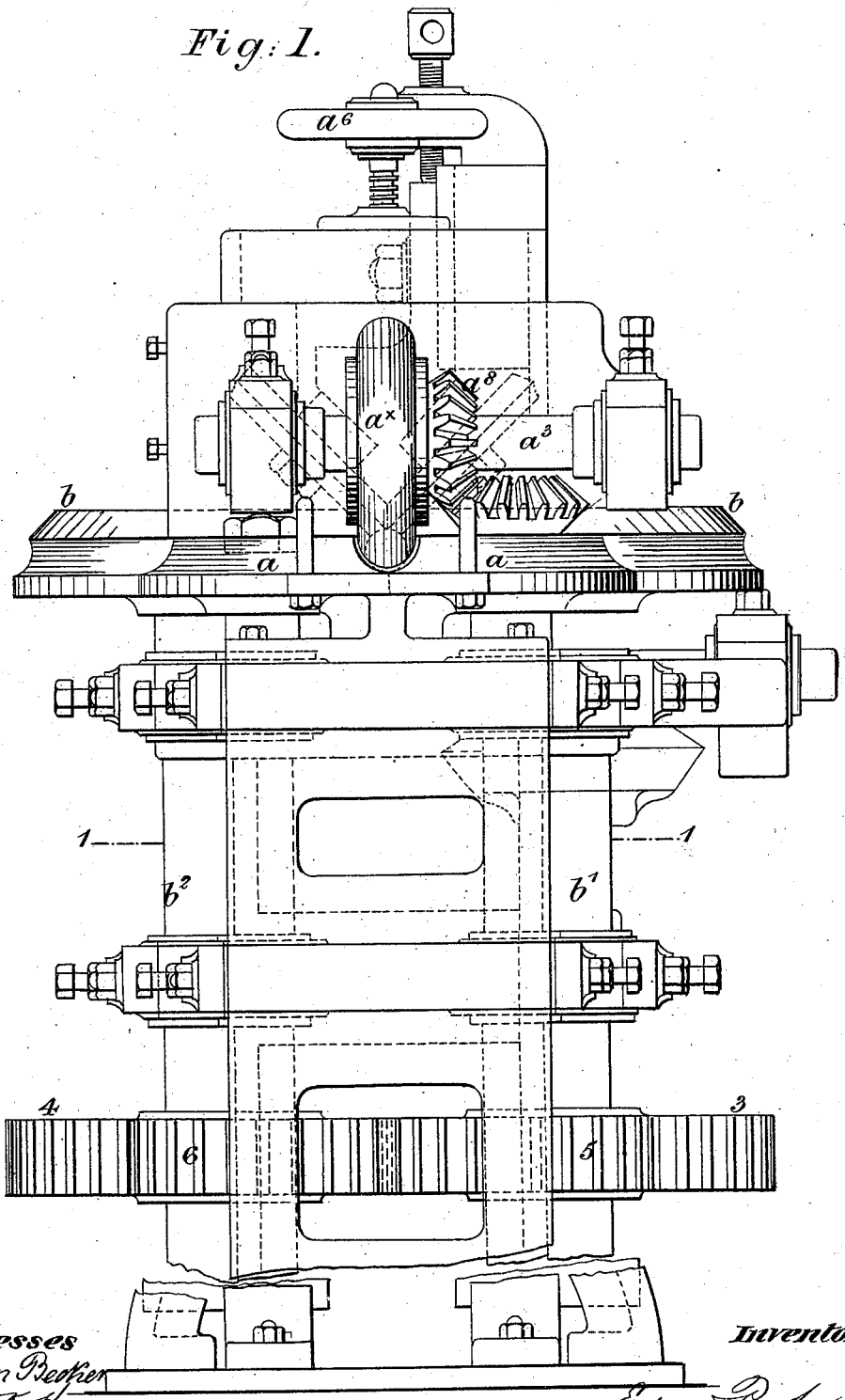
6 Sheets—Sheet 1.

