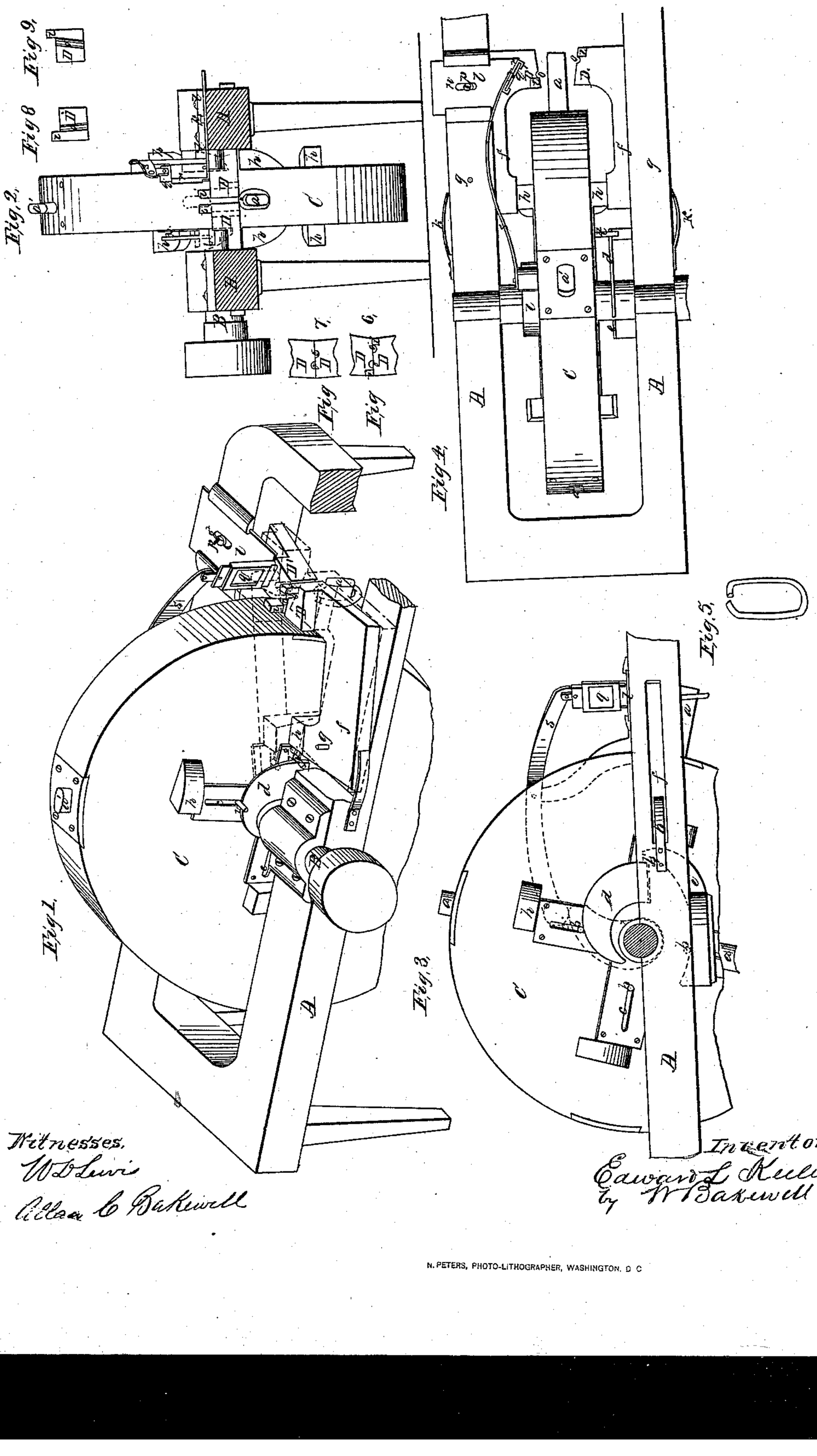
E. L. Keeler.

