

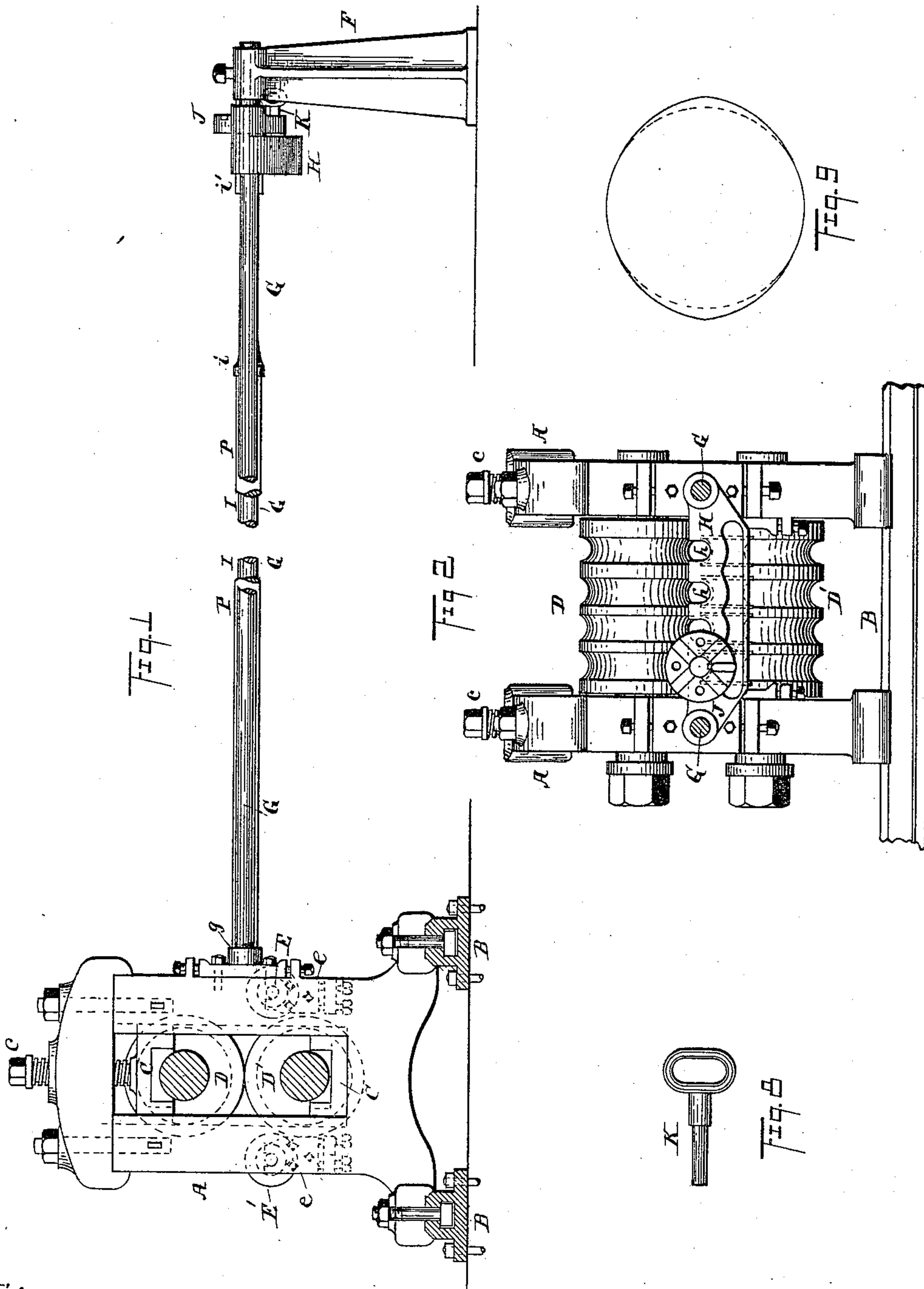
(No Model.)

2 Sheets—Sheet 1.

T. J. BRAY.
MACHINE FOR ROLLING TUBES.

No. 451,912.

Patented May 12, 1891.



Witnesses.

Will S. Lounie
C. E. Humphrey

Inventor.

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by *C. E. Humphrey*
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(No Model.)

