

(No Model.)

2 Sheets—Sheet 1.

W. S. McCracken.
TUBE ROLLING MACHINE.

No. 582,668.

Patented May 18, 1897.

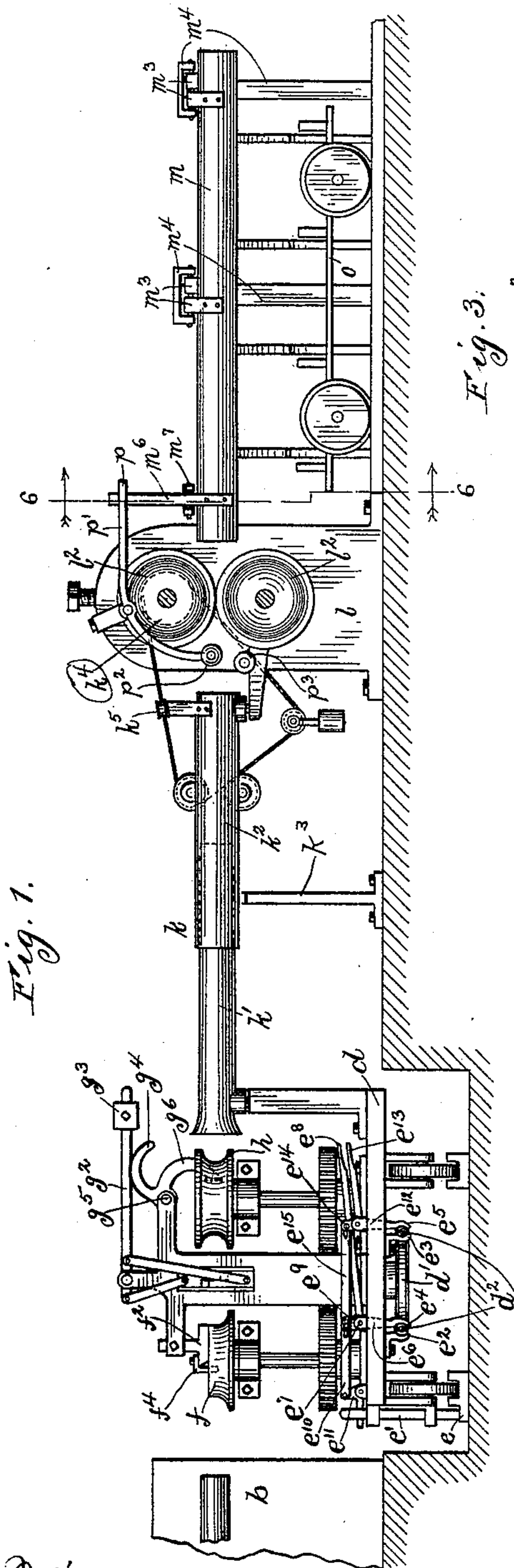


Fig. 3.

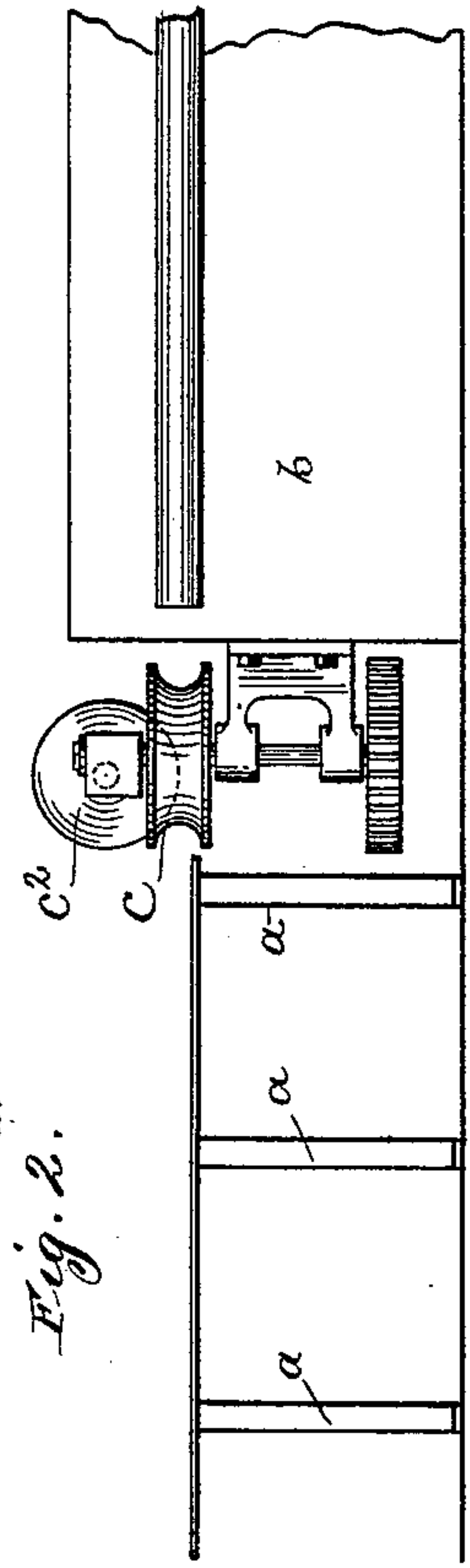
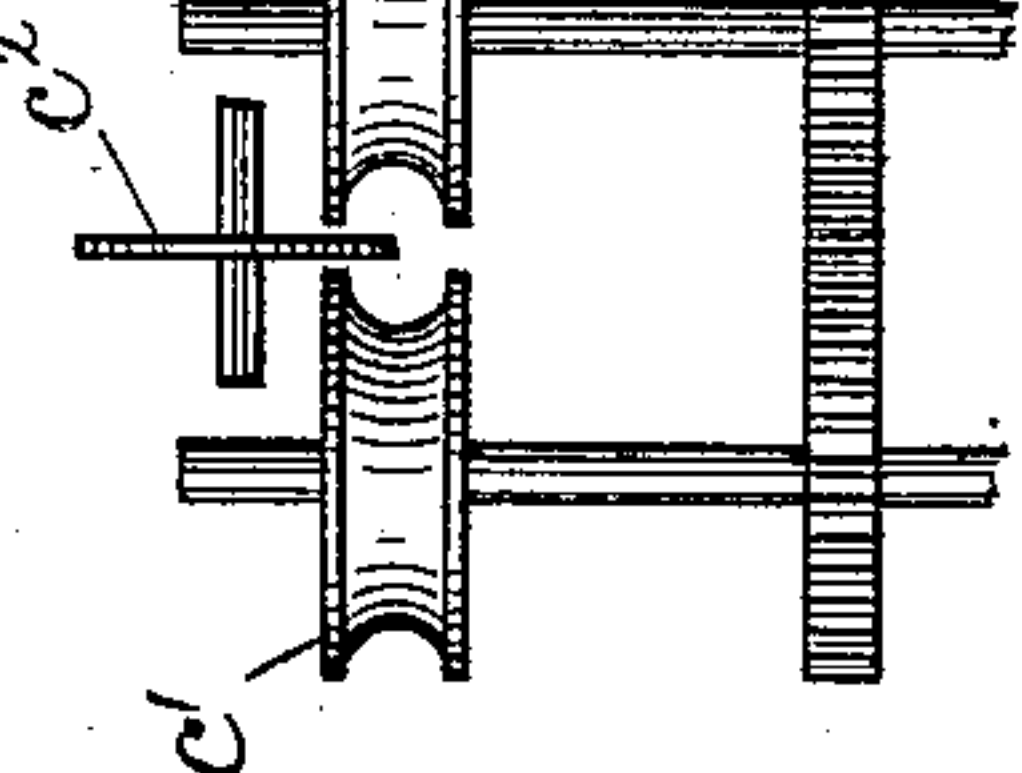


