2 Sheets.
Sheet 1.

HENRY BOYD

Improvement in manufacture of Chains

No. 120,148. Patented Oct. 24, 1871.

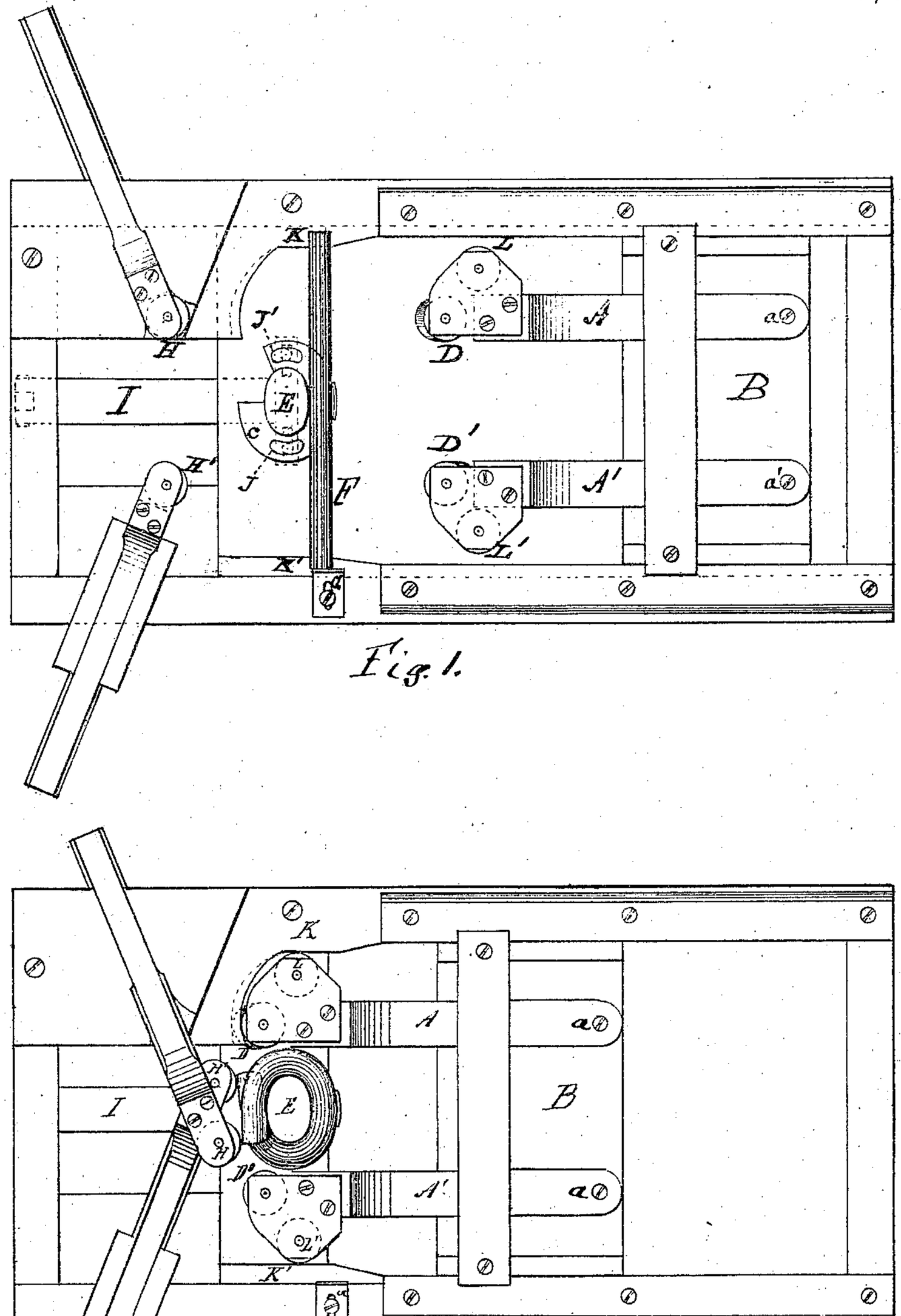

Fig. 1.

Fig. 2.