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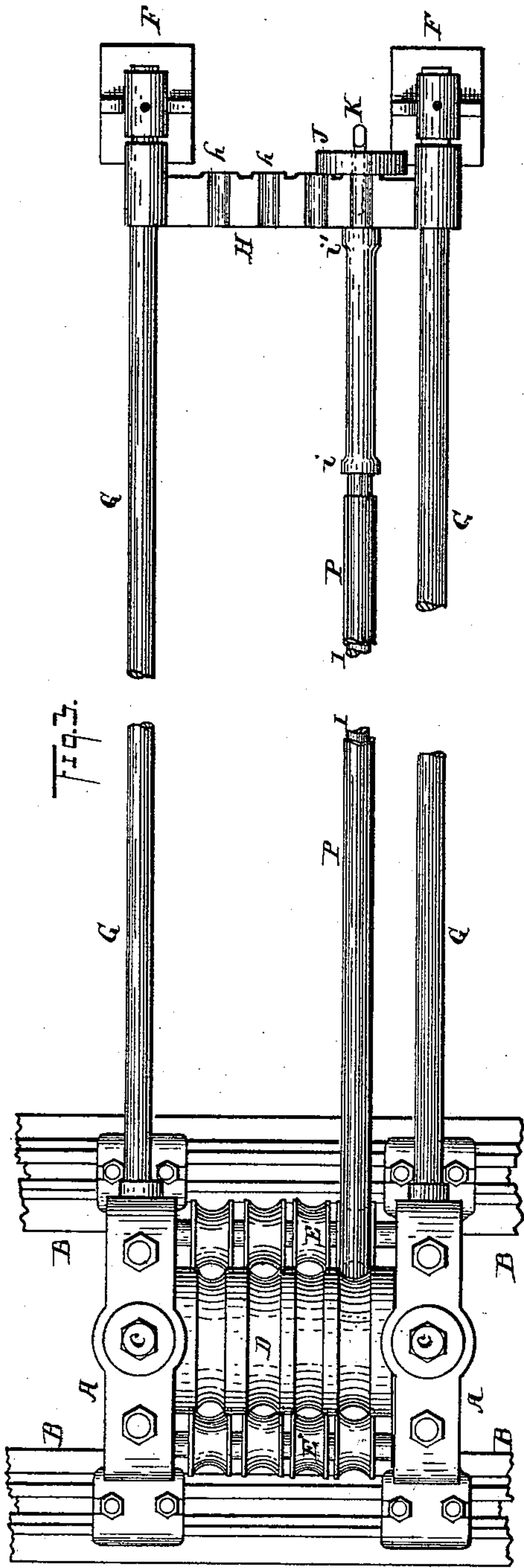


Fig. 3.

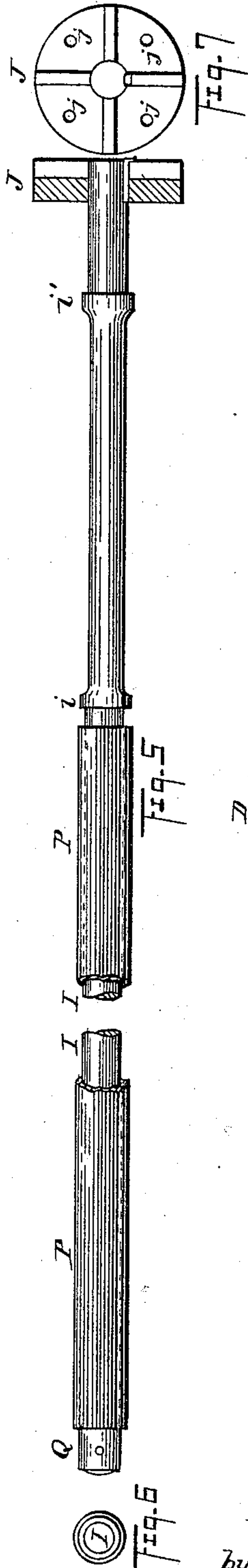


Fig. 7.

Fig. 5.