Making Chains.

No. 57,043. Patented Aug. 7, 1866.



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UNITED STATES PATENT OFFICE.

EDWARD L. KEELER, OF ALLEGHENY, PENNSYLVANIA, ASSIGNOR TO HIMSELF AND JOSEPH GRAFF, OF SAME PLACE.

IMPROVEMENT IN MACHINES FOR BENDING CHAIN-LINKS.

Specification forming part of Letters Patent No. **57,043**, dated August 7, 1866.

To all whom it may concern:

Be it known that I, EDWARD L. KEELER, of the city of Allegheny, in the county of Allegheny and State of Pennsylvania, have invented a new and useful Improvement in Machines for Bending Chain-Links; and I do hereby declare the following to be a full, clear, and exact description thereof, reference being had to the accompanying drawings, forming part of this specification, in which—

Figure 1 is a perspective representation of my machine, a part of the frame-work of the revolving disk being removed. Fig. 2 is a front view or vertical elevation of my machine. Fig. 3 is a side view of the operative parts of the machine. Fig. 4 is a top view. Fig. 5 is a representation of a link as it comes from the machine. Fig. 6 is a representation of the top, and Fig. 7 of the bottom, of the dies when closed. Figs. 8 and 9 are face views of the two dies for bending the links, showing the slightly-inclined grooves for receiving the link.

In the several figures like letters of reference denote similar parts.

My machine is designed to make links for chains from rods of iron, of suitable shape and diameter, by cutting from the rod a piece of suitable length and bending it between a pair of dies secured on an elliptical mandrel, so as to give the proper shape to the link without, however, bringing the ends which are to be united close together. The ends of the link are bent over far enough to meet, and are cut off slanting, so as to lap, but are bent with a slight twist, so as to separate sidewise far enough to allow the insertion of another link before the lap-edges of the new link are brought together and welded.

To enable others skilled in the art to use my invention, I will proceed to describe the construction and operation of my improved machine.

In the drawings, A is the frame of the machine, which supports, in suitable bearings, a transverse horizontal shaft, B, which revolves on its axis by power applied in any convenient way. To the shaft B is attached a circular disk, C, which contains the mandrels *a a'*, &c., around which the links are formed. These mandrels may be four or more in number, according to the size of the machine. They are all inserted in the body of the disk C, each in a suitably-shaped cavity therein. The mandrels *a a'*, &c., are situated with their axes in the lines of radii to the disk, with their outer extremities at uniform distances apart on the circumference. When operating to form a link the mandrels project from the circumference of the disk sufficiently far to operate on the rod of iron placed across the bending-dies D D', which are situated near to the disk, and after the link has been formed the mandrel around which it has been bent is withdrawn into the disk, thereby discharging the link and allowing it to drop down to the ground.

The mandrels *a a'*, &c., are elliptical in shape, (if that is the shape which it is desired to give to the link,) the long diameter of the ellipse being parallel to the sides of the disk. A pin, *b*, attached to one side of each mandrel *a* projects at right angles to the mandrel through a slot, *c*, in the side of the disk C far enough to pass over the face of two cams attached to the frame of the machine. One cam, *d*, is so shaped that as the disk revolves with the pin *b*, resting on its upper face, it forces the mandrel *a* outward from its cavity in the disk, holding it thus protruded until the link is formed around it, and the other cam, *e*, is so shaped and situated that as soon as the pin *b* is released from the cam *d* it passes over the curved face of that cam and pushes the mandrel back into the disk C. This takes place when the mandrel is in a vertical position with its point downward, so that the link which is thus delivered from the mandrel drops under the machine.

The mandrels *a a'*, &c., are all similarly constructed, and are operated successively by the cams *d e* as the disk C revolves.