E. PEYTON & T. BOURNE.

Machinery for the Manufacture of Metal-Tubes.

No. 217,141. **Patented July 1, 1879.**

Fig. 1.



Witnesses

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Fig. 2.

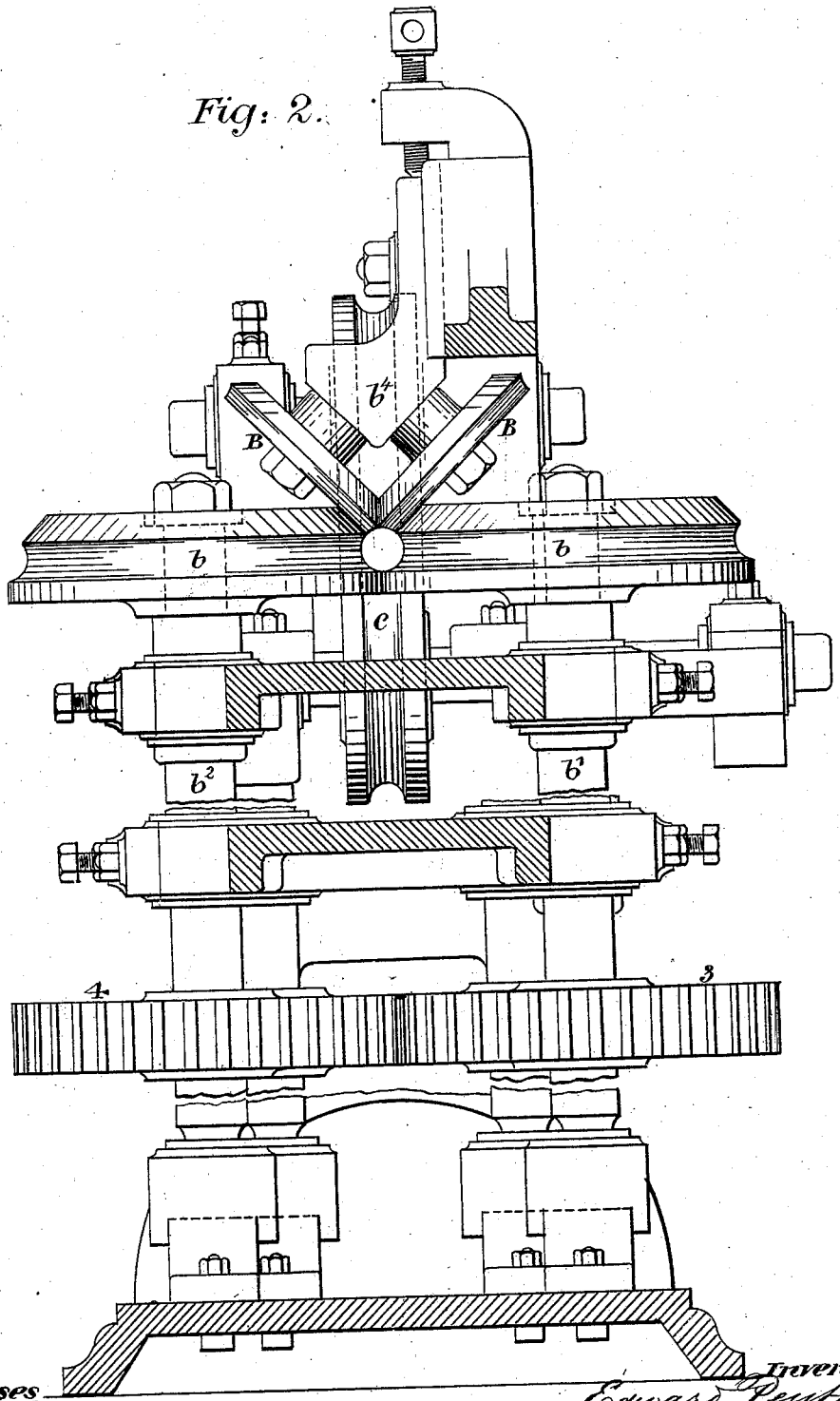

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Fig: 3.