Fig. 7.

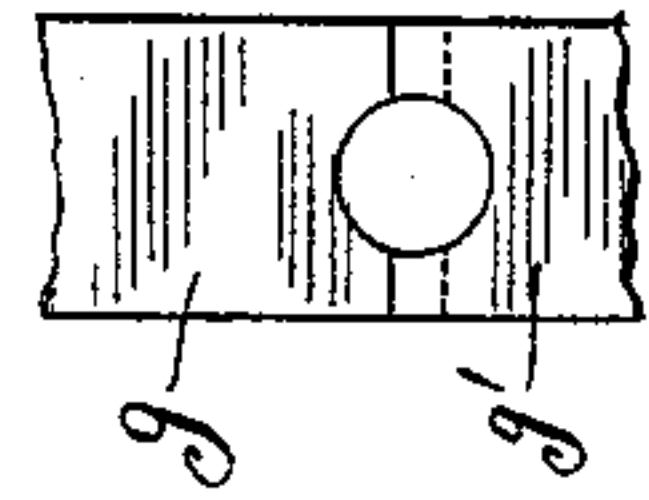


Fig. 6.

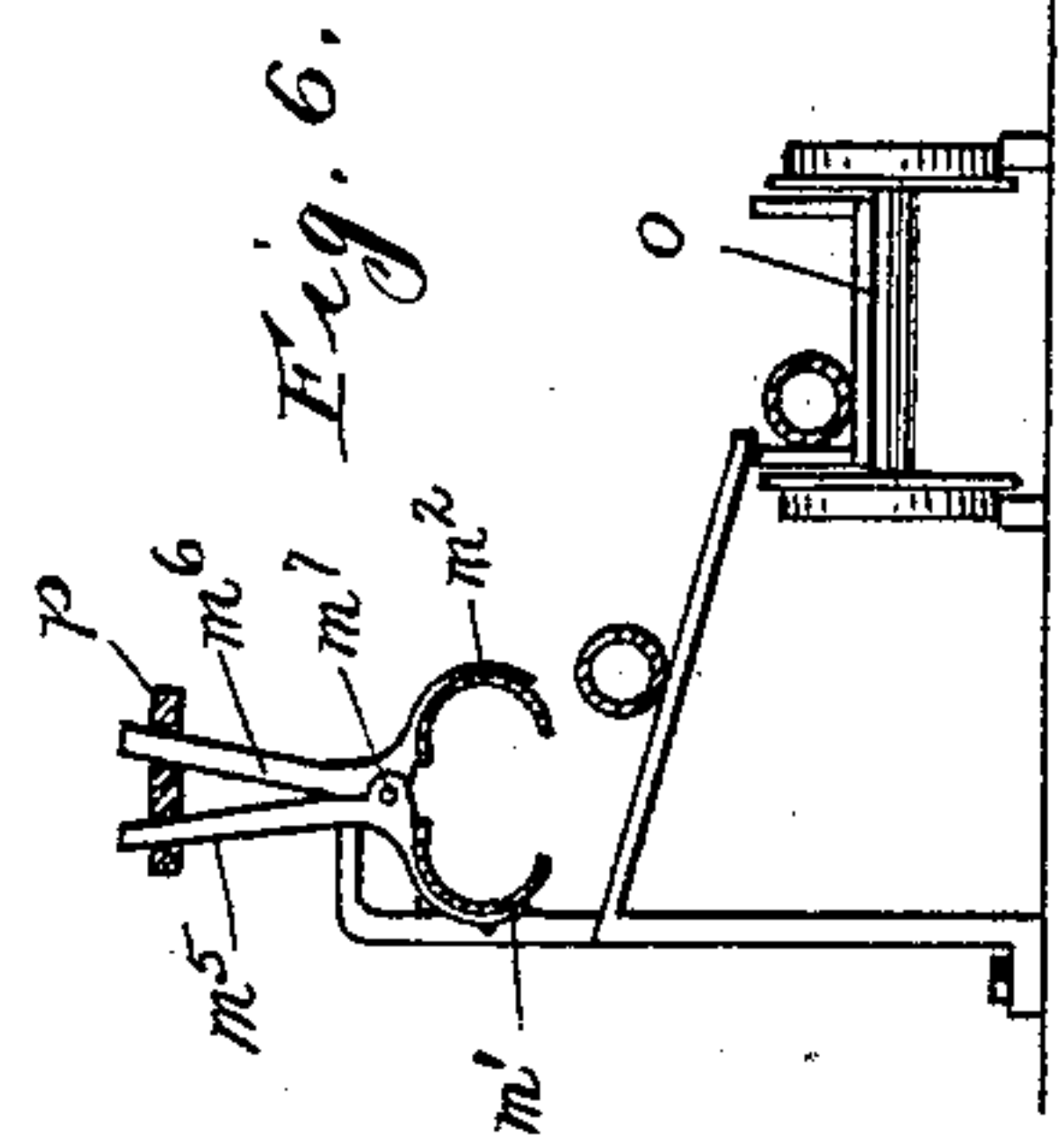


Fig. 5.