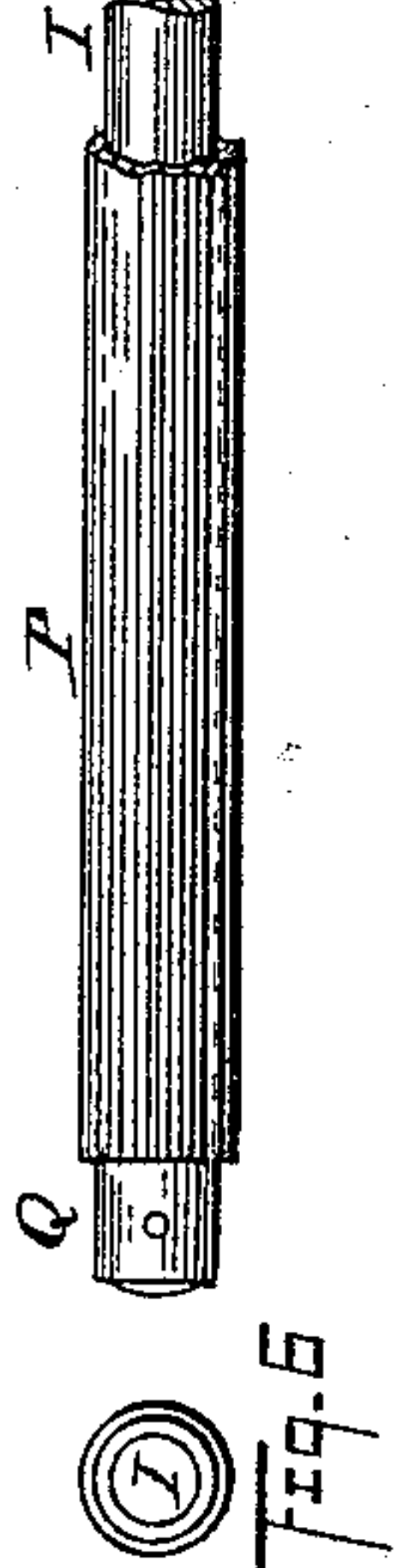


Fig. 6.