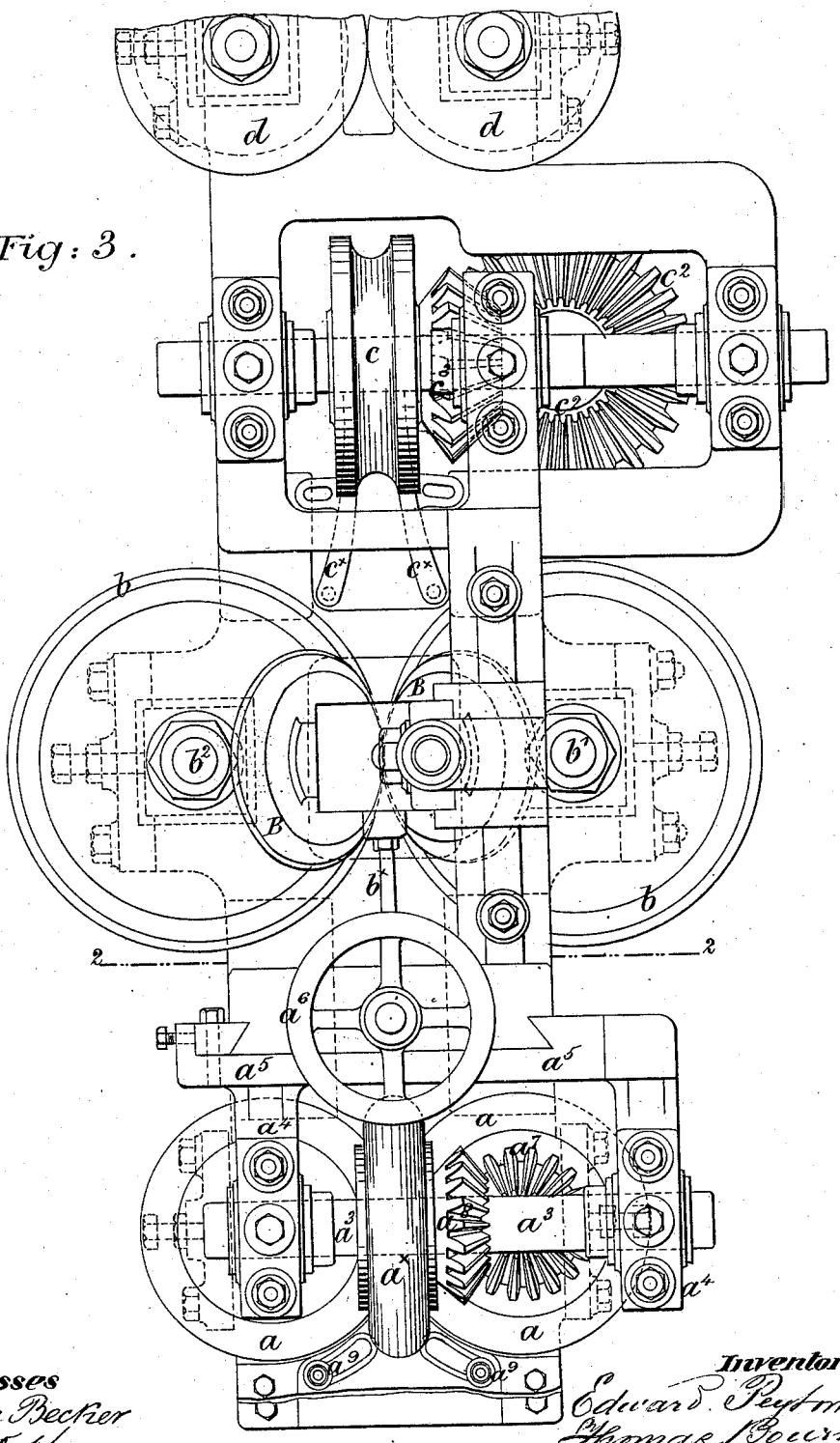

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