The bending-dies D D' are attached to the lever-arms *f f'*, which work horizontally in slots in the frame of the machine, to which the arms *f f'* are pivoted at *g g'*, one on each side of the machine, as seen in Fig. 4. The dies D D' project from their arms so as to meet, when the arms are pressed inward, in front of the revolving disk C. When the lever-arms are not pressed inward the dies D D' stand apart, with their operative faces opposite to each other, as in Fig. 4. The dies are closed by means of wedge-cams *h*, attached to the

sides of the disk C, which, as they pass the arms *f f'* of the dies back of their pivots *g g'*, force the dies together until their faces come together. When the wedge-cams *h* release the dies the springs *k k* open the dies.

Each of the bending-dies D D' has a lug, *i i'*, projecting upward above the level of the top of the die, the lug *i* on the die D being in front of the groove in the face of the die, and the lug *i'*, on the other die, D', being in the rear of the groove in the face of that die. When the iron rod from which the link is to be made is fed into the machine it is laid across the top of the dies D D', between these lugs *i i'*, which prevent the rod from slipping away from the mandrel, as it might otherwise do.

In the face of each of the dies D D' is a groove, *o*, extending downward, which groove receives the sides of the link as it is carried down between the dies by the mandrel *a*. These grooves *o o* are not exactly opposite, nor are they parallel to, each other, but diverge slightly from a vertical line in opposite directions, as shown in Figs. 8 and 9, so that as the mandrel draws the link downward one side shall be bent a little forward and the other side a little back, and so that as the dies close over the ends of the link on top of the mandrel, bending the ends round, they shall not exactly meet so as to close the link, but leave the link open sufficiently to insert another link before the ends are welded. Thus the link is bent somewhat spirally around the mandrel, which permits of the ends being bent over without exactly meeting.

On one side of the machine, attached to a sliding frame, *l*, which is adjustable by means of a slot, *n*, and pin *p*, is a knife, *q*, which works up and down in its frame *r*. This knife is set at an angle of about forty-five degrees to the axis of the mandrel *a*, and is designed to sever a piece of iron rod of sufficient length to form a link. By cutting off the rod at an angle the edges of the end of the link are beveled, so that when bent round and united the edges form a lap-joint, which is more easily welded and is stronger. The knife *q* is operated so as to shut down and sever the link from the rod just as the mandrel touches the rod by means of a lever-arm, *s*, operated by a cam, *t*, on the side of the disk C, as shown in Fig. 4.

The operation of my machine is as follows: When the bending-dies D D' are open, as in Fig. 4, and just before the mandrel *a* reaches them, the rod of iron from which the link is to be made is fed in by laying it under the knife *q* horizontally across the top of the dies D D' and between the lugs *i i'*. The knife then descends and severs a blank from the rod. The edge of the mandrel then presses on the rod just over the space between the dies D D', which support it at both ends but leave it unsupported in the middle, and thus the rod is bent down by the mandrel and forced around the sides of the mandrel, as the dies gradually close upon it, pressing it closely thereto. As soon as the mandrel passes below the lower edge of the dies they close over the link, bending the two ends of the piece of iron round, so as to fit closely to the mandrel, with their ends passing each other, but not quite touching, as before explained. The mandrel then begins to recede into its cavity in the disk C, and in so doing forces the link off, which thus is delivered from the machine. This operation is repeated successively, each of the mandrels in its turn, as it reaches the dies, forming a link, if the iron is fed into the machine.

Having thus described my improved machine for making chain-links, what I claim as my invention, and desire to secure by Letters Patent, is—

1. The combination of the mandrel or mandrels *a*, projecting from the periphery of a revolving disk, C, the converging dies D D', and knife set so as to bevel the ends of the link, constructed and operating substantially as and for the purposes hereinbefore described.

2. The converging dies D D', having grooves *o*, slightly inclined in opposite directions, in combination with the mandrel or mandrels, for the purpose of bending over the ends of the link without closing the link, substantially as and for the purposes hereinbefore set forth.

In testimony whereof I, the said EDWARD L. KEELER, have hereunto set my hand.

EDWARD L. KEELER.

Witnesses:
W. BAKEWELL,
ALLAN C. BAKEWELL.