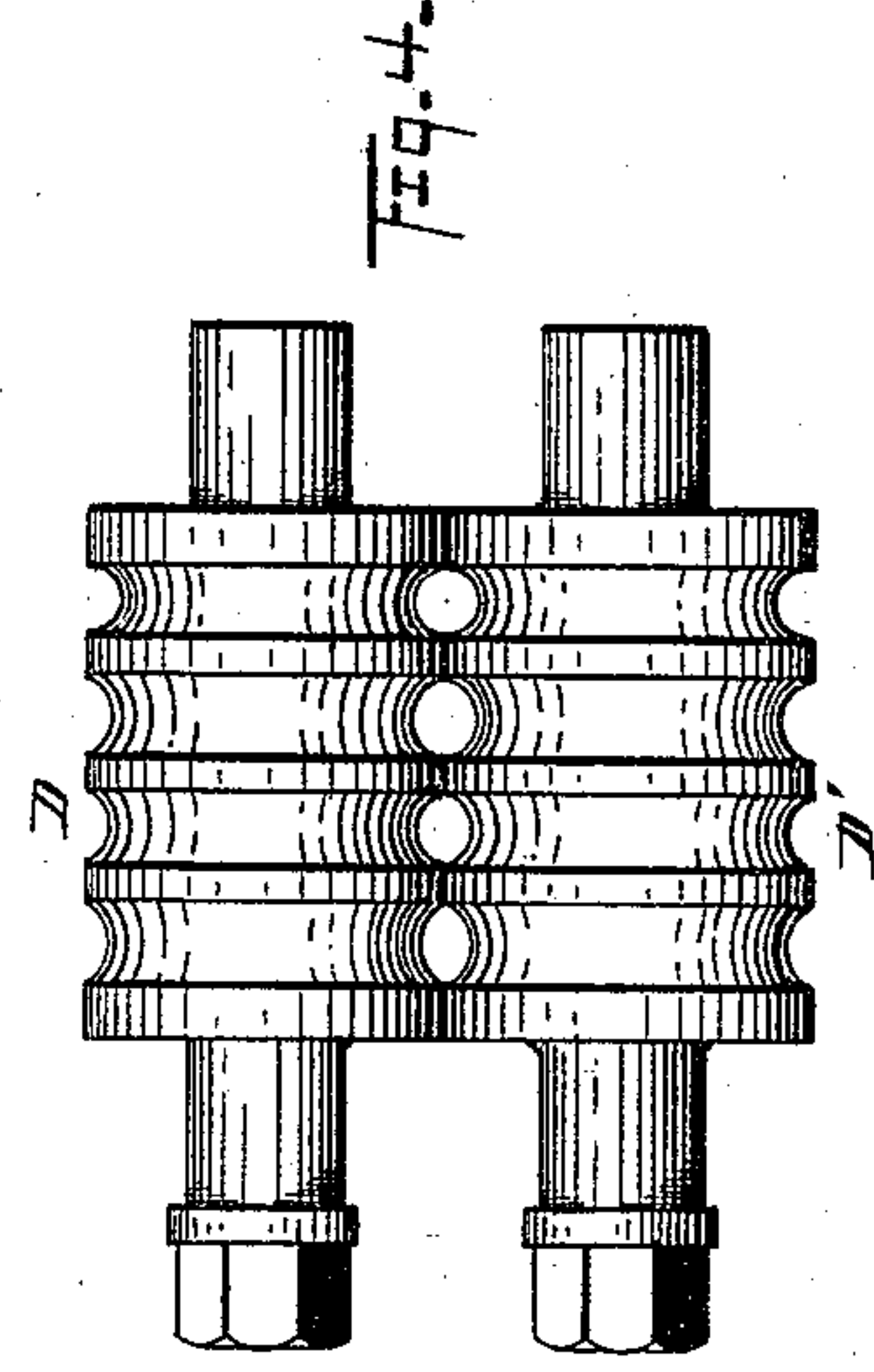


Fig. 4.

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UNITED STATES PATENT OFFICE.

THOMAS J. BRAY, OF WARREN, OHIO, ASSIGNOR OF ONE-HALF TO THE
PAIGE TUBE COMPANY, OF SAME PLACE.

MACHINE FOR ROLLING TUBES.

SPECIFICATION forming part of Letters Patent No. 451,912, dated May 12, 1891.

Application filed August 15, 1890. Serial No. 362,043. (No model.)

To all whom it may concern:

Be it known that I, THOMAS J. BRAY, a citizen of the United States, residing at Warren, in the county of Trumbull and State of Ohio, have invented a certain new and useful Improvement in Machines for Rolling Metallic Tubes, of which the following is a specification.

Ordinary welded pipe has rough uneven inside and outside surfaces, and is thereby unfitted for many of the purposes for which it is required, to fit it for which purposes it is necessary to ream out or bore the interior and grind or turn the outer surface. This process is objectionable because of the time and expense to properly finish the pipe, and also because by the reaming and grinding a considerable part of the pipe is cut away and the pipe also thereby weakened.

The object of my invention is to overcome these objections, to rapidly and cheaply produce tubing having true smooth inside and outside surfaces without loss of any part of the metal, to render the surfaces more compact by compression, and to provide devices and machinery by which to accomplish these objects.

To the aforesaid objects my invention consists in certain peculiar and novel construction, combination, and arrangement of mechanical parts, and in their operation, as hereinafter fully described, and then specifically pointed out in the claims, reference being had to the accompanying drawings, forming a part of this specification.

In the accompanying drawings, in which similar letters of reference indicate like parts, Figure 1 is a side elevation of my improved tube-rolling machine; Fig. 2, an end elevation, looking from the brackets hereinafter described; Fig. 3, a plan; Fig. 4, an elevation of the shaping-rolls; Figs. 5 to 8, details of the mandrel and connected parts slightly enlarged, and Fig. 9 a diagram showing the contour of the grooves of contiguous rolls.

Referring to the drawings, A A are upright housings mounted on bed-rails B B and bearing journal-boxes C C', in which are journaled the grooved rolls D D', hereinafter more fully described, adjusted by screws c c. Mounted

in adjustable bearings e e, attached to the inner faces of the housings A A on each side of the rolls D D', are smaller grooved rolls E E, hereinafter more fully described, and for a purpose to be stated.

Opposite and at a right angle with the axes of the rolls D D' and at such distance therefrom as the work to be performed may require are upright brackets F F, preferably attached to a common base with the bed-rails B B, which brackets are connected with the corresponding housing A A by parallel rods G G, said rods being attached to the brackets F F by set-screws or other equivalent device and with the housings A A by vertically-adjustable collars g. These rods constitute guides, upon which is mounted a sliding carriage H, arranged to be moved to and from the rolls D D', in the upper face of which are semicircular journal-bearings h. The grooves in the rolls D D' E E' and the journal-bearings h are the same in number and are respectively in the same vertical planes and in horizontal longitudinal alignment. The rolls D D' are arranged by suitable mechanism, which it has not been deemed necessary to show, as any of the well-known devices may be employed, to have their adjacent faces run in the same direction with the motion of the carriage H as it approaches them and to be reversed and run in the opposite direction after it shall have completed its forward movement and is ready for its retrograde movement, as hereinafter described.