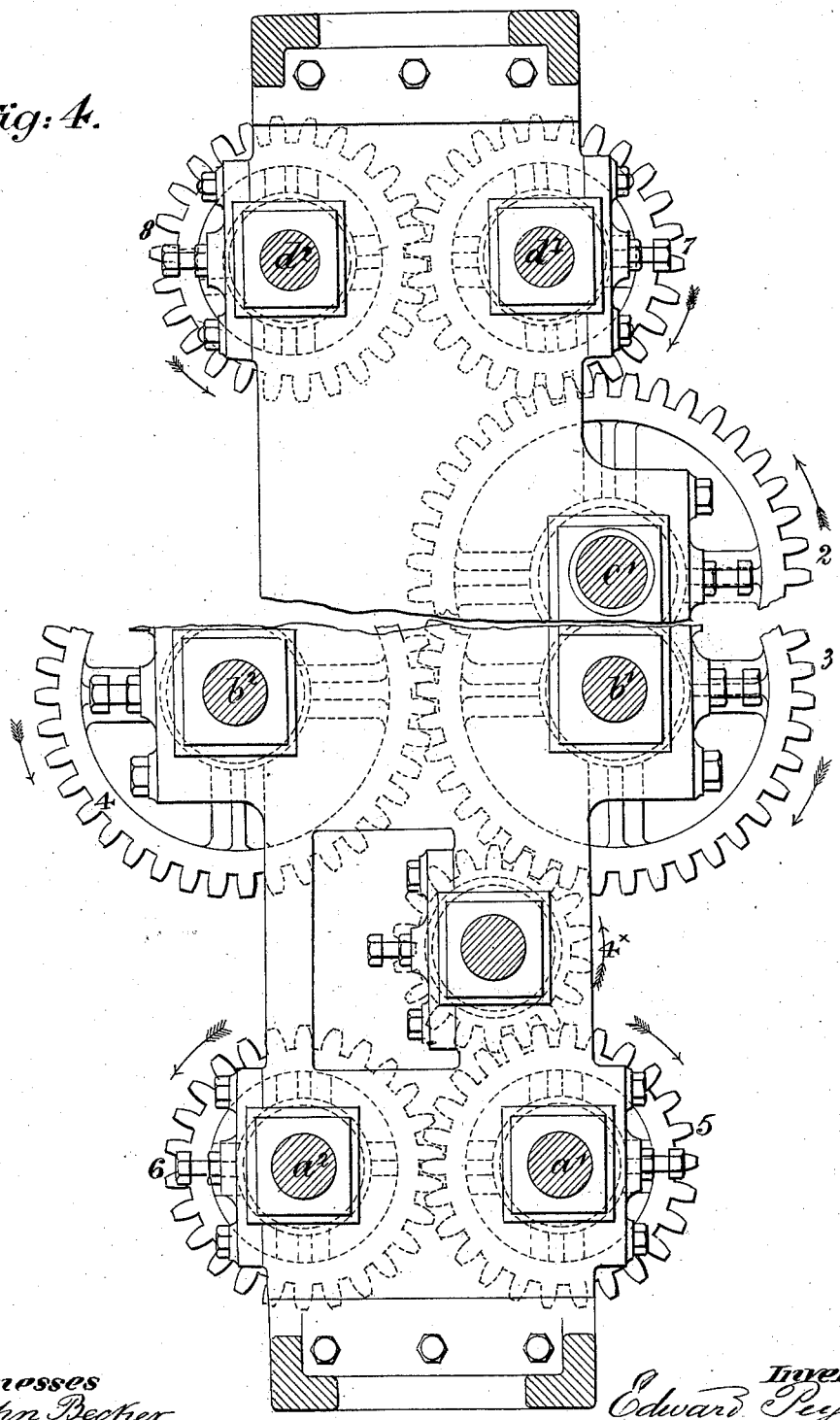
Fig: 4.



