

J. S. DENNIS.

Machines for Forming Sheet-Metal Elbows.

No. 154,589.

Patented Sept. 1, 1874.

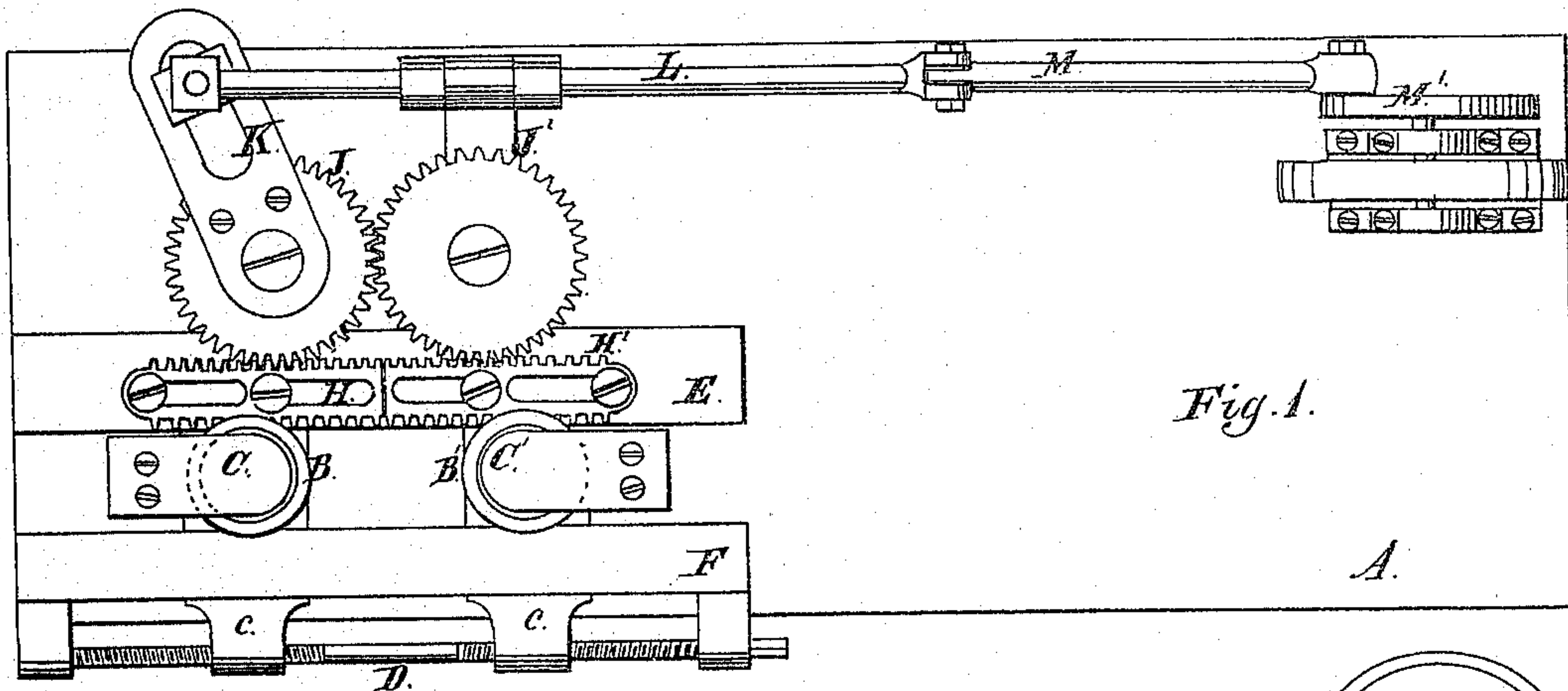


Fig. 1.

