2 Sheets—Sheet 1.

A. C. JORDAN.

Machines for Forming Chains and Like Articles.

No. 200,199. **Patented Feb. 12, 1878.**

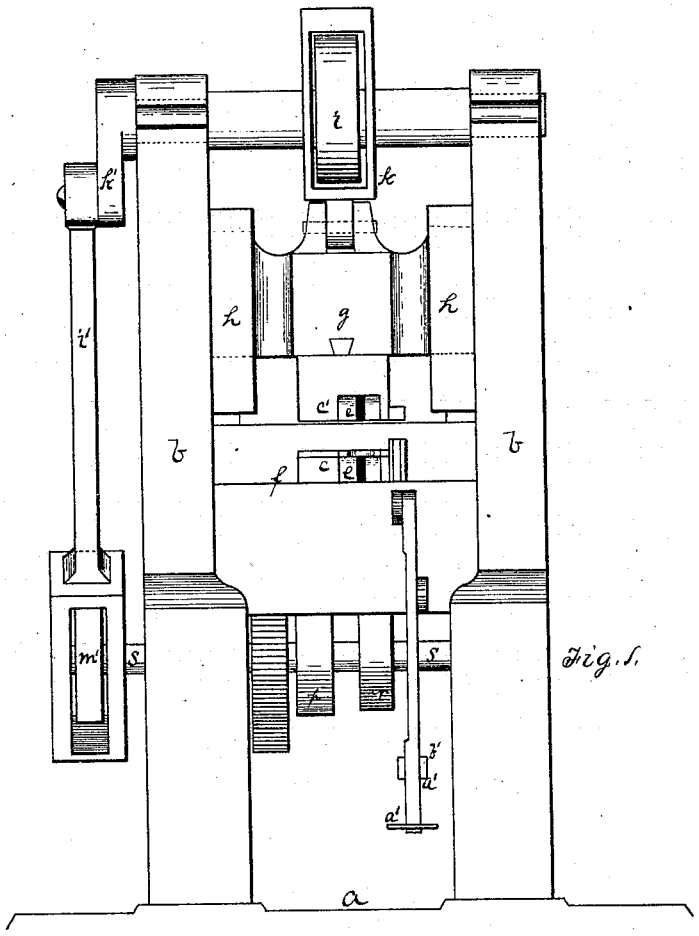

Fig. 1.

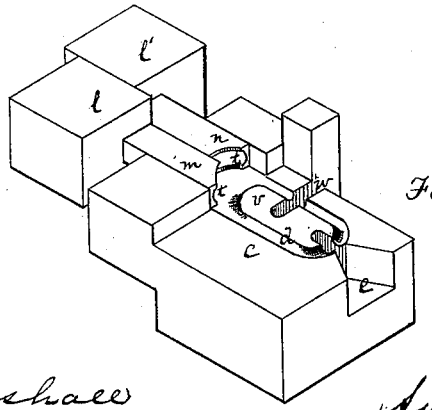

Fig. 2.

Witnesses.

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2 Sheets—Sheet 2.

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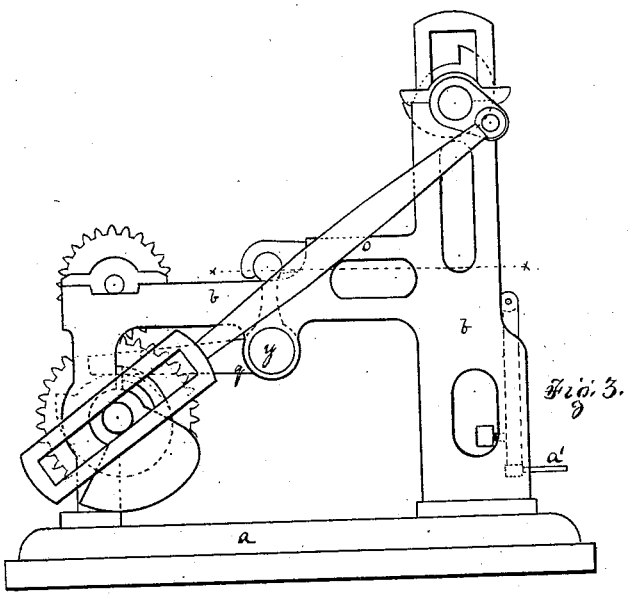

Fig. 3.

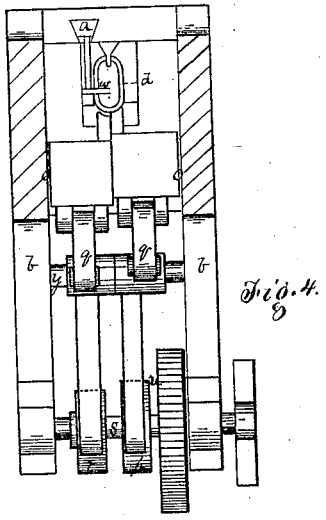

Fig. 4.