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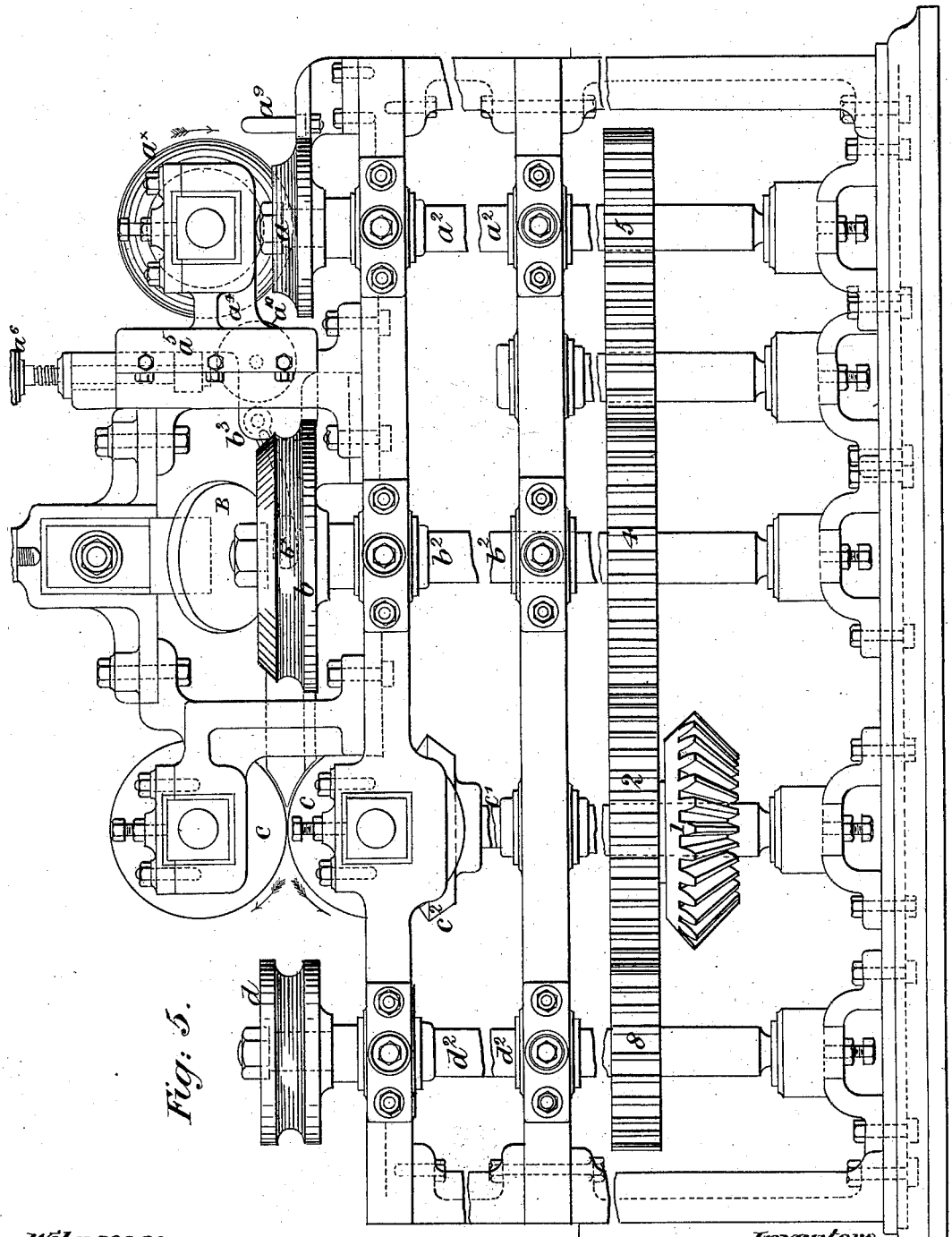

Fig. 5.