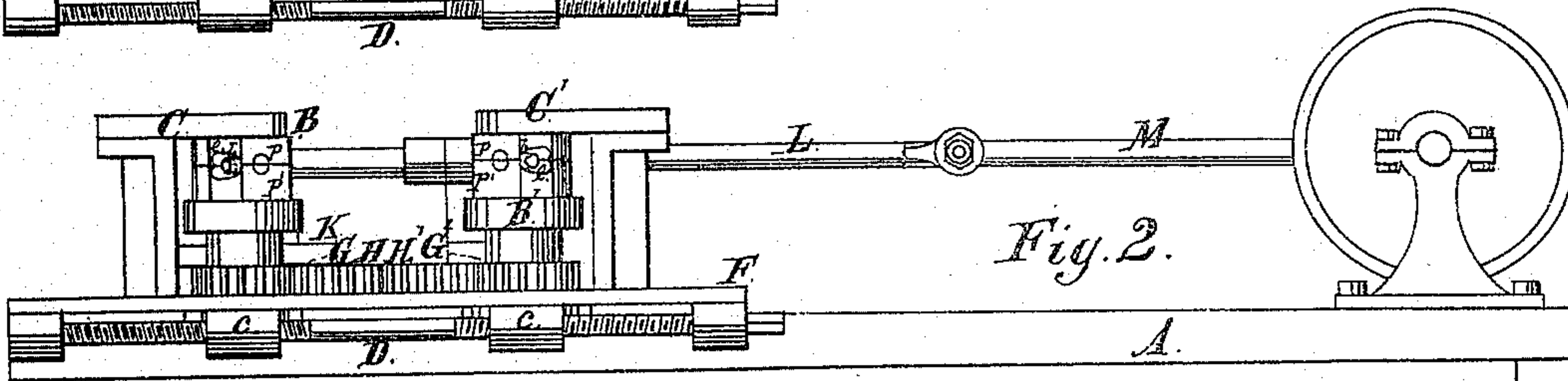


Fig. 2.

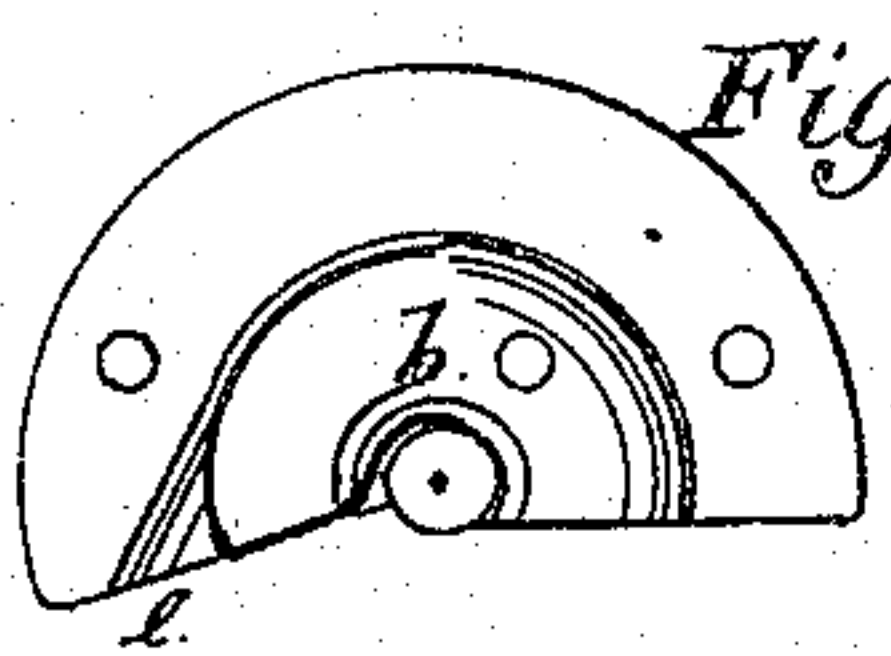


Fig. 4.

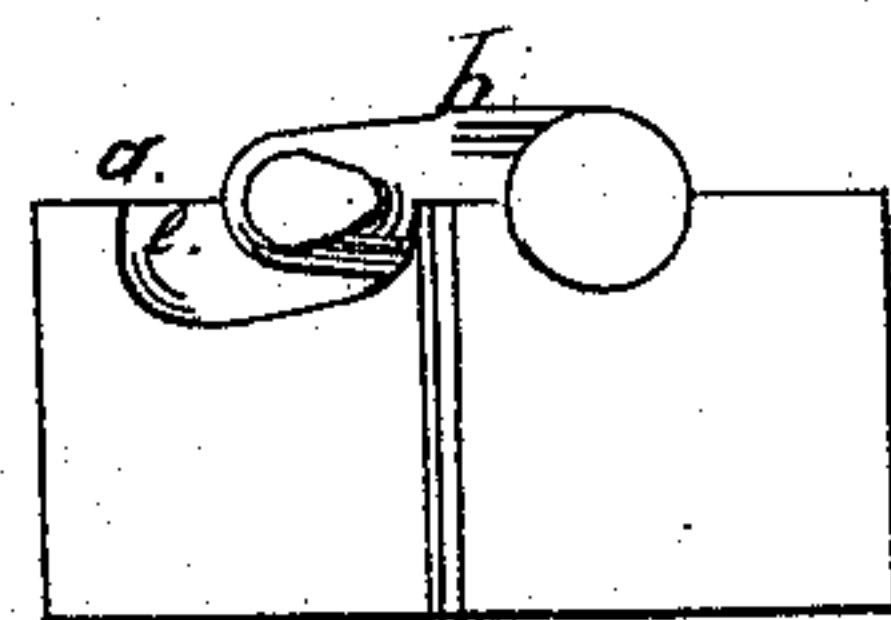


Fig. 5.

