(No Model.)

J. R. JACKSON.

MACHINE FOR BENDING TUBE SKELPS.

No. 315,626. Patented Apr. 14, 1885.

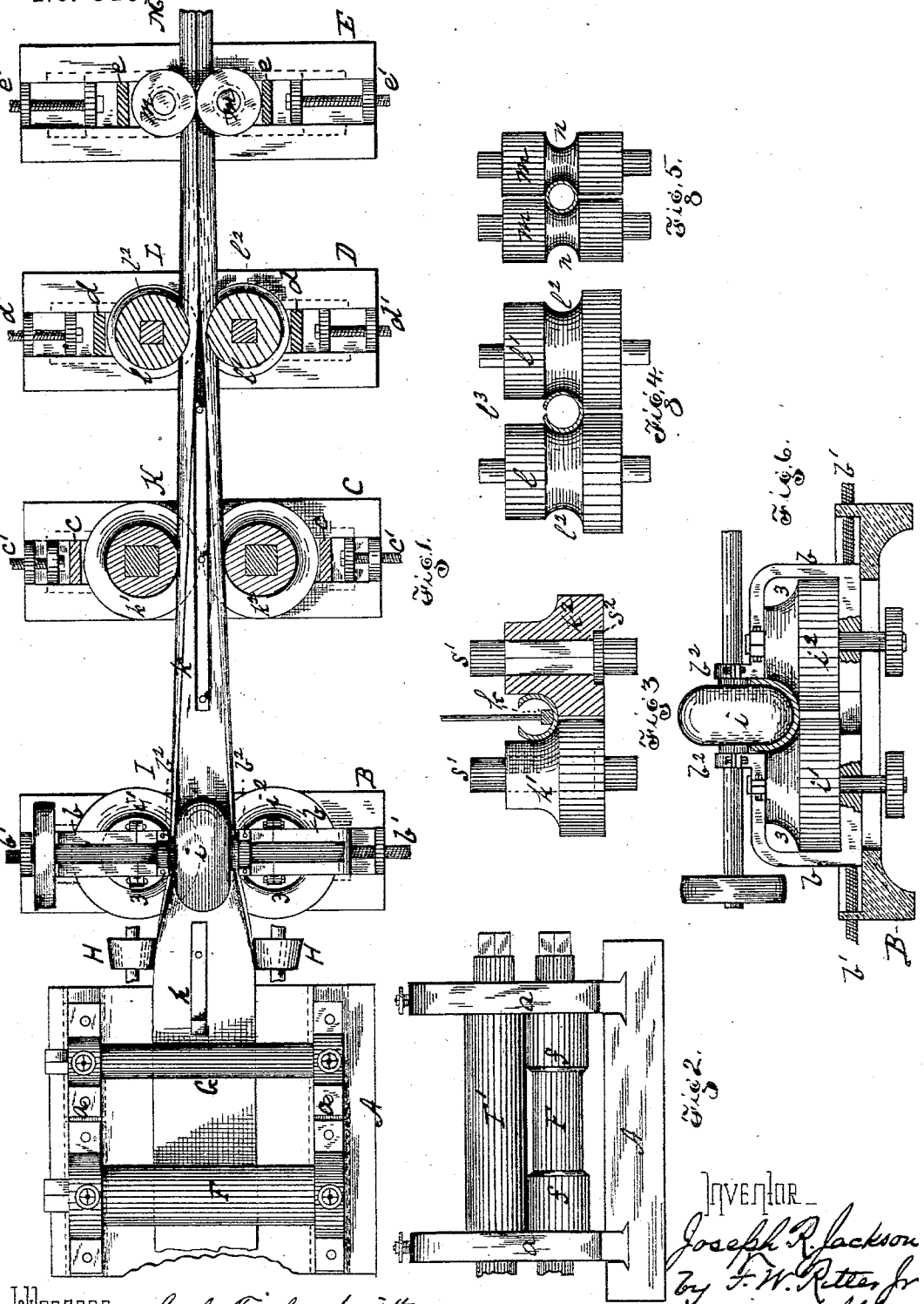


Fig. 1.

Fig. 5.

Fig. 4.

Fig. 3.

Fig. 6.

Fig. 2.

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UNITED STATES PATENT OFFICE.

JOSEPH R. JACKSON, OF PITTSBURG, PENNSYLVANIA.

MACHINE FOR BENDING TUBE-SKELP.

SPECIFICATION forming part of Letters Patent No. 315,626, dated April 14, 1885.

Application filed June 16, 1884. (No model.)