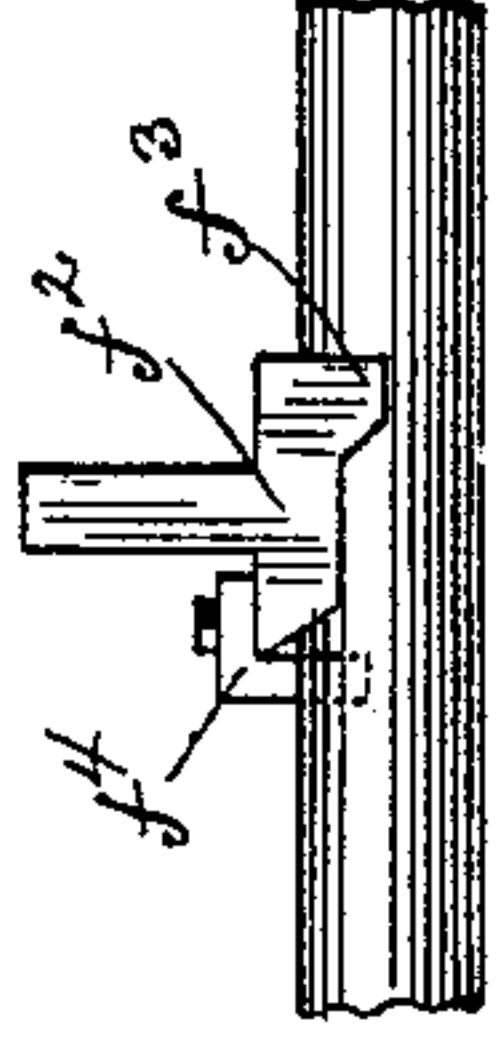
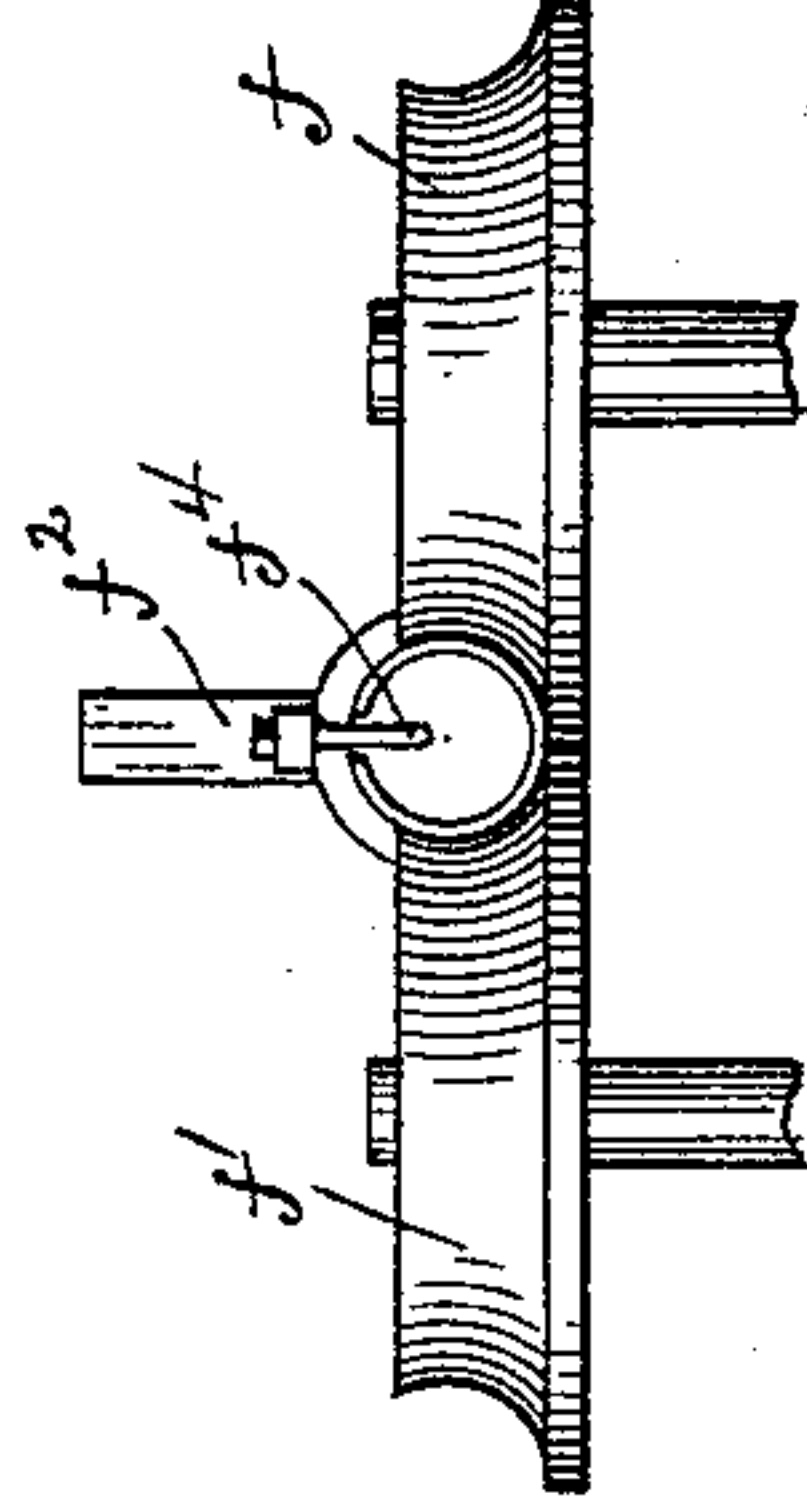


Fig. 4.



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(No Model.)

2 Sheets—Sheet 2.

W. S. McCracken.
TUBE ROLLING MACHINE.

No. 582,668.

Patented May 18, 1897.