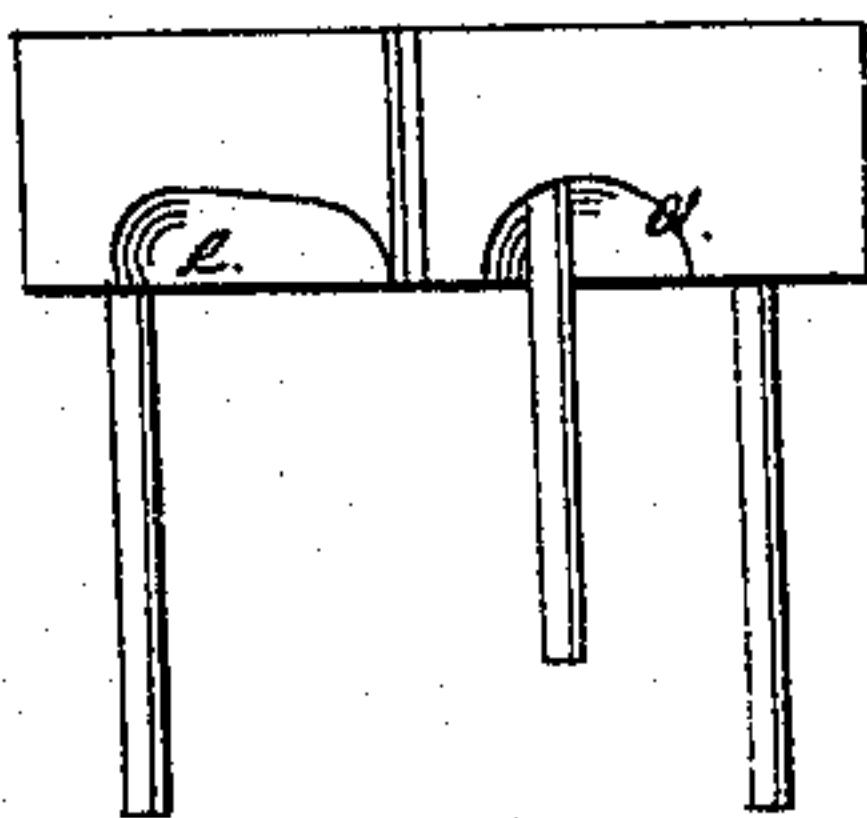


Fig. 6.

