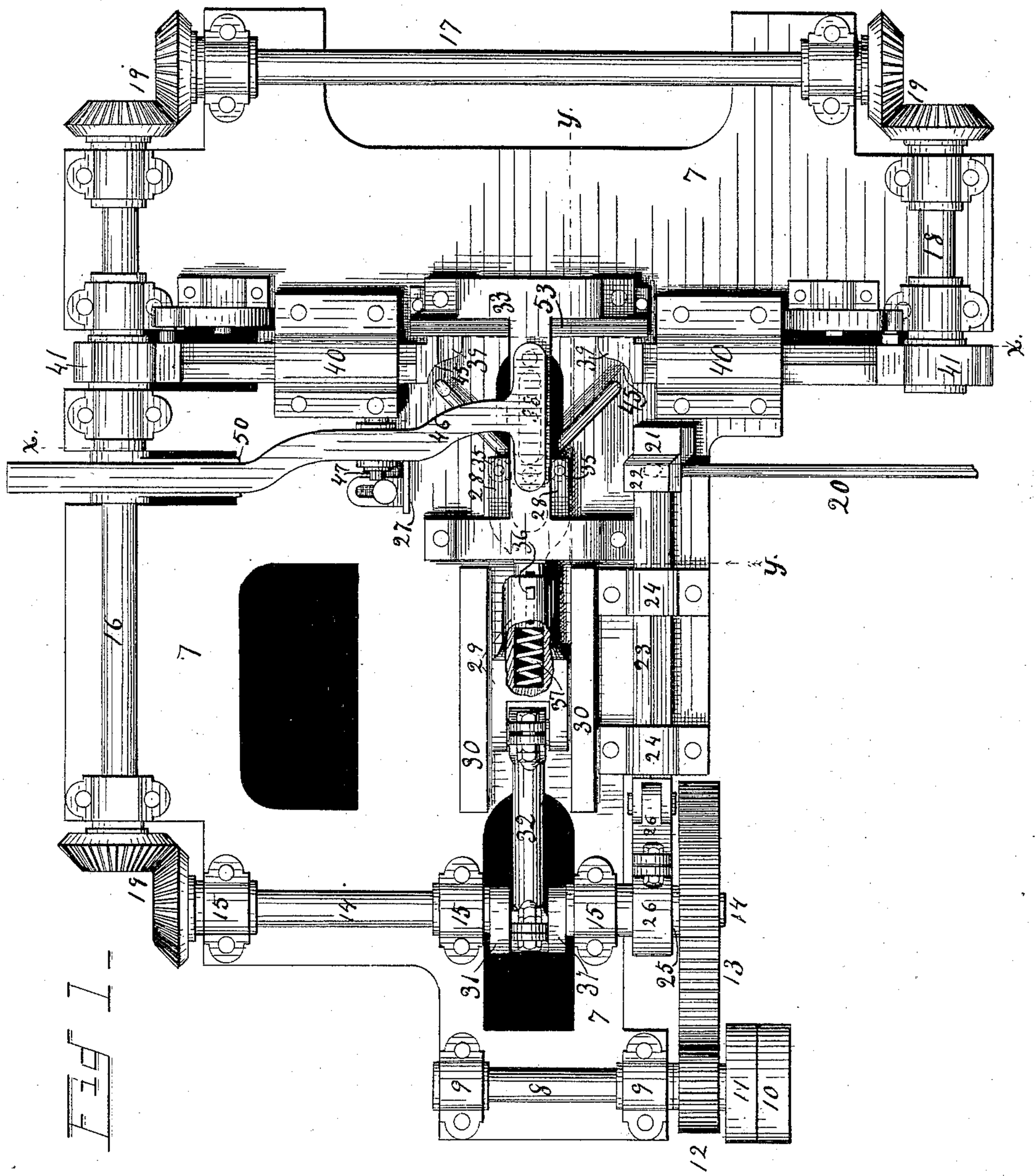
(No Model.) 2 Sheets—Sheet 1.

S. COLLINS.

LINK BENDING MACHINE.

No. 366,304. Patented July 12, 1887.



Witnesses
S. E. E. Stevens
P. E. Stevens.

Inventor
Stephen Collins.
By his Attorney W. L. Stevens.

(No Model.) 2 Sheets—Sheet 2.

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Fig 2.