Witnesses

Francis E. Boyd

J. E. Maynadier.

Inventor

Henry Boyd

2 Sheets:
Sheet 2.

HENRY BOYD

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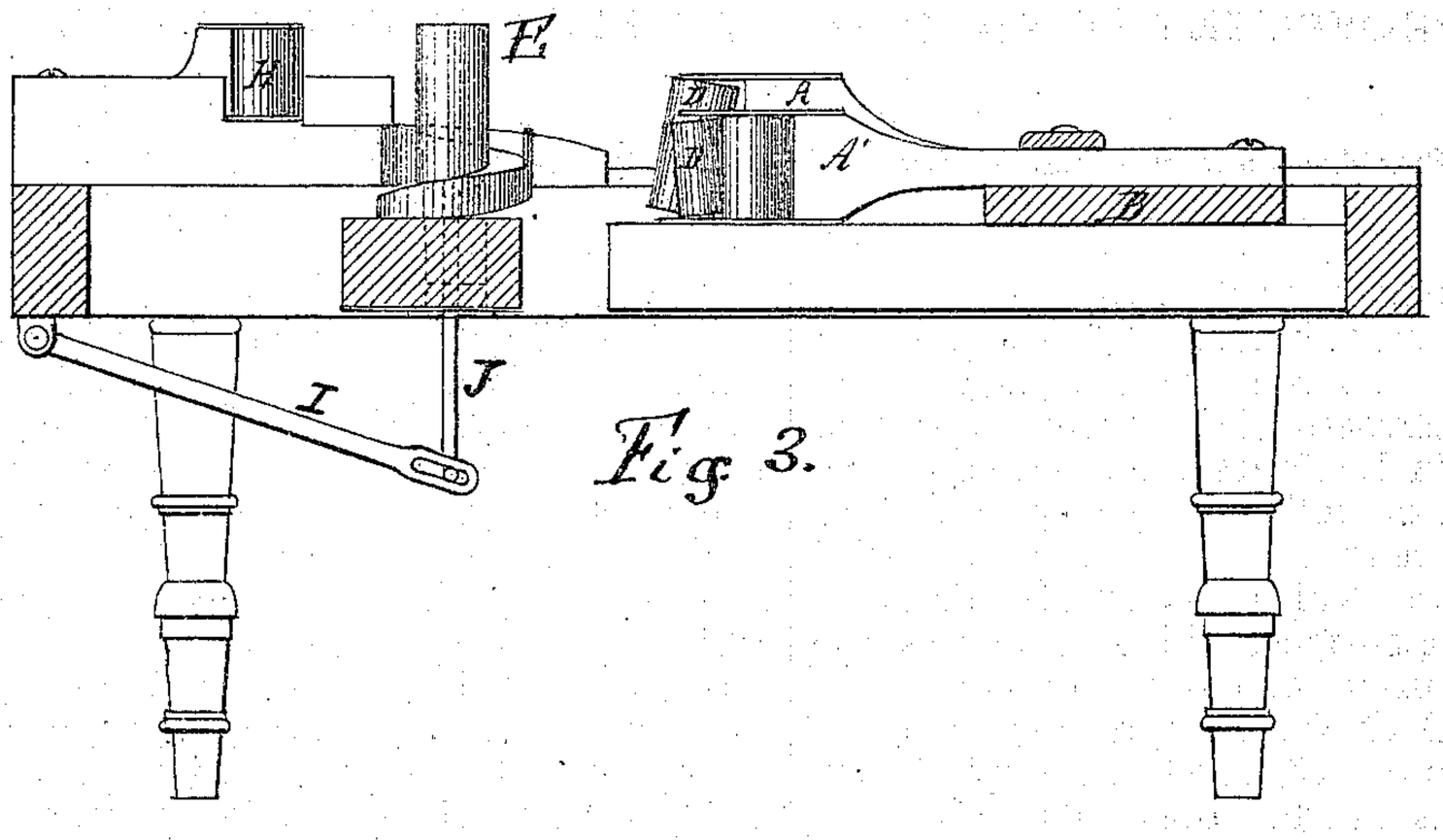

Fig. 3.