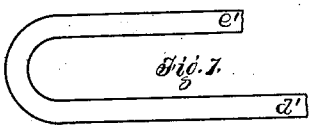

Fig. 7.

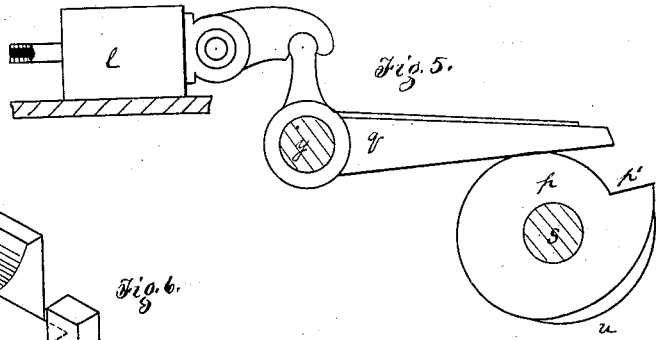

Fig. 5.

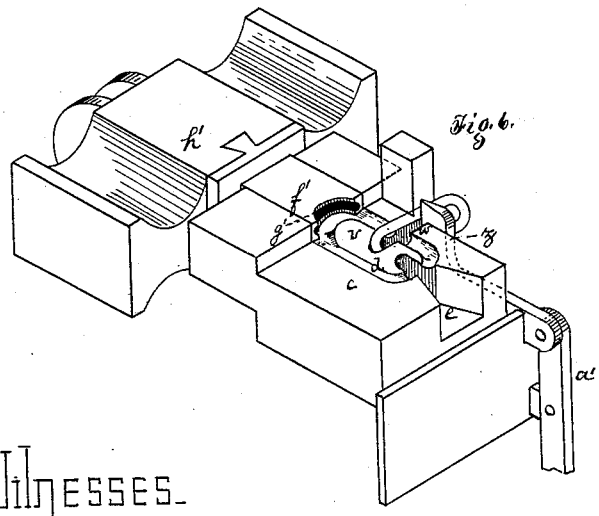

Fig. 6.

Witnesses.

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UNITED STATES PATENT OFFICE.

AUGUST C. JORDAN, OF PITTSBURG, PENNSYLVANIA.

IMPROVEMENT IN MACHINES FOR FORMING CHAINS AND LIKE ARTICLES.

Specification forming part of Letters Patent No. **200,199**, dated February 12, 1878; application filed June 9, 1877.

To all whom it may concern:

Be it known that I, AUGUST C. JORDAN, of the city of Pittsburg, in the county of Allegheny and State of Pennsylvania, have invented a new and useful Improvement in Machines for Forming Chains and like Articles; and I do hereby declare the following to be a full, clear, and exact description thereof, reference being had to the accompanying drawings, forming a part of this specification, in which—

Figure 1 is a front elevation of my improved machine, in this instance especially adapted to the manufacture of chains. Fig. 2 is a perspective view of three of the form-dies used therein for lap-welding and joining the links, the absent die being the upper holding-die, which, however, is the counterpart of the lower holding-die therein shown. Fig. 3 is a side elevation of the machine. Fig. 4 is a plan below the line *x x* of Fig. 3. Fig. 5 is a view of the cam mechanism for giving the peculiar movement of the lap-welding dies. Fig. 6 is a perspective view of two of the dies for butt-welding the links, the upper holding-die being absent, as in Fig. 2. Fig. 7 is a view of the link-blank which is used in this machine, it having been previously bent in another machine to the form shown.

Before describing the drawings specifically I will state that like letters of reference thereto indicate like parts; and that my invention consists in the combination of dies, which, being suitably operated, complete the link by bending the free ends of the same and welding them, either by a butt or a lap-weld, as desired, the dies being so formed and operated that as each link is put into the machine and bent and welded, it is joined to or strung with the next preceding one, so that the chain is made and completed by this machine.

The machine has a bed, *a*, and a suitable frame or housing, *b*, upon which the operative parts are mounted.

For lap-weld chains I use the dies shown in Fig. 2. The dies which hold the link during the bending and welding operation are the same, whether a butt or lap weld is made.

The holding-dies *c c'* each have a groove, *d*, corresponding to the form of the link, and at its outer end each has an opening, *e*, which is made for the insertion of the tongs in placing and manipulating the link-blank. The two dies being brought together, these grooves form a cavity of like form with the link-blank. The lower die *c* is placed on the permanent bed *f*, and the upper or moving die *c'* is placed in the head *g*, which has a vertically-reciprocating movement in the slides *h* given to it by the oscillating cam *i*, to which it is connected by the cam-yoke *k*. The motion of the die *c'* is sufficient to bring it into working contact with the lower die *c*, and it is, by reason of the peculiar intermittent effect of the cam *i*, caused to clamp and hold the blank during the operation of the bending and welding dies, which operation begins at the instant the blank is finally grasped by the holding-dies.