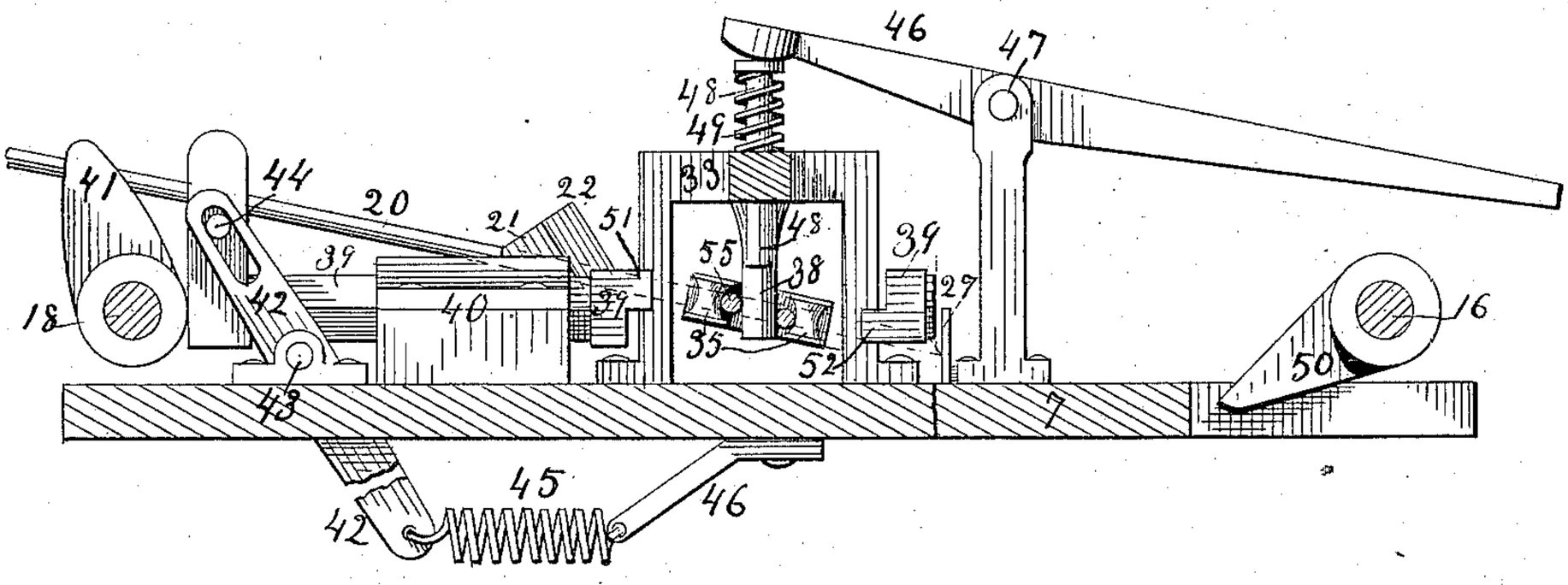


Fig 3.

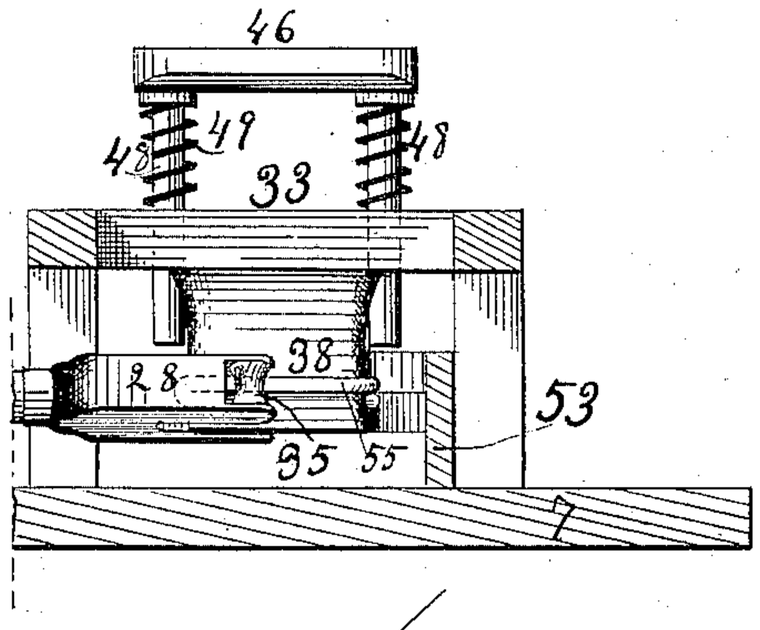
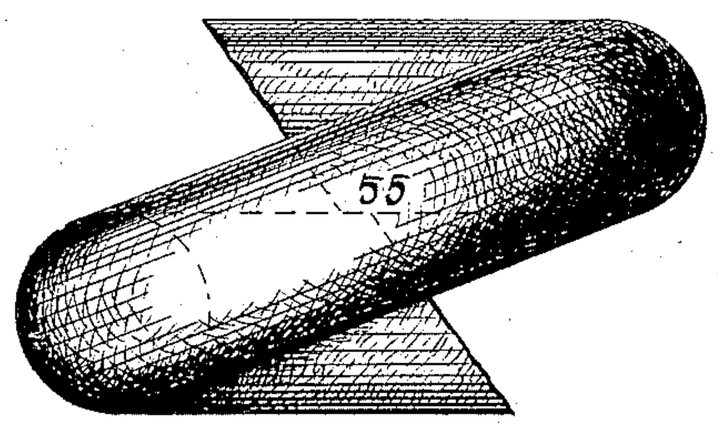