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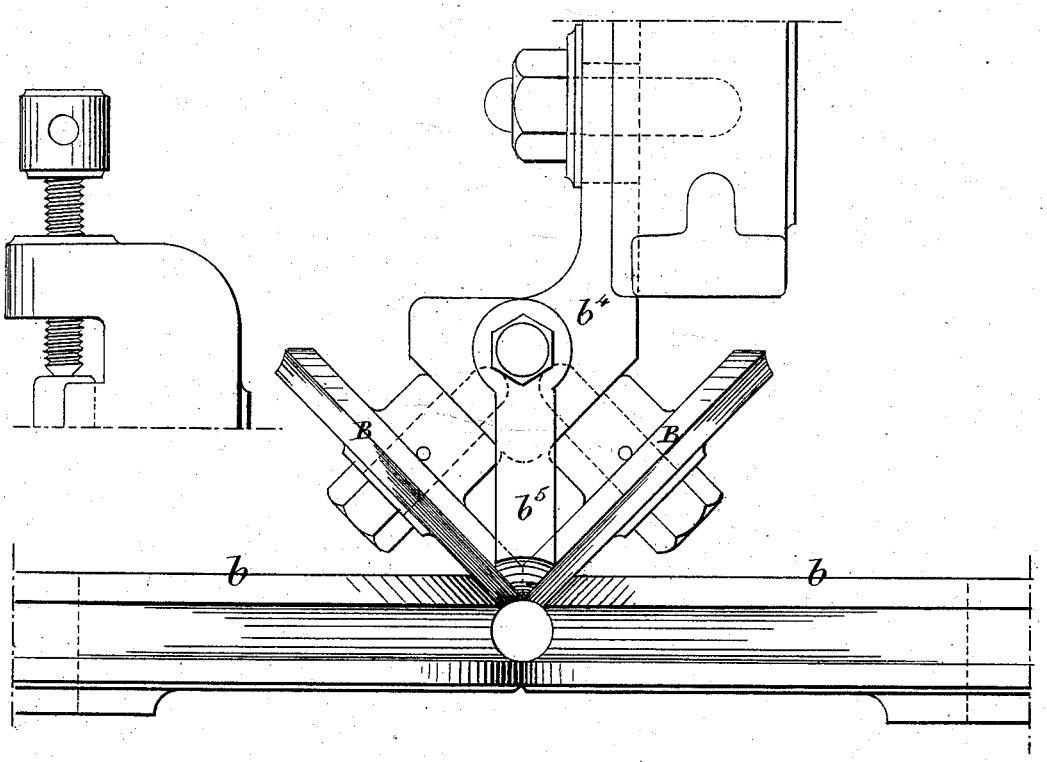
Fig: 6.



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UNITED STATES PATENT OFFICE

EDWARD PEYTON AND THOMAS BOURNE, OF BORDESLEY, COUNTY OF WARWICK, ENGLAND.

IMPROVEMENT IN MACHINERY FOR THE MANUFACTURE OF METAL TUBES.

Specification forming part of Letters Patent No. **217,141**, dated July 1, 1879; application filed April 21, 1879; patented in England, March 27, 1877.

To all whom it may concern:

Be it known that we, EDWARD PEYTON and THOMAS BOURNE, both of Bordesley, in the county of Warwick, England, have invented new and useful Improvements in Machinery for the Manufacture of Welded and other Wrought-Iron, Steel, and other Metal Tubes, which improvements are fully set forth in the following specification, reference being had to the accompanying drawings.