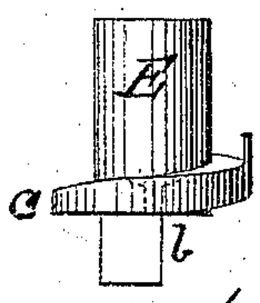

Fig. 6

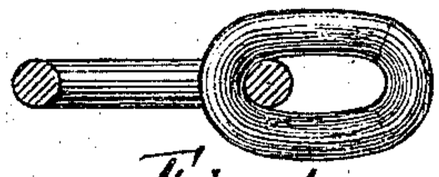

Fig. 4.

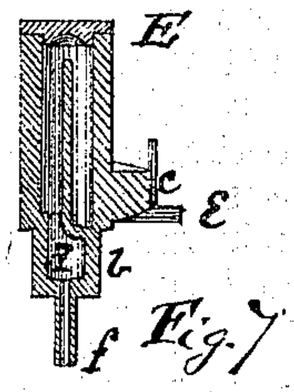

Fig. 7

Fig. 8

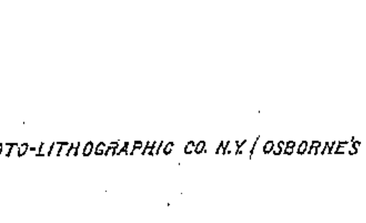

Fig. 5.

Fig. 9

Witnesses
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J. E. Mayneadier

Inventor.
Henry Boyd

UNITED STATES PATENT OFFICE.

HENRY BOYD, OF EAST BRIDGEWATER, MASSACHUSETTS.

IMPROVEMENT IN MACHINES FOR BENDING CHAIN-LINKS.

Specification forming part of Letters Patent No. 120,148, dated October 24, 1871.

To all whom it may concern:

Be it known that I, HENRY BOYD, of East Bridgewater, in the county of Plymouth and State of Massachusetts, have invented certain Improvements in Machines for Bending Chain-Links, of which the following is a specification:

My invention relates to the combination, with the former around which the link is bent, and the reciprocating surfaces which act against the rod to bend it spirally around the former, of certain devices, each of which singly, and all acting together, tend to bend the rod into a spiral with the scarfed ends overlapping much more perfectly than it can be done by the former and bearing-surfaces without these auxiliary devices. An example of the combination of a former and four reciprocating bearing-surfaces without any of the auxiliary devices contained in my machine will be found in Letters Patent No. 19,094 to W. J. Lewis. In the Lewis patent the two bearing-surfaces which act upon the rod are rigidly connected together, and incapable of adjustment in relation to each other or to the mandrel, and necessarily so, because these two surfaces are the extremities of an inwardly-curved surface (fitting on the curved surface of the mandrel) which requires to be grooved in order to give the required spiral form to the link; while in my combination these surfaces are distinct from each other and capable of adjustment in relation to each other and to the mandrel, the groove is dispensed with, and each of these surfaces may consequently be allowed to revolve, thereby requiring less power. As an additional precaution I use, in combination with the former and the four reciprocating bearing-surfaces, a flange upon the mandrel, the upper surface of which is spiral, so that the link will necessarily have the exact spiral desired if it be kept while bending in contact with the upper surface of this flange; and still further to insure the correct bending of the link, I so incline the bearing surfaces that they shall tend to keep the rod in contact with this flange as they bend it.

In the accompanying drawing, Figures 1 and 2 are plans of a machine which embodies my improvements, Fig. 1 showing the position of the rollers before they act upon the rod to bend it into a link; and Fig. 2 showing their position when the link is bent. Fig. 3 is a side view of this machine, a portion of the former having been removed. The other figures show details.