Fig 4.



Witnesses
L. E. E. Stevens
P. E. Stevens.

Inventor
Stephen Collins.
By his Attorney W. K. Stevens

UNITED STATES PATENT OFFICE.

STEPHEN COLLINS, OF ST. JOHN, NEW BRUNSWICK, CANADA.

LINK-BENDING MACHINE.

SPECIFICATION forming part of Letters Patent No. 366,304, dated July 12, 1887.

Application filed March 14, 1887. Serial No. 230,895. (No model.)

To all whom it may concern:

Be it known that I, STEPHEN COLLINS, a citizen of Canada, residing at St. John, in the Province of New Brunswick, Canada, have invented certain new and useful Improvements in Link-Bending Machines; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

This invention relates to that class of machines which are designed to form, from bars of metal, links for car-coupling, chain-links, &c.; and its object is to adapt a machine to receive bars of iron hot from the rolling-mill, to cut them into exact lengths for links, the cut being made at a slant suitable for welding, to bend the pieces so cut into the form of links, with their ends in the exact relation to each other required for welding, and to discharge the shaped links from the machine, all automatically.

To this end the invention consists in the construction and combination of parts forming a link-bending machine, hereinafter described and claimed, reference being had to the accompanying drawings, in which—

Figure 1 is a plan view of a link-bending machine showing my invention. Fig. 2 is an end elevation, partly in section, of a portion thereof along the irregular line X X, Fig. 1. Fig. 3 is a longitudinal vertical section thereof. Fig. 4 is an end view of a link as completed by this machine in form to be welded.

7 represents the frame or roll plate of the machine, the supports to which are not shown, and they may be of any usual form.

8 is a counter-shaft journaled in bearings 9, which are fixed upon the frame.

10 is a belt-pulley fixed upon the shaft 8, whereby power is to be communicated to run the machine; and No. 11 is a loose pulley or idler for the belt to run on when not in service.

12 is a pinion fixed upon the shaft 8, to engage a spur-wheel, 13, which is fixed upon the main shaft 14, which is journaled in bearings 15, fixed to the frame 7.

16, 17, 18 are shafts, also journaled in bearings fixed to the frame, and engaged to run together, and with the main shaft 14 by miter gear-wheels 19, whereby all these shafts run in unison with the main shaft, one revolution of which produces one revolution of each of the others, and all the parts are so timed that one revolution of the said shafts performs all the functions of the machine, completing the cycle of steps which enter into the formation of a link thereby.

20 represents a rod of iron, which I design to have taken in its heated state directly from the rollers which formed it, and passed into this machine between the stationary blade 21 and the movable blade 22 of a pair of shears, where the end of the rod is first to be trimmed diagonally, and each subsequent cut is to be made of the same diagonal slant to match therewith. To accomplish this the shear-blades 21 and 22 are set slanting, as shown in Fig. 3, and the blade 22 is fixed upon a shaft, 23, which is mounted to slide longitudinally in bearings 24, that are fixed to the frame; and the shaft 23 is connected with an eccentric, 25, on the main shaft 14 by a pitman, 26. The shear-blade travels continually, but it performs its service near the extremity of its stroke. The rod is then thrust into the machine until it is stopped by the guard 27, which is adjustably fixed on the frame 7.

