(No Model.)

3 Sheets—Sheet 1.

J. I. CHEESMAN.

LINK MAKING MACHINE.

No. 332,993. Patented Dec. 22, 1885.

Fig. 1.

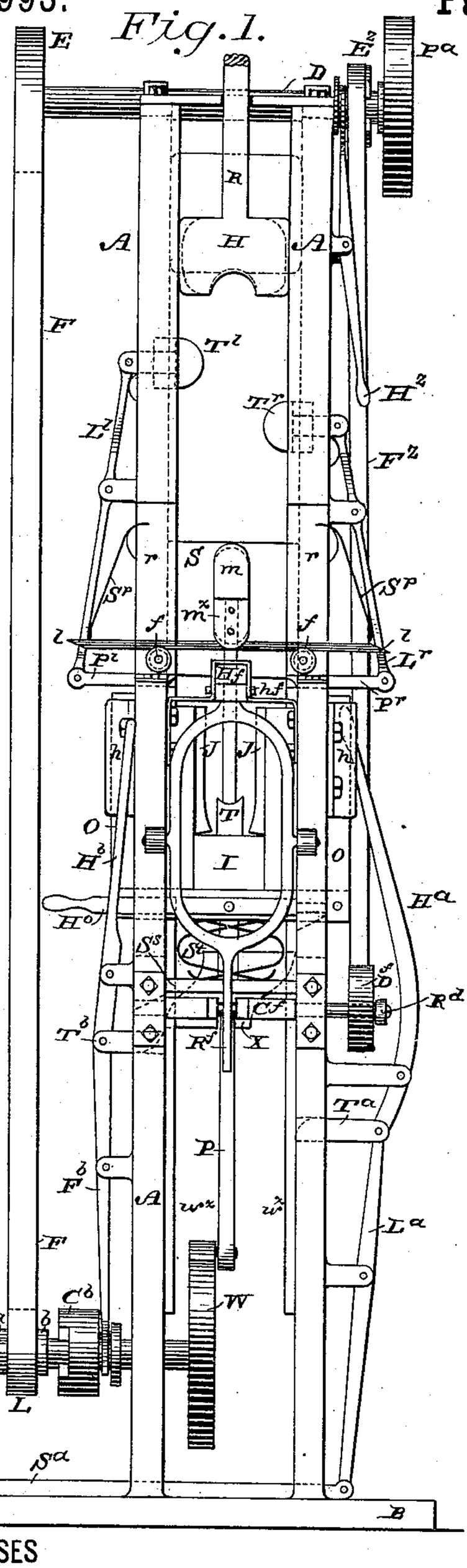
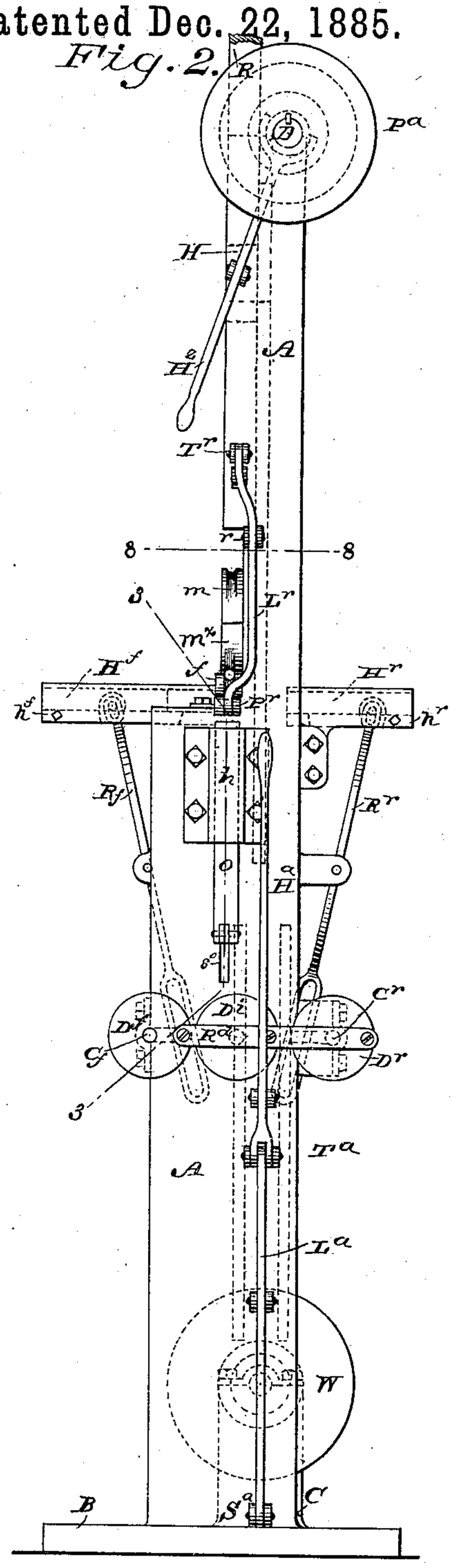