To all whom it may concern:

Be it known that I, JOSEPH R. JACKSON, a citizen of the United States, residing at Pittsburg, in the county of Allegheny and State of Pennsylvania, have invented certain new and useful Improvements in Machinery for Bending Tube-Skelp in the Formation of either Butt or Lap Weld Tubing; and I hereby declare the following to be a full, clear, and exact description of the same, reference being had to the accompanying drawings, in which—

Figure 1 is a plan view of machinery embodying my invention, the driving-gear being omitted for sake of clearness, as any of the many well-known forms of gearing may be employed, and the second and third forming-rolls being in transverse section. Fig. 2 is an elevation of scarfing-rolls which may receive the skelp directly from the well-known skelp-rolls if it is desired to work from the billet without reheating. Fig. 3 is an elevation of the second set of forming-rolls, one of said rolls being in section. Fig. 4 is an elevation of the third set of forming-rolls or the first set of tubing-rolls. Fig. 5 is an elevation of the fourth set of forming-rolls or final set of tubing-rolls. Fig. 6 is an elevation of the first set of forming-rolls, or, as they are sometimes called, the "crimping-rolls."

Like letters refer to like parts wherever they occur.

The object of the present invention is to provide simple and efficient machinery for bending skelp for the manufacture of either butt or lap weld tubing, which machinery shall be of a character adapted to operate upon skelp of any length, and may, if desired, be interposed between the billet-rolls and welding-rolls, so as to enable the several steps, from the breaking down of the billet to the completion of the tube or pipe, to be continuously carried on without loss of time or the additional expense due to reheating and transferring or handling the skelp in manner now commonly practiced.

While in general appearances the apparatus invented by me may bear resemblance to others of this class, wherein the bending of the skelp and forming of the tube are accomplished by rolls, it will be observed on closer examination that the elements have been so modified as to impart a very different character to the apparatus as a whole. For instance, the skelp has been conducted to the tongued roll by a guide-trough, which added to the friction and wear and required increased power in the machinery. This I have obviated by employing two tapering rolls in conjunction with a guide-mandrel, which rolls, in addition to serving as guides, give to the edges of the skelp a slight bend, which facilitates its entrance into the first set of forming-rolls and insures its proper relation to the bending-rolls. Also, where horizontal rolls have been employed, as is sometimes done, there is a tendency of the pipe to sag or take an oval form, which it is difficult to correct in the last rolls when the iron has become chilled, to obviate which I employ vertical rolls from first to last, as such rolls tend to lift the sides of the skelp and give it a true circular or tubular form.

There are other minor details of considerable importance to a satisfactorily operating machine which will hereinafter more fully appear.

I will now proceed to describe my invention more specifically, so that others skilled in the art to which it appertains may apply the same.

In the drawings, A B C D E indicate suitable beds or foundations for the support of the housings *a b c d e*, in which the rolls are journaled. The housings are preferably sliding housings, as indicated in the drawings, and those of the bending or forming rolls are provided with screws *b' c' d' e'*, so that the vertical rolls may be adjusted to or from each other to vary the size of the pass, align the rolls, or to withdraw a skelp from the rolls in case of necessity.

F F' indicate the scarfing-rolls, one of which may be plain, while the other has beveled collars *f*, which bevel the edges of the skelp as it passes between the rolls. Where butt-welding tubing is to be formed the scarfing-rolls may be omitted, or the collars *f* may be square, so as to true the edge of the skelp.

If desired, a pair of feed-rolls, G, may be interposed between the scarfing-rolls and the first set of bending-rolls.

H H represent the guide and edging rolls. These rolls are tapering rolls, or have the forms of conical frusta, are journaled in suit-

able housings, (not shown,) are arranged with the bases of the cones toward the first set of bending or forming rolls somewhat closer together than the width of the skelp to be operated on, and are power-driven.

Midway between the guide-rolls H H, and parallel to the axes thereof, is a suspended mandrel, *h*. The function of the rolls H H is to direct the skelp to the first set of forming-rolls, and at the same time to slightly bend or curl up the edge of the skelp, so as to facilitate its entrance into the rolls. The mandrel *h* coacts with these rolls to steady the skelp and prevent it from rising or buckling.