This invention relates to improvements in the machinery for the manufacture of welded and other wrought-iron and steel and other tubes, wherein a series of successive operations are combined in one machine or set of machines, whereby a finished welded or other wrought-iron or steel tube is produced from a heated plate or "skelp" in its passage through the machine, or other tubes may be otherwise produced.

In the manufacture of the welded tube the heated plate or skelp (which may advantageously have one end, previously to its being heated, bent up into a U or trough shape) is fed or guided into the machine between a set of three rolls, the peripheries of which, where they come together, form a U or trough shaped passage or opening, into and through which the plate or skelp at a welding-heat is passed.

Two of the first set of rollers are mounted on vertical axes, the third roller being mounted upon the end of a horizontal axis, and the three rollers are driven by suitable gearing so as to run at or near the same surface-speed.

The trough-shaped plate or skelp is guided in its passage to a second set of four rolls arranged in connection with a mandrel, as hereinafter described, and shown in the drawings annexed. The rolls force together the lips or edges of the trough-shaped plate or skelp and weld them firmly together. The tube, thus far welded and formed in its progress, is guided between a pair of grooved rolls, by which it is further compressed and delivered from the machine in a complete and finished condition; or, if desired, it may be passed through other pairs or sets of finishing-rolls.

In order that our improvements may be clearly understood and readily performed or carried into practice, we will proceed to describe the drawings hereto annexed.

Referring to the drawings, Figure 1 shows an end view, Fig. 2 a vertical section, Fig. 3 a plan, Fig. 4 a plan in section, and Fig. 5 a side view, of a complete set of machinery arranged and constructed in accordance with our invention for manufacturing welded wrought-iron, steel, or other tubes.

$a\ a\ a^{\times}$ is the first set of three rolls, between which the plate or skelp at a welding-heat for forming a tube is fed or guided.

The end of the skelp should be previously bent up into a U or trough shape, roughly corresponding with the space formed by the peripheries of the rolls $a\ a\ a^{\times}$ where they come together.

From the rolls $a\ a\ a^{\times}$ the plate thus bent into a trough shape is conducted by guiding-surfaces into and between the second set of four rolls, $b\ b$ and B B.

The edges or lips of the plate or skelp are closed in upon and around the enlarged tapering head of the mandrel $b^{\times}$, carried by an arm fixed to the bracket b^{3} on the framing of the machine.

The edges of the plate or skelp, as it passes between the rolls $b\ b$ and B B, are thus effectually welded together upon the mandrel $b^{\times}$, so as to form a welded tube.

The two upper rolls, B B, are set so as to act at an inclination to one another, and they produce a very important effect on the lips or edges of the bent plate or skelp.

The sides of the skelp are so shaped and fed in by the feeding-rolls that they are relatively of the same shape and size, and, when the lips or edges are closed in and pressed by the inclined rolls B B, the metal is confined, and the particles of one lip are forced into and among the particles of the other lip, so as to produce a perfect weld in a manner that has not hitherto been practicable.

The tube so formed by the combined action of the four rolls $b\ b$ and B B is further compressed and finished in its passage between a third set or pair of vertical rolls, $c\ c$, from which it passes onto and between the fourth set or pair of horizontal rolls, d, and is finished fit for use. Other pairs of rolls may also be employed when it is thought advisable to do so.

Motion is communicated to the four sets of

rolls a, b B, c, and d in the following manner: 1 is a bevel-wheel fixed on the axis c^1, which receives motion from a steam-engine or other motive power. c^2 is a bevel-wheel fixed on the upper end of the axis c^1, which gives motion to a bevel-wheel, c^3, fixed on the axis of the lower finishing-roll, c. The toothed wheel 2, fixed on the axis c^1, gives motion to the toothed wheel 3, fixed on the axis b^1 of one of the horizontal rolls b. The toothed wheel 3 also gives motion to the toothed wheel 4, fixed on the axis of the other horizontal roll b, to give motion thereto.