Fig. 2.



WITNESSES

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(No Model.) 3 Sheets—Sheet 2.

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Fig. 3.

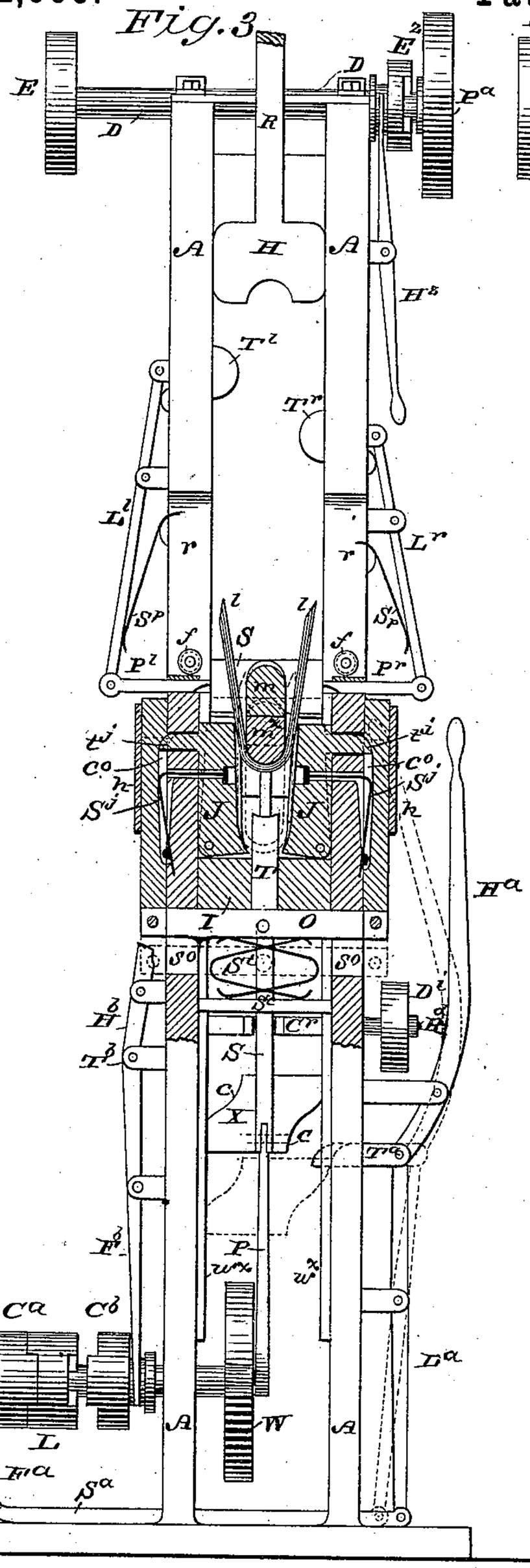

Fig. 4.