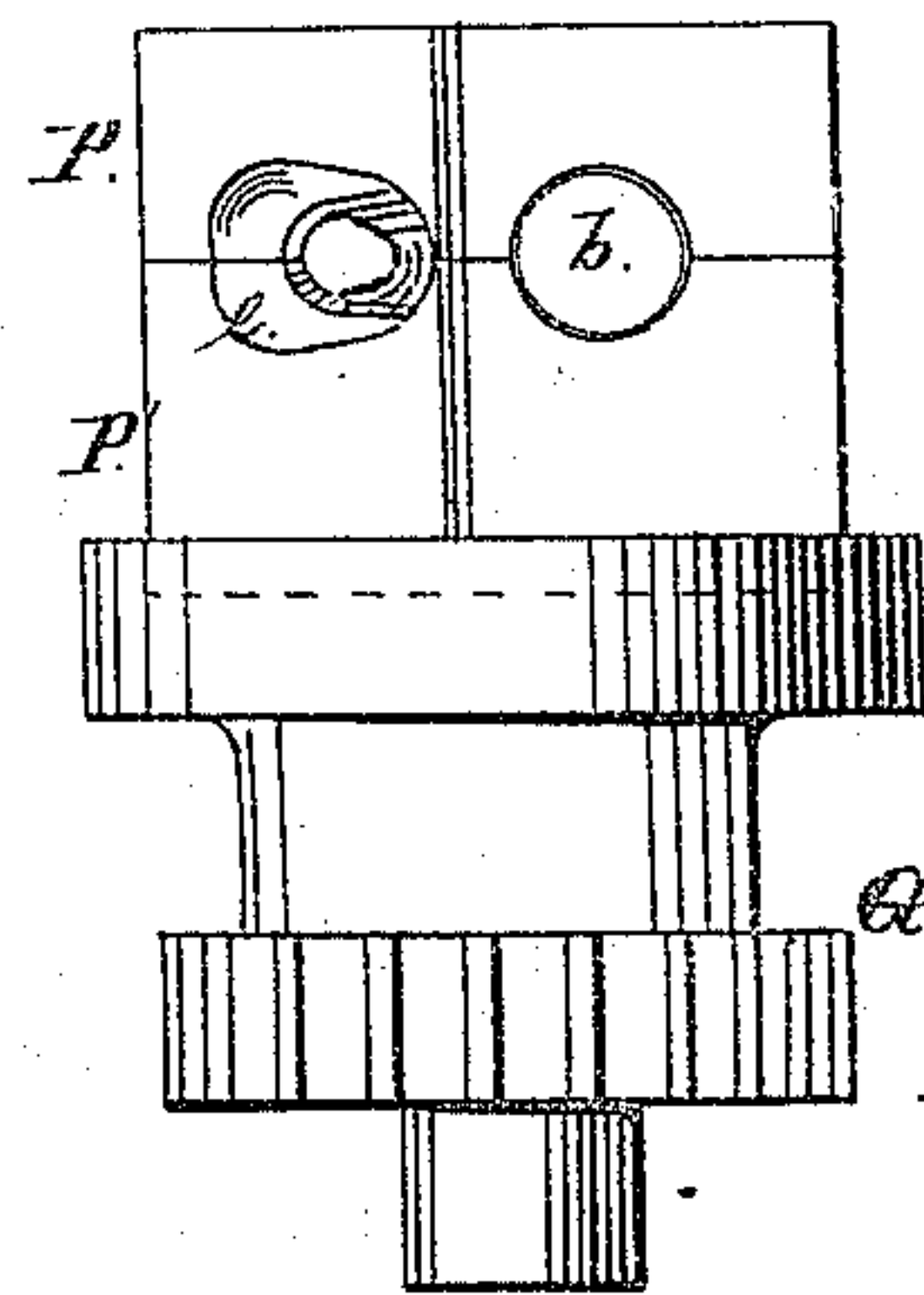


Fig. 3.

Witnesses:

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UNITED STATES PATENT OFFICE.

JOSEPH S. DENNIS, OF CHICAGO, ILLINOIS.

IMPROVEMENT IN MACHINES FOR FORMING SHEET-METAL ELBOWS.

Specification forming part of Letters Patent No. 154,589, dated September 1, 1874; application filed July 14, 1874.

To all whom it may concern:

Be it known that I, JOSEPH S. DENNIS, of Chicago, in the county of Cook and State of Illinois, have invented certain Improvements in Machines for Forming Elbows upon Sheet-Metal Tubes and Pipes; and I do hereby declare that the following is a full, clear, and exact description of the same, reference being had to the accompanying drawing, which forms a part of this specification, and in which—

Figure 1 represents a top or plan view of the machine. Fig. 2 is a front view thereof. Fig. 3 is a front view, upon a larger scale, of one of the dies detached. Fig. 4 is a top view of the lower half of one of the dies. Fig. 5 is a front view of the same. Fig. 6 is a front view of the upper half of the same die.

Like letters of reference made use of in the several figures indicate like parts wherever used.

The office of the machine which is the subject of this invention is the formation of the peculiar elbow-joint heretofore invented by me, and described in Letters Patent No. 151,103, dated May 19, 1874.

In the accompanying drawing, A represents the frame-work or table upon which the various parts of the machine are mounted. B B' are two upright shafts, which carry the forming-dies, which dies will be presently described. These upright shafts B B' are mounted, each one, in an adjustable support, C C', furnished with arms c c', through the ends of which passes a screw-shaft, D, cut with oppositely-inclined thread, so that when the screw is turned the supports and shafts are moved toward or away from each other, sliding along the table or bed, and held to move smoothly by the overlying plates E and F. This forms a means of adjusting the dies at any desired distance apart, when the gearing has been previously disengaged. At the bottom of each upright shaft is a cog-wheel, G G', which mesh with the sliding rack-bars H H', clogged upon both sides, and meshing upon the other side with the cog-wheels J J', which also mesh with each other. The cog-wheel J carries a slotted arm, K, connected by a sliding block to the rod, L, which receives an alternate rectilinear

motion from the pitman M and crank-wheel M', as from any well-known means of producing such a motion.