The lap-welding dies *m n* are two in number. The die *m* is mounted on a die-carrier, *l*, and the die *n'* on a carrier, *l'*. These carriers have a horizontally-reciprocating motion in the guides *o*, which is given to them by the vibrating bell-levers *q*, the latter being actuated by the cams *p r* mounted on the shaft *s*. The levers *q* are mounted on the shaft *y*. The dies *m* and *n* have a groove, *t*, in their front ends, which correspond in form with the end of the finished link. The die *m*, by reason of the greater eccentricity of its operating cam *p*, as shown at *u* in Fig. 5, is projected in advance of the die *n*, and, meeting the free end of the link which stands in its path, bends it around in the die-cavity against the end of the former *v*. The die *n* advancing simultaneously, but more slowly, encounters and bends the other full end of the link against the former *v*, overlapping it upon the first end. The two dies at the end of their movement press equally upon the link, swaging up the metal and welding the ends firmly together. The oscillation of the cam *i* then raises the upper die *c'*, and the next step of the operation—to wit, the formation of the chain by joining the links—is performed simultaneously with the welding of subsequent links. If it is desired the link may be left in the dies until struck a second or third time by the welding-dies.

The link being welded and the upper die raised, the operator places it on its edge in the cavity *w*, which is formed in the die *c* at right angles to and extending across one side of the

groove *d*, as shown in Figs. 2, 4, and 6. A similar formation is observed in the corresponding die *c'*. The second link-blank is then placed in the die *c*, with one end passing through the last completed link standing in the groove or cavity *w*; then, when the open end of the link-blank is closed and welded, as hereinbefore described, it is joined to the first link. The first link is held firmly in the cavity *w* by the clamping-jaw *z*, which is operated by the foot-treadle *a'*. The latter is provided with a weight, *b'*, which, when the operator's foot is removed from the treadle *a'*, seeks its center of gravity, and thereby throws the jaw *z* back and frees the link. The first link is then raised out of the cavity *w* and the second link placed in it, and so on until the desired length of chain is made.

The link-blank used to make an overlap joint is made with one arm or end longer than the other, as shown at *d'* of Fig. 7. The object of this is to cause the long end *d'*, when bent by the die *m*, to extend beyond the side of the die out in the path of the die *n*, so that when the short end *e'* is bent around by the die *n* it will be overlapped upon the long end and welded thereto.

For making butt-weld links I observe the same course, except in the use of a single die for bending and welding the open ends instead of two dies, and in the use of a blank having ends or arms of equal length, instead of the blank shown at Fig. 7. The die I use for butt-welding is shown at *f'* of Fig. 6. It has a groove, *g'*, at its front end, which corresponds in shape to the end of the finished link. The die *f'* is mounted on a sliding carrier, *h'*, and operates, as do the dies *m* and *n*, between the rear ends of the dies *c c'*, and at the completion of the stroke completes the inclosure of the link-cavity. The sliding die-carrier *h'* moves in guides *o*, and is operated by a bell-lever, *q*, mounted on the shaft *y*, and a cam mounted on the shaft *s*. The link-blank is inserted between the dies *c c'*, and clamped by them, as before described. The die *f'* then advances, receives the free ends of the blank in its groove *g'*, bends them around the former *v*, and welds them by a butt-weld. The link is then placed in the cavity *w* and the operation repeated, welding the links and uniting them at the same time.

The shaft of cam *i* is operated by crank *k'*, cam-rod *i'*, and cam *m'*, mounted on the power-shaft *s*.

The cam which operates the bell-lever of the horizontally-moving die or dies has an offset, *p'*, which permits the weighted arm *q'* of the lever to fall and retract the die.

The dies are removable in the usual way and interchangeable with others for different-sized links.

The machine may be used for making metallic sockets, rings, or eyes on the end of iron straps and other articles of like nature. For these various purposes dies of suitable shape must be used, but the same general character of form of article is preserved. The lateral cavity *w* for joining chain-links will in such cases not be required.

What I claim as my invention is—

1. In a machine for welding chain-links and similar articles, the clamping-dies, forming a matrix adapted to receive and support a partially-formed blank, in combination with a reciprocating welding tool or tools adapted to bend, close, and weld the open end of the blank, substantially as specified.

2. In a machine for welding chain-links and similar articles, the clamping-dies, forming a matrix adapted to receive and support a partially-formed blank, in combination with a reciprocating tool for bending, and a second reciprocating tool for bending, closing, and welding the unfinished portion of the blank, substantially as specified.

3. In a machine for forming chains, the clamping-dies adapted to form a matrix to receive and support a partially-formed link, and having a transverse slot, as at *w*, in combination with a reciprocating plunger adapted to bend, close, and weld the free end of the blank, substantially as specified.

4. In combination with the transversely-slotted holding-dies, a clamping-jaw operated by a treadle, for holding a finished link firmly in place while another link is being united thereto, substantially as described.

In testimony whereof I, the said AUGUST C. JORDAN, of the city of Pittsburg, county and State aforesaid, have hereunto set my hand.

AUG. C. JORDAN.

Witnesses:
T. B. KERR,
JAMES I. KAY.