A A′ are two arms, pivoted at *a a′* to the slide B. This slide has a reciprocating motion imparted to it by any suitable mechanism. I use a cam attached to a shaft, which forces the slide forward during a portion of its revolution, and backward during another portion of its revolution. Upon the extremities of each of these arms A A′ are rollers D D′, having their axes slightly inclined in opposite directions, so that they shall tend to force the rod to be bent in opposite directions, the one above and the other below, the plane in which they reciprocate. The rollers D D′ are so placed in relation to the former or mandrel E that when the rod F is in place—that is, with one extremity against the gauge G and its middle in contact with the mandrel—each of the rollers in their forward motion shall strike the rod and bend it spirally, and so that the portion bent shall conform to the mandrel, leaving it in the form of a staple, except that the arms or prongs are not on a level. The rollers H H′ (also properly mounted on slides and arranged in proper relation to the former) then move forward and engage with and bend inward these arms or prongs, thus completing the link. These rollers H H′ also have their axes inclined in opposite directions, though this is not so important in the case of these rollers as in the case of the rollers D D′. During the backward movement of the rollers D D′ the rollers H H′ are also retracted, (I use cams to move them forward, the cam-shaft being properly geared to the cam-shaft of the rollers D D′, and retract them by means of springs,) and the lever I is raised, throwing the link thus formed off the mandrel by means of the clearers J J′. A second rod is then placed in contact with the mandrel, and with one of its ends against the gauge, and so on. The rollers D D′ are so arranged that they will strike the rod at points about one-half the distance between the inside and the two ends of the rod, and are moved inward by means of the inclined planes K K′ and rollers L L′, thus forcing the rod to conform to the mandrel. This construction is not essential, as it is obvious that the rollers D D′ may be mounted as are the rollers H H′; but it is preferable because of the facility it affords for adjustment by changing the inclined planes K K′ to suit different sizes of links; it is also advantageous, although of less importance, to mount the rollers H H′ in the same way. In the machine, as shown, the mandrel E is adjusted in

proper relation to the rollers H H′, and when that is done the rollers D D′ are adjusted in proper relation to the mandrel by means of the pivoted arms A A′, inclined planes K K′, and rollers L L′, so that the various mandrels used in the machine, as shown, must be so constructed that, when placed in the machine, they will be in proper relation to the rollers H H′. I prefer, therefore, to make all four rollers adjustable. The gauge G is also adjustable.

This machine is adapted to various sizes and styles of links, a suitable mandrel being used for each size or style. In the drawing three styles of mandrels are shown, one for making circular links, one for making oval links for an "end weld," and the third for making oval links for a "side weld." Each of these mandrels has a tenon, *b*, at its lower end, which fits into a corresponding mortise into the frame of the machine, this tenon being so arranged in relation to the rear face of the mandrel as to bring that face into proper relation to the rollers H H′, when the tenon is fitted in the mortise. But it is clear that the forward motion of the rollers H H′ must be less, and that of the rollers D D′ greater, when the oval mandrel is used, with its long diameter parallel to the line of motion of the rollers D D′, than when its long diameter is at right angles to that line of motion, that is to say—that the rollers H H′ do not require to be moved so far forward, and the rollers D D′ should be moved further forward. To effect this without changing the cams I make all the cam-bearings on adjustable beds, and substitute a thicker bed, when the roller is required to be moved further forward, and a thinner bed when it is not required to be moved so far. The collar *c* of the mandrel, although not an essential, is of great importance, as it produces great uniformity in the links. It is advisable to make the inclination of the roller D′ rather more than would be sufficient alone to bend the rod spirally, and that of the roller D rather less, as thereby the tendency of the rollers is to force the rod against the upper face of this collar.

I do not broadly claim four reciprocating bearing-sufaces in combination with a mandrel; nor on the other hand do I regard it as essential that all my improvements upon this combination shall be used together, although I do regard their combined use as necessary to produce the best results.

What I claim as my invention is—

1. The combination of the mandrel E and four reciprocating bearing-surfaces D D′ H H′, when the bearing-surfaces are so arranged together, in the manner described, that they can be adjusted, as described, the whole being substantially as above specified.

2. The combination of the mandrel E and its spiral flange *c* with four reciprocating bearing-surfaces, D D′ H H′, substantially as described.

3. The combination of the mandrel E, gauge G, four reciprocating bearing-surfaces, D D′ H H′, and clearers J J, all substantially as described.

4. The combination of the mandrel E and its spiral flange *c* with the inclined and reciprocating rollers D D′ or their equivalents, all substantially as described.

HENRY BOYD.

Witnesses:
FRANCIS E. BOYD,
J. E. MAYNADIER.

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