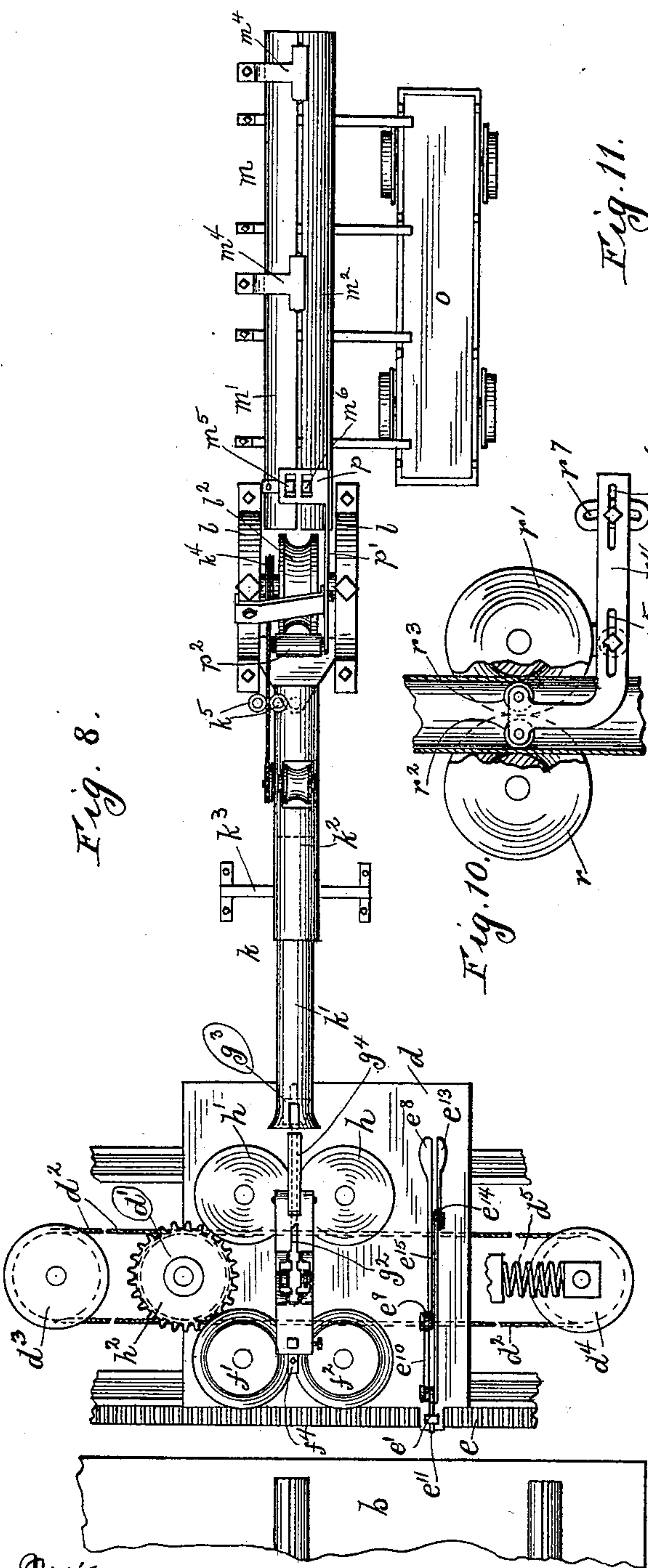


Fig. 8.

Fig. 11.

