claim:—

1. In apparatus for forming tubes, a stand of rolls having continuous helical male and female bending surfaces, for bending the blank into an approximately semi-circular form said rolls engaging the inner and outer surfaces and the longitudinal edges of the blank, with its edges radially disposed, a second stand of rolls having a continuous helical pass arranged to engage the outer surface of the blank to further bend it into circular form, and means to transfer the tube from one set of rolls to the next set of rolls; substantially as described.

2. In apparatus for forming tapered tubes, a stand of rolls having a continuous

helical male and female surface for bending the blank into approximately semi-circular form, said rolls engaging the inner and outer surfaces and the longitudinal edges of the blank with its edges radially disposed, a second stand of rolls having a continuous helical pass of circular form arranged to engage the outer surface of the blank to further bend it into circular form, and a third stand of rolls having a continuous helical pass of circular form arranged to engage the outer surfaces of the blank to bend it into circular form and bring its longitudinal edges into engagement with each other, and means to transfer the blank from one set of rolls to an adjacent set of rolls; substantially as described.

In testimony whereof, we have hereunto set our hands.

JAMES S. LEWIS.
WILLIAM H. POWELL.

Witnesses:

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