To form the interior of each tube a mandrel I is used. This mandrel has a smooth even outer surface of the size to which it is desired to reduce the interior of the tube, and slightly exceeding the tube in length to provide for longitudinal extension of the latter in the process of rolling and reducing. Back of the smooth surface of this mandrel is a shoulder i, and beyond it a reduced portion, for a purpose to be hereinafter stated, terminating in a similar shoulder i', beyond which it is again reduced, forming a journal which fits the bearings h. On the end of the mandrel I is attached a disk J, provided with holes j, which register as the mandrel is revolved with a hole in the carriage H, and so arranged

that by inserting a key K through any of the holes *j* into the hole in the carriage H the disk J and mandrel I will be held from revolving.

The grooves in the rolls E E' are similar in shape and are shallow and substantially semi-circular in section, and serve to sustain and guide the mandrel and pipe between the rolls D D' and to sustain the end after it passes. The grooves in the rolls D D', excepting the one to the right in the drawings, are of peculiar form and will be readily understood by reference to Fig. 9, which shows in diagram the outline of the opening created by the union of the grooves in opposite rolls. In contour the inner half of each groove measuring in each direction from a central vertical line is the quadrant of a circle whose center is the point of intersection of said vertical line with the horizontal line between the rolls, from the ends of which quadrant the lines extend laterally outward on arcs of circles of greater radii. By this peculiar construction one-fourth of the periphery of the pipe is simultaneously pressed between the rolls and mandrel on each side at each passage between the rolls, whereby one-half the pipe is finished without compressing the pipe tightly on the mandrel, but permitting its unfinished and uncompleted sides, naturally slightly expanded by the pressure on the alternate quadrants, to pass through the side spaces created by the peculiar form of the rolls, to be subsequently pressed at the second passage, as hereinafter described.

The invention is intended for finishing pipe in either a hot or cold state. In the former case a section of tubing, as P, as it leaves the welding-rolls and while still heated, or a section of the ordinary pipe of commerce heated to a red heat, is placed on the mandrel I and held thereon by a collar Q, (see Figs. 5 and 6,) retained by a rivet or other similar device. The mandrel is then placed with its journal in the first of the bearings in the carriage H, the outer end resting on the corresponding groove in the roll E and held from revolving by the insertion of the pin K through one of the holes *j* in the disk J into the hole in the carriage H, hereinbefore referred to, as shown in Fig. 3. The carriage H is then pushed forward and the tube thus mounted is passed through the rolls D D' until the reduced portion of the mandrel between the shoulders *i i'* is between them, thereby compressing one-fourth of the tube on opposite sides. The mandrel and tube are then revolved one-fourth, this being permitted by the reduced portions of the mandrel, and again fastened by the pin K, when it is returned by the reverse action of the rolls, whereby the alternate quadrants are similarly compressed.

In operation it may be found preferable to have a series of grooves, as shown in the drawings, each slightly reduced in size from the first, and terminating in semicircular grooves to perfectly round the pipe, and the pipe may be successively passed between them.

In adapting this invention to the finishing of cold pipe the operation of the rolls is substantially the same; but the rolls should be "chilled iron," and the pipe cleansed by an acid bath to remove scale before being mounted on the mandrel.

I claim as my invention—

1. In a machine for rolling metallic tubes, the combination, with reducing-rolls, a carriage arranged by guides to travel reciprocally to and from said rolls, and bearing-mandrels arranged to pass between the grooves in said rolls, of guide-rolls disposed on one side of said rolls, having grooves in alignment with the grooves therein to support and guide said mandrels and pipe in entering the grooves of the reducing-rolls, substantially as shown and described.

2. The combination, in a machine for rolling metallic tubes, with reducing-rolls arranged to compress the tube on opposite sides, a carriage arranged to travel on guides reciprocally to and from the reducing-rolls, and bearing-mandrels arranged to be carried by it between the grooves of said reducing-rolls, of grooved guide-rolls disposed on opposite sides of said rolls and having grooves in alignment with the grooves therein to support said mandrels on the passage from each direction between said reducing-rolls, substantially as shown and described.

3. In a machine for rolling metallic tubes, the combination, with housings bearing reducing-rolls, and supporting-brackets connected with said housings by parallel rods, of a carriage arranged to slide reciprocally on said rods and provided with bearings for mandrels for reducing the pipe, substantially as shown and described.

4. The herein-described machine for rolling metal tubes, consisting of housings A, rolls D D', journaled in bearings therein, guide-rolls E E, guide-rods G, having oppositely-disposed supports, as the brackets F, and carriage H, arranged to slide on the guide-rods G and provided with journal-bearings to receive the mandrels, all constructed and arranged substantially as shown.

In testimony that I claim the above I hereunto set my hand.

THOMAS J. BRAY.

In presence of—

C. E. HUMPHREY,
C. P. HUMPHREY.