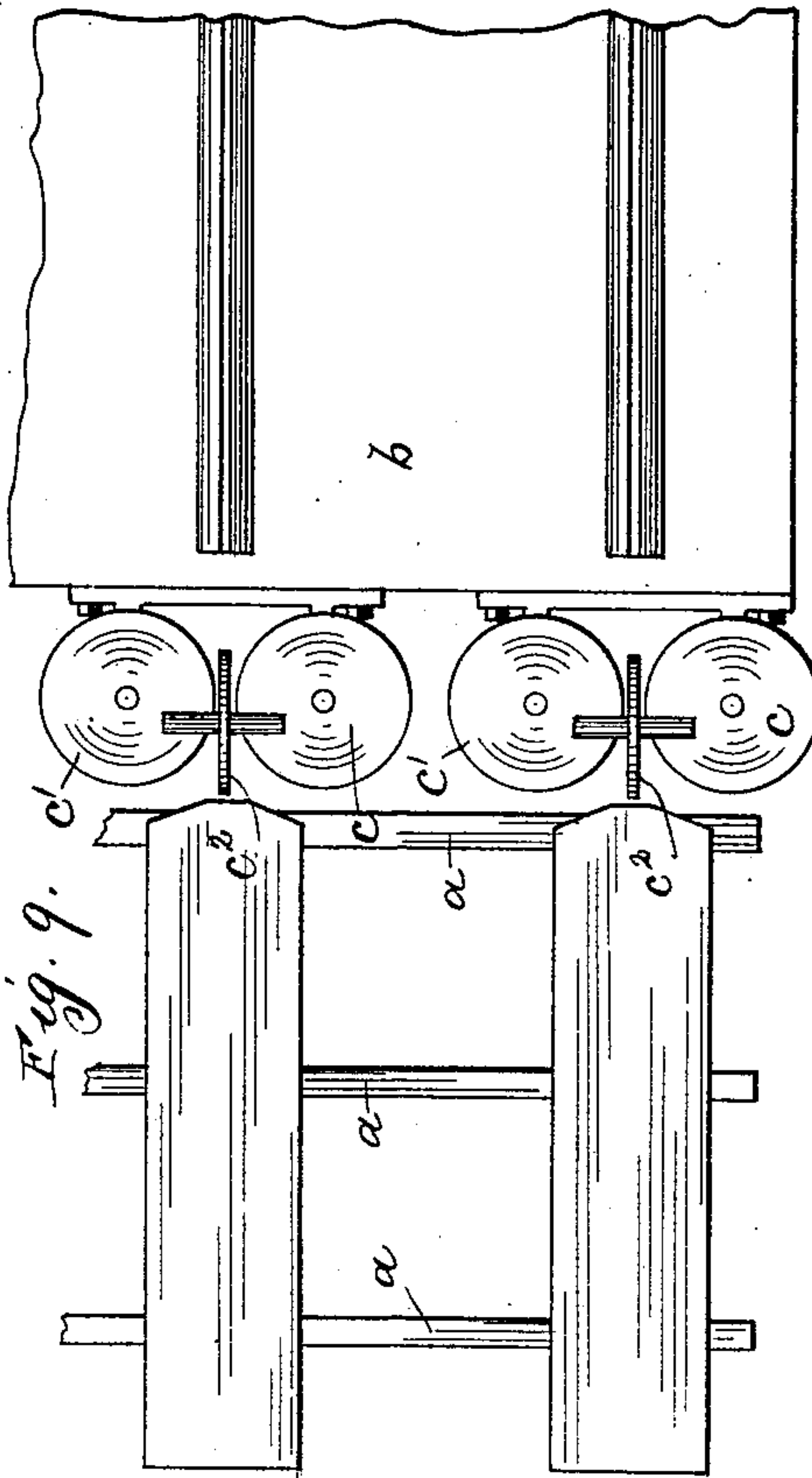
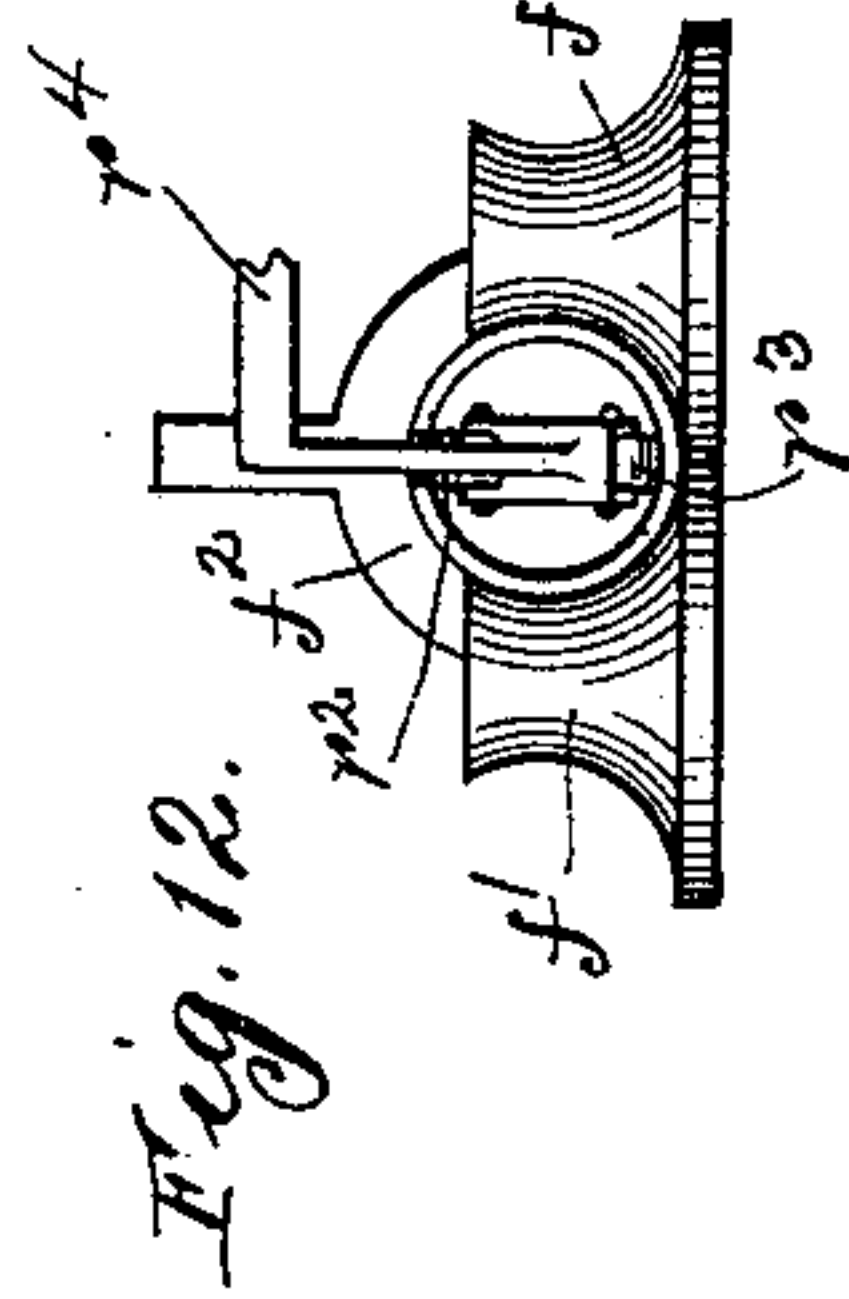