$4^\times$ is an intermediate toothed wheel, which gives motion to the toothed wheel 5, fixed on the axis a^1 of one of the horizontal feed-rolls a. The toothed wheel 5 also gives motion to the toothed wheel 6, fixed on the axis a^2 of the other horizontal feed-roll a.

The vertical feed-roll $a^\times$ is mounted on the horizontal axis a^3, carried by the brackets a^4 on the slide a^5, which can be raised and lowered by the hand-wheel a^6, so as to adjust the position of the vertical feed-roller $a^\times$ as required. The feed-roller $a^\times$ is driven by the bevel-wheel a^7, fixed on the upper end of the axis a^1, taking into the bevel-wheel a^8, fixed on the axis a^3 of the roll $a^\times$.

a^9 a^9 are adjustable stops or guides, arranged in front of the feed-rolls a. a^{10} is a guide-roller, for guiding the bent plate from the rolls a to the rolls b B. The two upper welding-rolls, B B, placed at an angle, are mounted and turn freely on studs carried by the sliding bracket b^4, which is capable of adjustment, as shown.

A guide, b^5, as shown in Fig. 6, may be arranged between the angle formed by the upper pair of welding-rolls, b, if desired. The tube, as it leaves the welding-rolls b, is conducted by the guides $c^\times$ between a pair of vertical finishing-rolls, c, the lower one of which receives motion from the bevel-wheel c^2, on the axis c^1, taking into the bevel-wheel c^3, fixed on the axis of the lower roller, c, as previously described. From the roll c the welded tube passes forward between the pair of horizontal delivering-rolls d d, which are driven in the following manner: The toothed wheel 2 on the axis c^1 takes into and drives the toothed wheel 7, fixed on the vertical axis d^1 of one of the delivering-rolls d, and the toothed wheel 7 takes into and drives the toothed wheel 8, fixed on the axis d^3 of the other delivering-roll d, as will be readily understood on examining the drawings.

We find it advantageous in some cases to shape the orifice formed by the peripheries of the four welding-rolls b b and B B as indicated in Fig. 2 of the drawings, whereby the thickness of the metal is somewhat increased at the joint, and a more perfect joint is thereby made at the welding-point.

In the manufacture of some descriptions of welded tubes the mandrel may be dispensed with, the welding being effected without internal resistance; and the tubes may also be formed with lap in place of butt joints, as previously described, in which case one side of the trough-shaped skelp formed by the feeding-rolls is made somewhat higher than the other, and the welding-rolls must be modified so as to form a lap-joint.

The machinery previously described may be employed for manufacturing iron, steel, or other metal tubes, the joints of which are not welded either from heated or cold plates or strips of metal.

Although we have described a combination of four welding-rolls, which we have found may be most advantageously used with our feeding-rolls, other combinations of welding-rolls—as, for instance, two horizontal and one vertical roll—may in some cases also be used therewith.

Having thus described the nature of our improvements, and the manner of performing or carrying the same into practice, we would remark that we do not intend to claim separately any of the parts which are well known and in common use, and we are aware that it is not new to employ welding-rolls to weld the joints of tubes, and we make no general claim to such rolls; but

What we claim is—

1. The shaping and feeding rollers a a and $a^\times$ and welding-rolls b b and B B jointly with the mandrel $b^\times$, the whole constructed and operating substantially as hereinabove shown and described.

2. The improved arrangement and combination of the three feed-rolls a a and $a^\times$, for shaping the plate or skelp and feeding it into welding-rolls or machinery for the manufacture of welded and other wrought-iron and steel or other tubes, substantially as described.

3. The improved arrangement and combination of the four welding or closing rolls b b and B B, two of them being inclined to one another and to the other two, which are horizontal, for welding or closing the joint in the manufacture of welded and other wrought-iron or steel or other tubes, substantially as hereinbefore described.

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