28 is a forked bender mounted in a head, 29, which is fitted to slide on ways 30, that are fixed on the frame 7; and 32 is a pitman connecting the head 29 with a crank, 31, in the shaft 14.

38 is a former, around which the link is to be bent. It is parallel with the ways 30, and it is suspended from a support, 33, with its delivery-face downward, so that the link, when formed, may drop therefrom by gravity through an aperture, 34, in the frame.

35 35 are grooved rollers journaled in the arms of the fork 28 to bear and roll against the link-rod. The fork 28 has a shank fitted to slide in the head 29, and is slotted to receive a key, 36, which is fixed in the head to prevent the fork from being pushed entirely out of the head by the spring 37. The eccentric 25 and the crank 31 are so located or timed relative to each other in the circle of revolution of the shaft 14 that the rollers 35 are brought to bear upon the rod 20 before the shear begins cutting it off, and as the shear-blade 22 advances the head 29 also advances, compressing the spring 37 against the shank

of fork 28, and, by means of the rollers 35, holding the rod firmly pressed against the former 38, keeps the rod from turning while being cut off. This diagonal cutting has some tendency to turn the rod, and it is desirable that it should not be turned, in order that the slanted or scarfed ends of the rod may be cut so as to be parallel when brought together. As soon as the rod is cut off the continuing advance of the head 29 will compress the spring 37 with sufficient force to propel the fork 28 forward and bend the cut-off portion of the rod around the adjacent end of the former 38, and the rollers 35, advancing along the sides of the former, press the sides of the link 55 into position parallel with each other.

39 39 represent the end benders. They are fitted to slide transversely to the former 38, in bearings 40, which are fixed to the frame, and they are propelled forward at the proper time by tappets 41, which are fixed upon the shafts 16 and 18, to revolve therewith.

To withdraw the benders 39 after they have done service, springs 45 are attached at one end to some fixture of the frame—such as the arm 46—and at the other end to levers 42, which are pivoted at 43 to the frame, and slotted to receive a pivoted stud, 44, which is fixed to the bender. This spring and lever presses the bender constantly toward the tappet, so that the bender rests against the circular base of the tappet, and is kept out of service about three-quarters of the time. The fork 28 is fixed in the head 29, at an incline to the plane of movement of the benders 39, in order that it may lie one side of the link higher than the other against the former 38, so that the horizontal movement of the benders 39 will carry one end of the link above the other into a position ready for welding, while the sides of the link remain parallel. The advance working corners of the benders 39 are rounded to reduce friction as they rub against the link in bending its ends, and rounded cavities are made in the benders to receive and shape the bends in this formation of the last end of the link. The working-plane of one bender is above the working-plane of the other, and the end 51 of one bender passes over the end 52 of the other enough to place one end of the link over the other end. The link now being completed so far as this machine has to do with it, the end benders, 39, and the forked bender 28 withdraw, leaving the link free to drop from the former 38, through the hole 34, out of the machine. To insure the immediate removal from the former 38 of the completed link, a discharging-lever, 46, is pivoted at 47 to a post secured to the frame 7, two pins, 48, pass down through the support 33, at the ends of the former 38, springs 49 press upward under the heads of the pins 48, to hold the pins when not in service elevated out of the path of the link, and a tappet, 50, on the shaft 16 lifts the outer arm of the lever 46, thereby depressing the inner arm thereof, and the pins 48 with it, with a quick stroke, which will knock off the link from the former. The pins being returned by the springs also return the lever to its place of rest.

53 is a rib against which the backs of the benders 39 may slide to prevent their being crowded away from the former while bending the ends of the link.

In adapting this machine for the required work the length of the link to be made must be taken into consideration, and the shears 21 22 and the guard 27 must be placed accordingly, and at about equal distances from the former 38. If the fork 28 were placed horizontally, then the benders 39 would be required to move in slanting planes, to operate on the principle herein described. That would be merely reversing the order of parts. The fork 28, acting in a plane slanting to the plane of the former 38, produces a link thereon a little wider than the link would be if made in a plane parallel with the plane of the former, thereby enabling the link to be freed from the former more readily. This is an important feature, because the cooling of the link by contact with the machine causes the link to shrink, so that if it were bent directly, instead of diagonally or slantingly, around the former it would fasten thereon like a shrunken band. The former having its delivery end downward, the natural tendency of the link is to remove itself by gravity as soon as freed from the benders. The fork 28, mounted in the head 29, with a sliding joint, and constantly impelled forward by the spring 37, enables it, in combination with the former 38, to perform the double office, first, of a holder for the bar while it is being cut, and, second, to proceed to bend the link with a yielding resistance, which is a great source of security to the machine. Guides to deflect the end of the cut bar to the slant of the fork 28 would be readily suggested by the usual knowledge of rolling-mill men, if such guides should be found necessary; but I have found the grooves in the rollers 35 to answer this purpose in an experimental machine. Forming the link with its sides parallel and only its ends twisted out of the general plane of the link, as herein described, is a material advantage over that method of forming the link in which the sides of the link are twisted out of plane to make the bent ends pass each other, because in the former case the result of welding will be to leave the link straight, while in the latter the link will be twisted after welding, and require careful attention to straighten it.