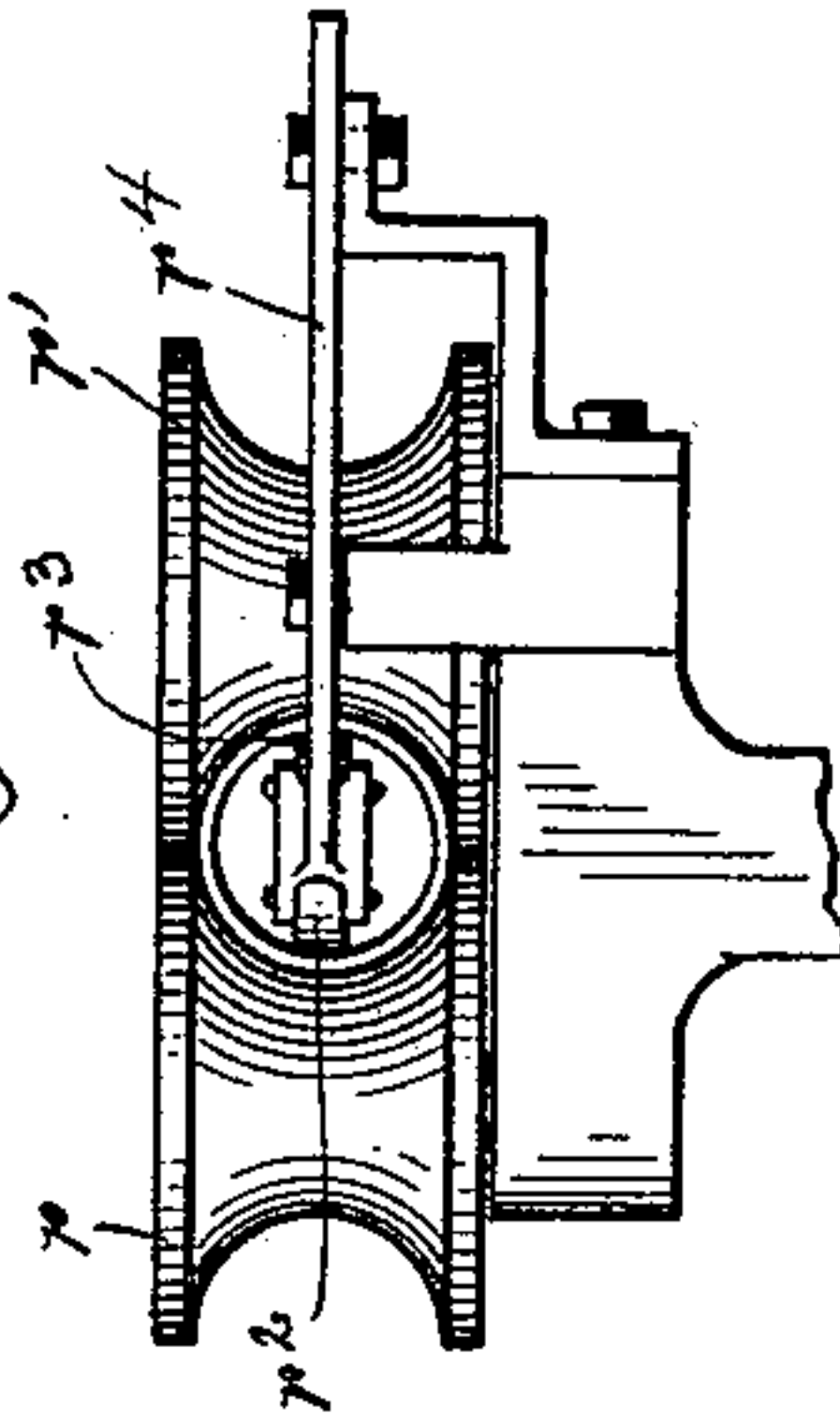
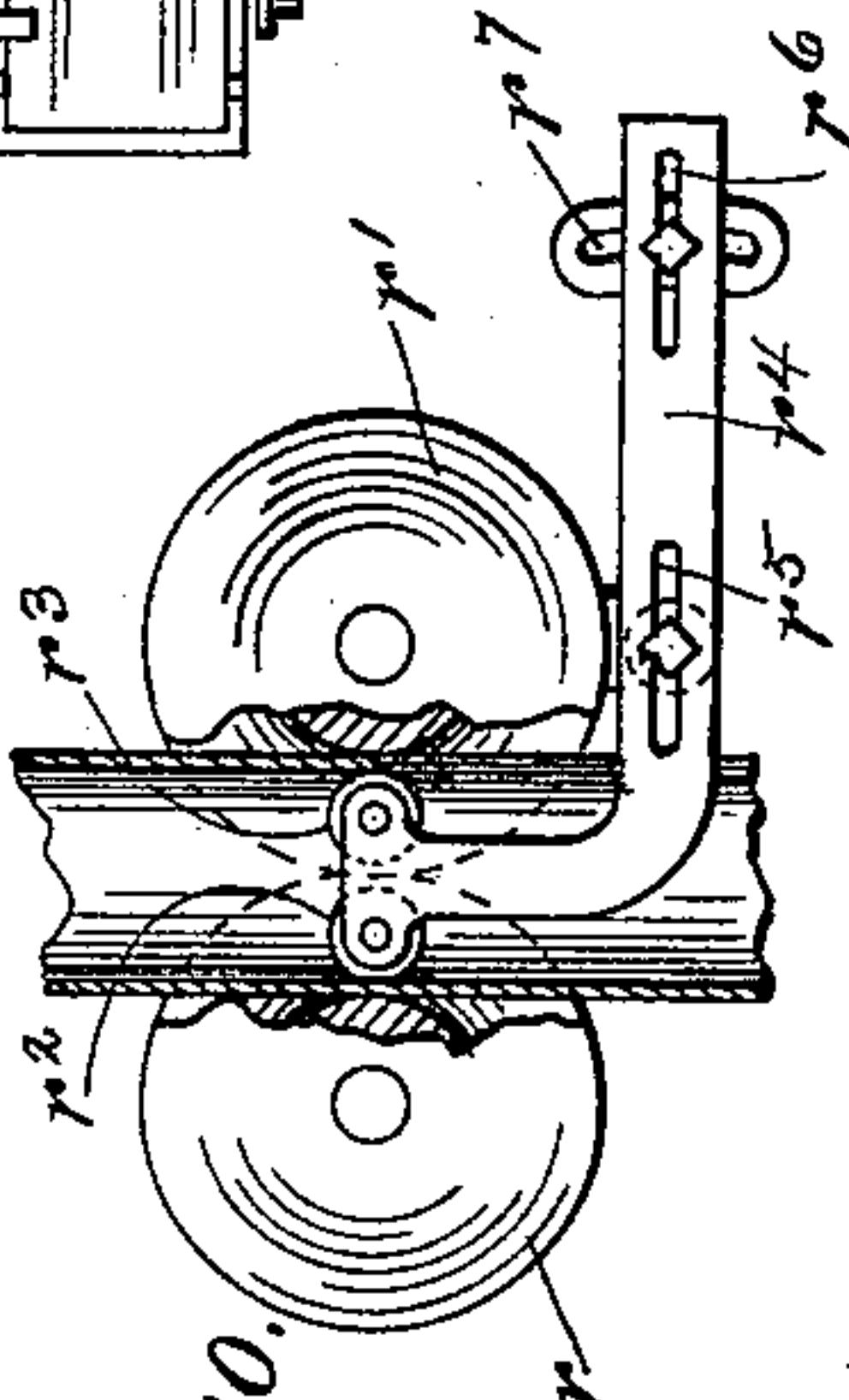