By following this connection back to the dies it will be seen that said dies receive an alternating rotary motion, turning first toward each other, and then away from each other, at each stroke of the pitman.

The object of having two dies, and having them antagonize each other, is to enable me to form both ends of a tube into a half-elbow at the same instant, which adapts the machine especially to the manufacture of tubes for tubular lanterns, and also enables me to form two short pipes, and thus a full elbow, at one motion of the machine.

If it be desired to form only one end of a tube or pipe, it is quite obvious that the adjusting devices and the gearing for producing the antagonistic rotation may be dispensed with, as only a single die need be used.

To form the dies I first cut a circular groove, a, the cross-section of which will be a half-circle, in the opposite faces of each of the halves P P' of the die. A ring, b, exactly fitting this groove, is then turned, and cut off to the right length for the die, and one end of this ring—the end which is in the receiving or open end of the die—is reduced in size just enough to allow for the thickness of the metal of the pipe to be formed, and the outer end of the core b and the hole e are worked off, as shown in Figs. 4, 5, and 6, to facilitate the entrance of the pipe.

The die thus made, when the halves are united and the ring-section b inserted, presents the appearance shown at Fig. 3 of the drawing. An annular opening, largest upon the outer side of the circle and slightly flattened at that side, winds into the block with a gradually-converging space, e, as indicated in the drawing.

The blanks for the tubes are formed as described in my former patent, No. 151,103, and the end inserted into the hole e; the die then is made to turn forcibly toward the tube, and the metal of the tube enters the space and is formed into an elbow of the shape and style described in said former patent. When

both ends are to be formed at once, both are inserted, one in each of the dies. A clutch, (not shown in the drawing,) and which may be of any desired kind, governs the movement of the crank-wheel, so that the dies may be caused to make only a single alternate rotation and then rest.

In forming elbows with this machine it is sometimes necessary to coax the metal of the tube into shape by successive steps, gradually increasing the extent of the curvature of the tube at each operation. This may be done in several ways. It may be done by first forming the tubes with a partial or slight stroke, by setting the dies farther apart from each other for the first operation, and adjusting them a little closer for each succeeding step, or by turning the dies around, and setting them so that at first only the latter portion of the rotation will act upon the tube, and gradually at each succeeding operation setting them farther around toward the tube; or the same result may be accomplished by adjusting the motion of the rod so that it shall impart at first a small rotation, and then adjusting it to impart in each succeeding step a greater rotation to the dies; or the same result can be obtained by a series of dies, in which the hole *e* and core *b* are brought from a larger curve to the one desired.

It would be possible to reach the result aimed at in this invention by fixing the dies rigidly, and forcing the pipe into the die by a rotating movement; but this would be less convenient, and only one end of a pipe could be formed at a time.

Although in forming small pipes I prefer to prepare the blanks as described in my Patent No. 151,103, yet in forming larger elbows it is enough to cut the end of the pipe at an angle of about forty-five degrees.

If the metal is rigid, and yet thin, to prevent the body of the pipe from crushing while the

end is forming, I use a combined shield and mandrel, which holds the metal firmly outside and inside, and at the same time leaves the end free to enter the die. If it is desired to form two short pipes, and thus one full elbow, at a single motion of the machine, I put the two short pipes on the opposite ends of the mandrel, and in this way elbows are formed with great rapidity.

Although the opening or entrance of the hole *e* is enlarged to receive the pipe, the hole itself, taking a central line as a guide, is upon a curve concentric to the shaft, so that the hole and shaft move in a true circle, or so much of a true circle as the extent of the movement of the die comprehends.

Having thus described my invention, I claim as new and desire to secure by Letters Patent the following:

1. The die for forming elbows upon sheet-metal tubes or pipes, having a curved hole, *e*, and curved core *b*, substantially as specified.
2. The die made substantially as described, in combination with the rotating shaft, substantially as specified.
3. The die having a hole, *e*, concentric with its pivot, substantially as specified.
4. The combination of two dies made and rotated toward and so as to antagonize each other in forming two elbows, substantially as described.
5. The combination of the dies, the cog-wheels *G G'*, the rack-bars *H H'*, cog-wheels *J J'*, arm *K*, and rod *L*, substantially as specified.
6. The combination of the two dies and die-holders with the screw-shaft *D*, substantially as and for the purpose specified.

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Witnesses:

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