I indicates the first set of bending-rolls, which is composed of one horizontal roll or tongued roll, *i*, and two vertical grooved rolls, i' i^2, which coact therewith. The roll *i* has by preference the general form of a flattened sphere, as shown in the drawings, though any roll with a tongue of similar character would answer, while the rolls i' i^2 are vertical rolls having their upper portions cut out on the arc of a quarter of a circle, more or less, as indicated at 3, to receive the roll or tongue *i*. The shafts s' of the vertical rolls are polygonal in cross-section, so that the rolls which are movable thereon will revolve with the shafts. On the lower part of the shafts s' are shoulders or collars s^2, which support the rolls. The object of this construction is as follows: For manufacturing butt-weld pipe the rolls occupy the relative position shown in Fig. 3; but when a lap-weld pipe is required a liner is interposed between the shoulder s^2 and the corresponding roll so as to elevate the groove in one vertical roll, slightly above that in the other. This construction of the rolls independent of their shafts has also the advantage of permitting the rolls to be readily removed when the working-faces require dressing, while the adjustable character of the housings permits the wear of the rolls to be taken up. Upon the housings *b* of this pair of vertical rolls are bolted the journal-boxes b^2 for the shaft of the horizontal or tongued roll *i*, which, being a plain shaft, as shown, does not interfere with the lateral adjustment of the housings *b*. The second set of rolls, K, is similar to the vertical rolls of the first set, and is composed of two rolls, k' k^2, which are adjustable on their shafts, as before specified, and have their upper portions cut out on the arc of a quarter of a circle from the same center, but on shorter radii than those of the first set, so that the pass is of less width and of U form. Arranged in the central line of this pass, well down toward the bottom of the groove formed by the vertical rolls k' k^2 and extending nearly to the third set of forming-rolls, is a second suspended mandrel or guide, *k*, which serves to keep the skelp in the bite of the rolls k' k^2, while it is transformed into something more than a semicircle, as shown in Fig. 3. The third set of forming-rolls, L, (see Fig. 4,) is composed of two vertical rolls, l l', adjustable on their shafts, so that liners can be inserted, and have each a groove, l^2, struck from the same center, but something less than a semicircle, so that when the two rolls are adjusted the pass is less than a circle open above, as at l^3, and, though less in diameter than the preceding pass, is, nevertheless, slightly greater than the final pass or finishing set. The final set (see Fig. 5) may be two ordinary vertical rolls, *m*, each having a semicircular groove, *n*, equal to half the circumference of the finished tube, and following this set of rolls may be arranged a set of welding-rolls with or without the interposition of a reheating-furnace, as circumstances or necessity may dictate.

The operation of my devices is as follows: The skelp in a suitable condition, either by being brought directly from the skelp-rolls or from a skelp-furnace, is introduced between the scarfing-rolls F, and, having the edges beveled, passes either to the feed-rolls G, or, if they have been omitted, then directly beneath the suspended mandrel *h* and between the edging-rolls H H, which bend or curl up the edges of the skelp and guide it into the bite of the first set of forming-rollers, I. Of this set the upper or tongued roller, *i*, bends or gutters the skelp into a semicircular form, while the vertical rolls i' i^2, turning in the direction of the travel of the skelp, carry up the sides uniformly without any tendency to buckle or draw the skelp. The semicircular trough then passes under the suspended mandrel *k* and between the vertical rolls k' k^2, which turn in the upper edges slightly, as shown in Fig. 3. From these rolls it passes to the third set, Fig. 4, which nearly close the circle, and finally to the last set, Fig. 5, which completely close the circle, but are not intended to weld it. If a welded pipe is required, welding-rolls and other suitable devices should be added.

As shown in the drawings, the devices will produce a skelp bent for butt-welding; but if a lap-weld is wanted it is only necessary to insert a liner under each of the rolls of the same side in the several sets, and the skelp will be lapped accordingly.

Where in using the apparatus it is only desired to produce the unwelded tube, to be subsequently welded, I cool the rolls gradually in the well-known manner, flooding the final rolls, M; but where the bent skelp is to pass directly to the welding-rolls—or furnace—I omit the flooding of the rolls, for obvious reasons.

Having thus described the nature, operation, and advantages of my invention, what I claim, and desire to secure by Letters Patent, is—

1. In a machine for bending skelp, the combination, with the first set of bending or forming rolls, of horizontal tapering edge-rolls, and a suspended guide or mandrel, substantially as and for the purposes specified.

2. In a machine for bending skelp, the com-

bination, with a tongued roll and two vertical rolls having their upper portions or ends cut away to form a groove which coacts with the tongued roll, of horizontal tapering guide and edging rolls, arranged in front of the said tongue-and-groove bending-rolls, substantially as and for the purposes specified.

3. In a machine for bending skelp, the combination of two vertical rolls having their ends cut away to form conjointly a U-shaped groove, and a suspended mandrel arranged in the groove between the rolls, substantially as and for the purposes specified.

4. In a machine for bending skelp, the combination of two grooved rolls, one of said rolls movable and adjustable on its shaft, the shaft of the adjustable roll provided with a collar, and a detachable liner interposed between the collar of the shaft and the roll thereon, substantially as and for the purposes specified.

5. In a machine for bending skelp, the combination of horizontal tapering edging-rolls having a suspended mandrel arranged between them, a tongued bending-roll having two vertical rolls cut away at their ends to coact therewith, two vertical rolls cut away at their ends to form a U-shaped groove, and having a suspended mandrel arranged in said groove, and one or more sets of grooved vertical finishing or final rolls, substantially as and for the purposes specified.

In testimony whereof I affix my signature, in presence of two witnesses, this 14th day of June, 1884.

JOSEPH R. JACKSON.

Witnesses:
F. W. RITTER, Jr.,
C. A. NEALE.