Fig. 9.

Fig. 10.



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UNITED STATES PATENT OFFICE.

WILLIAM S. MCCRACKEN, OF KEWANEE, ILLINOIS.

TUBE-ROLLING MACHINE.

SPECIFICATION forming part of Letters Patent No. 582,668, dated May 18, 1897.

Application filed May 22, 1896. Serial No. 592,655. (No model.)

To all whom it may concern:

Be it known that I, WILLIAM S. MCCRACKEN, a citizen of the United States, residing at Kewanee, in the county of Henry and State of Illinois, have invented a certain new and useful Improvement in Tube-Rolling Machines, of which the following is a full, clear, concise, and exact description, reference being had to the accompanying drawings, forming a part of this specification.

My invention relates to a tube-rolling machine, my object being to provide an improved machine whereby more perfect tubes may be formed than heretofore and at a greatly decreased cost, the machine of the present invention enabling the dispensing with a considerable amount of the labor heretofore necessary.

It has been the usual practice in the formation of tubes to draw the heated skelps through a bell, thus bending the skelp into tubulate form and welding the edges together, the end of the skelp being grasped and drawn through the bell by means of a pair of tongs which are attached to an endless chain traveling upon a swinging carriage. In accordance with the present invention the bell, tongs, endless chain, and swinging carriage are dispensed with, and the skelp after being fed from the furnace to the tube-forming machine is formed complete and deposited on a carriage without further manual attention. The labor heretofore necessary for manipulating the tongs, swinging carriage, &c., and for handling the tubes and for repairing the tongs and bells is dispensed with, and I am enabled to accomplish with the labor of five men what has necessitated the employment of thirty men by the practice of the prior art.

I have illustrated my invention in the accompanying drawings, in which—

Figure 1 is a view in elevation of the tube-forming mechanism. Fig. 2 is a view in elevation of the table and bending-rolls in the rear of the furnace. Fig. 3 is a front view of the bending-rolls. Fig. 4 is a front view of the welding-rolls and dies. Fig. 5 is a side view thereof. Fig. 6 is a view in detail of the device for separating the parts of the receiver. Fig. 7 is a front view of the chill-dies. Fig. 8 is a plan view of the tube-form-

ing mechanism. Fig. 9 is a plan view of the mechanism shown in Fig. 2. Fig. 10 is a view of the rolls for forming lap-welds. Fig. 11 is an end view thereof. Fig. 12 is a view of the same, showing the employment of a stationary die with the rollers.

Like letters refer to like parts in the several figures.

The plates or skelps from which the tubes are formed are fed from the table *a* into the furnace *b*, in which they are heated for passage through the welding and forming mechanism. In the rear of the furnace are provided bending-rolls *c c'*, between which the plates are passed to impart thereto a tubulate form. A thin roller *c²* extends between the peripheries of the rolls *c c'* to separate the edges of the bent plate and to prevent the twisting of the tube. In front of the furnace is provided a carriage *d*, which travels back and forth in front of the furnace, the carriage being mounted upon wheels traveling upon rails. The carriage carries a drum or pulley *d'*, around which passes an endless chain or rope *d²*, the rope then passing around the pulleys *d³ d⁴*, the pulley *d³* being positively driven, while the pulley *d⁴* is an idler, and is resiliently mounted through the agency of a spring *d⁵* or otherwise to thus maintain the rope taut. Alongside the track upon which the carriage travels is a rack *e*, with which a sliding bar or arm *e'* upon the carriage is adapted to engage to lock the carriage at rest in any position.

The to-and-fro movement of the carriage is effected by clamping the carriage to the rope *d²* upon one side or the other, according to the direction it is desired to move the carriage. Upon the carriage are provided the stationary clamping-jaws *e²* and *e³*, and opposite these are provided the movable jaws *e⁴* and *e⁵*, between which and the stationary jaws the rope or cable is adapted to be clamped, thus causing the carriage to move in one direction or the other. The jaw *e⁴* is carried upon the arm *e⁶* of a bell-crank pivoted at *e⁷* and having an arm or foot-lever *e⁸* and an arm *e⁹*, which is connected by a link *e¹⁰* with a bell-crank *e¹¹*, the opposite arm of which engages the sliding locking-bar *e'*. When the lever *e⁸* is depressed by the oper-

ator, the cable is locked between the jaws e^2 and e^4 , and the locking-bar is raised out of engagement with the rack. The jaw e^5 is mounted upon the arm e^{12} of a bell-crank having an operating-lever e^{13} and an arm e^{14} , connected by a link e^{15} with the bell-crank e^{11} , so that when the operating-lever e^{13} is depressed the cable is clamped between the jaws e^3 e^5 and the carriage is moved in the opposite direction. Slots are provided in the ends of the links e^{10} e^{15} to produce freedom of movement, which permits one clamping-jaw to remain at rest when the other is operated.

Upon the carriage are provided the welding-rolls f f' , between which the bent plate is passed to weld the edges together. Above the rolls is a die f^2 , the lower face of which coacts with the peripheries of the rolls to constitute a circular bore, through which the tube is passed to press the edges together and effect the weld. The die engages the edges to be welded and causes a drag on the metal, which forms a perfect weld.

In front of the die f^2 is an arm f^4 , which extends into the slot between the edges of the bent plate to guide the same and prevent twisting. The lower edge of the die rests upon the upper faces of the rolls, and as this has a tendency to form a seam or fin on the tube a tailpiece f^3 is provided, which extends below the upper faces of the rolls and removes the seam as the tube passes the tailpiece. The tube then passes between the dies or plates g g' , which engage the periphery of the tube and remove the scale and irregularities therefrom. As illustrated more clearly in Fig. 7, the dies are in the form of plates overlapping at the ends, the end of the die g being shown as lying behind the die g' . Each of the dies is cut away at the end to form semicircular openings, which coact to form a circular bore, through which the tube is passed to remove the scale and irregularities therefrom. The dies are mounted upon rods pivoted to the opposite sides of the fulcrum of the lever g^2 , carrying upon the end a weight g^3 . Engaging the under edge of the lever is an arm g^4 , pivoted at g^5 , and mounted to move with an arm g^6 , the end of which rests in the path of the tube. As the tube advances through the dies the end of the tube strikes the arm g^6 , thus raising the arm g^4 and rocking the lever g^2 to press the die into contact with the tube.

After passing through the dies the tube passes between the rolls h h' . The rolls h h' , as well as the rolls f f' , are driven by a gear-wheel h^2 , mounted upon the drum or pulley d' .

After passing through the rolls h h' the tube passes to the conductor or conveyer k , the end of which is pivoted to the carriage. The tube-conductor is formed in two telescoping portions k' k^2 , the portion k^2 being pivoted to the frame l of the finishing-rolls l' l^2 . A table k^3 is provided, upon which the conductor k rests and travels back and forth.

Rolls are provided in the conductor for feed-

ing the tube therethrough, one of the rolls being driven by a chain passing over a pulley k^4 and guided by idlers k^5 k^5 on the conveyer.