What I claim as my invention, and desire to secure by Letters Patent, is—

1. The combination of the frame 7, the shaft 14, journaled thereon and provided with an eccentric, 25, and crank 31, the blade 21, fixed on the frame 7, the shaft 23, mounted to slide in bearings on the frame and connected with the eccentric 25, the shear-blade 22 on the shaft 23, the support 33, fixed to the frame, the former 38, depending from the support, the head 29, fitted to slide on the frame and con-

nected with the crank 31, the fork 28, secured to the said head, and the rollers 35, journaled on the arms of the fork, substantially as shown and described.

2. The combination of the shears 21 22, the former 38, the sliding head 29, the bending-fork 28, fitted to slide in the said head, and a spring, 37, between the head and bending-fork, and mechanism operating the shears and sliding head in unison, substantially as shown and described.

3. The combination of the former 38, the head 29, the bending-fork 28, fitted to slide in the head, and a spring, 37, between the said head and fork, substantially as shown and described.

4. The combination of the stationary former 38 and the fork 28, mounted slantingly to the former in slideways which are parallel with the former, substantially as shown and described.

5. The combination of the frame 7, provided with the opening 34, the support 33, fixed upon the said frame, the former 38, depending from the said support, with its delivery end downward over the said opening, and means for bending links around the said former, substantially as shown and described.

6. The combination of the frame 7, provided with the opening 34, the support 33, fixed upon the said frame, the former 33, depending from the said support, with its delivery end downward over the said opening, the pins 48, fitted through the support at the ends of the former, the springs 49, adapted to raise the pins, the lever 46, pivoted to the frame over the said pins, and means for operating the same, substantially as shown and described.

7. The combination of the fixed former 38 and means, substantially as described, for bending a link around one end of it and along its sides, the end benders, 39, fitted to slide transversely past the opposite end of the said former, the tappets 41, engaging the benders 39, and the levers 42 and springs 45, acting upon said benders, substantially as shown and described.

8. The combination of the fixed former 38, the forked bender 28, fitted to pass along both sides of the said former, and the two grooved rollers 35, journaled in the arms of the forked bender, the grooves of these two rollers being in a plane slanting to the former 38, substantially as shown and described.

9. The combination of the fixed former 38, the forked bender 28, fitted to pass along both sides of the said former, the grooved rollers 35, journaled in the arms of the forked bender, the groove of one roller being above the horizontal plane of the groove of the other roller, and the benders 39, fitted to slide transversely past the end of the fixed former and provided with projecting ends 51 and 52, adapted to pass one above the other, substantially as shown and described.

10. The combination of the frame 7, the shaft 14, journaled in bearings thereon, the eccentric 25, and the crank 31 on the said shafts 16, 17, and 18, journaled in bearings on the said frame, the tappets 41 on the shafts 16 and 18, the tappet 50 on the shaft 16, the blade 21, fixed to the frame, the shear-blade 22, connected with the eccentric 25, the support 33, and the former 38 depending from it, the head 29, fitted to slide upon the frame and connected with the crank 31, the fork 28, slantingly mounted in the head 29 and provided with roller 35, the end benders, 39, fitted to slide on the frame transversely past the end of the said former and engaging the tappets 41, the levers 42, pivoted to the frame and loosely connected with the benders 39, the springs 45, connecting the levers 42 with fixtures of the frame, the pins 48 through the support 33, the springs 47 around the pins, and the lever 46, pivoted to a fixture of the frame and engaging the tappet 50, substantially as shown and described.

In testimony whereof I affix my signature in presence of two witnesses.

STEPHEN COLLINS.

Witnesses:
JAMES J. POWER,
THOMAS COLLINS.