The tube is fed from the conductor k to the finishing-rolls l' l^2 and from thence to the receiver m , from whence it passes to the carriage o by the opening of the receiver, thus permitting the tube to fall out. The receiver is formed in two semicircular halves m' m^2 , secured to plates or bars m^3 m^3 , pivoted at the upper ends to the standards m^4 , so that when rocked upon their pivots the parts m' m^2 may be separated at the lower ends to permit the tube to fall out. To effect the opening and closing of the receiver, arms m^5 m^6 , pivoted together at m^7 , are provided upon the respective parts m' m^2 , which pass through openings in a plate p , carried upon the end of a pivoted lever p' , the lever carrying upon the opposite end a roller p^2 , which rests in advance of the finishing-rolls and opposite a stationary roller p^3 . When the tube passes between the rollers p^2 p^3 , the roller p^2 is raised, thus rocking the lever p' and depressing the plate p to force the upper ends of the pivoted arms apart and close the lower edges of the parts m' m^2 together.

When the tube has passed from between the rollers p^2 p^3 , the weight of the roller p^2 rocks the lever p' to raise the plates p , and thus separate the parts m' m^2 and permit the tube to fall into the carriage.

When tubes with a lap-weld are to be formed, I replace the rolls and die by the rolls illustrated in Figs. 10 and 11.

The peripheries of the rolls r r' coact to form a complete circle and the edges of the tube are forced together and welded in passing between the rolls r r' , and upon the interior of the tube are provided two small rollers r^2 r^3 , which bear against the edges to be welded. The rollers are mounted upon an arm r^4 , which passes through the slot between the separated edges of the tube as the same passes to the rolls.

The arm r^4 carries two longitudinal slots r^5 r^6 , through which pass bolts for clamping the arm in position. The end bolt passes through a slot r^7 in the support extending at right angles to the slot r^6 , so that the angle of the arm may be changed to vary the distance from edge to edge of the rollers, thus varying the pressure upon the interior of the tube.

In Fig. 12 I have illustrated the interior rollers as added to the rolls and die of Fig. 1, whereby lap-welds may be formed. One of the rollers is placed opposite the stationary die, so that the metal at the weld is pressed against the die. The same rolls and die may thus be used for either lap or butt welds by the addition of the interior rollers.

Having described my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. The combination with the rolls f f' of the

stationary die f^2 coacting therewith to form a bore through which the bent plate is passed, said stationary die being situated in position to engage the edges of the bent plate as the same passes through the bore, substantially as described.

2. The combination with a pair of rolls, the coacting peripheries of which form a portion of a circle, of a stationary die forming the remainder of the circle, provided with a tail-piece f^3 and situated in position to engage the edges of the bent plate to be welded together, and an arm extending into the slot of the tube or bent plate to prevent the twisting of the tube, substantially as described.

3. The combination with a furnace, of rolls for feeding the flat skelps into the furnace and at the same time bending the same into tubulate form, substantially as described.

4. The combination with the dies g g' , of the lever upon which said dies are mounted to bring the dies together when the lever is rocked, and the arm in the path of the tube for rocking said lever, substantially as described.

5. The combination with a traveling carriage carrying welding-rolls, of a stationary frame carrying finishing-rolls, and a conveyer or conductor extending between said carriage and said finishing-rolls, said conductor being formed with telescoping parts and pivoted at the ends to the carriage and frame respectively to permit the to-and-fro movement of the carriage, substantially as described.

6. The combination with the furnace, of the carriage traveling back and forth in front of the same, welding-rolls carried upon said carriage, a stationary frame, finishing-rolls mounted thereon and a swinging conveyer or conductor for the tubes maintaining continuous connection between said carriage and said finishing-rolls, substantially as described.

7. The combination with the furnace, of the carriage traveling back and forth in front of the same, an endless chain or cable passing around end pulleys and around a pulley carried on said carriage to thereby operate the rolls upon the carriage, jaws or clamps carried upon said carriage for engaging said endless cable upon one side or the other to propel the carriage in one direction or the other, and a lock for locking the carriage in any position, substantially as described.

8. The combination with the tube-forming mechanism, of a receiver into which the tube is fed, and means for opening said receiver at the lower side to permit the completed tube to fall upon the carriage or other receptacle, substantially as described.

9. The combination with the tube-forming mechanism of a receiver into which the tube is fed, said receiver being formed in two parts adapted to be separated at the lower edges to

permit the tube to pass between said edges, substantially as described.

10. The combination with the tube-forming mechanism, of the receiver formed in two parts adapted to be separated at the lower edges, the arms pivoted together and secured to the respective parts of the receiver, the plate carrying openings through which said arms pass, the pivoted lever carrying said plate, and the roller mounted upon said lever and situated in position to be engaged by the tube, substantially as described.

11. In a tube-rolling machine, the combination with a furnace, of a traveling carriage moving back and forth in front of the same, rolls carried upon said carriage the peripheries thereof coacting to form a partial circle, and a stationary die coacting with said rolls to form a complete circle, and situated in position to engage the edges of the tube to be welded, substantially as described.

12. In a tube-rolling machine, the combination with a furnace, of a traveling carriage moving back and forth in front of the same, two pairs of rolls carried upon said carriage, and a pair of dies situated between said pairs of rolls, substantially as described.

13. The combination with the rolls and the stationary die coacting therewith to form a bore through which the plate may be drawn to press the edges together to form a weld, said stationary die being situated in position to engage the edges of the plate, of a pair of rollers adapted to rest upon the interior of the tube thus formed and press upon the metal at the weld, and an arm upon which said rollers are mounted, said arm passing through the slot of the tube or bent plate and serving to prevent the twisting of the tube, substantially as described.

14. The combination with a bore through which the plate is drawn to press the edges together to form a weld, of a pair of rollers adapted to rest upon the interior of the tube thus formed and press upon the metal at the weld, an arm upon which said rollers are mounted, said arm passing through the slot between the edges of the bent plate as the same passes to the rolls, said arm being constructed to permit an imaginary axis situated between the rollers to be shifted and said rollers partially revolved about said imaginary axis to increase or decrease the distance between the portions of the rollers bearing against the interior of the tube, substantially as described.

In witness whereof I hereunto subscribe my name this 13th day of May, A. D. 1896.

WILLIAM S. McCracken.

Witnesses:

W. CLYDE JONES,
EDWARD E. PION.