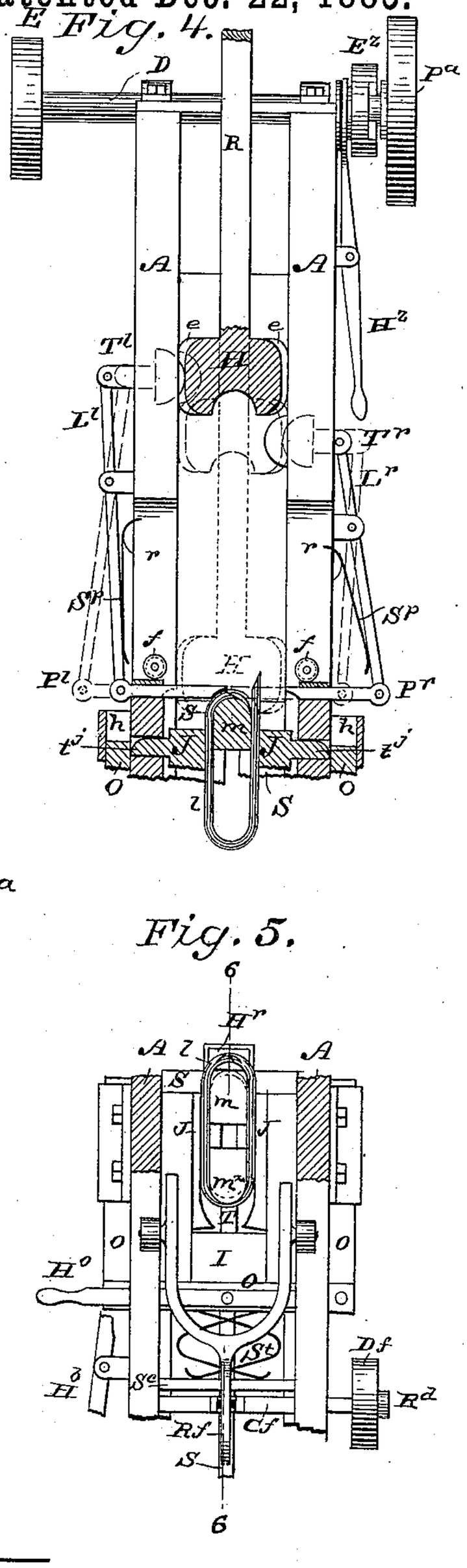

Fig. 5.

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Fig. 6.

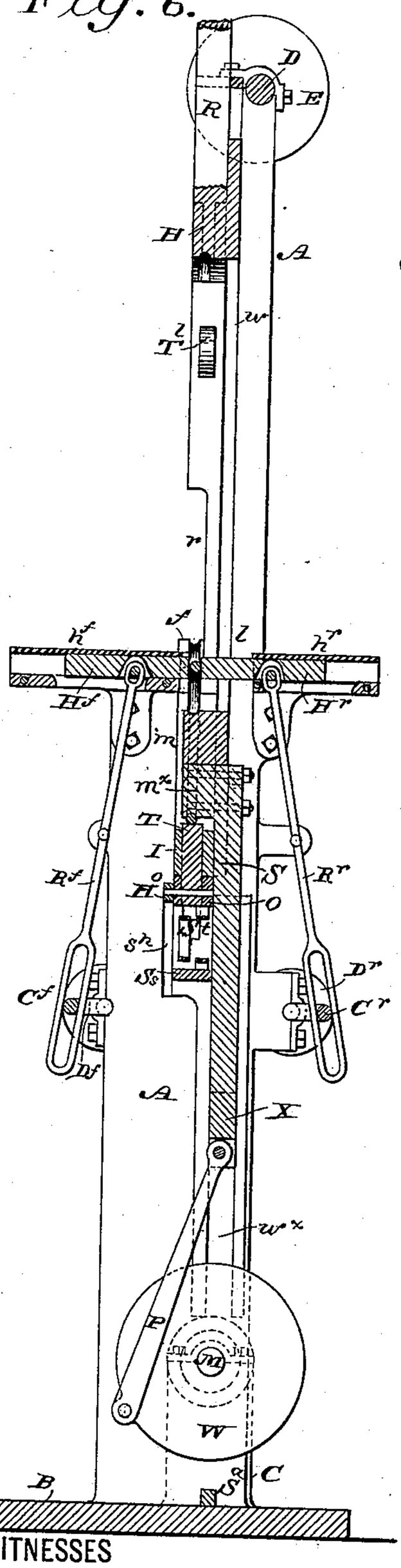


Fig. 9.

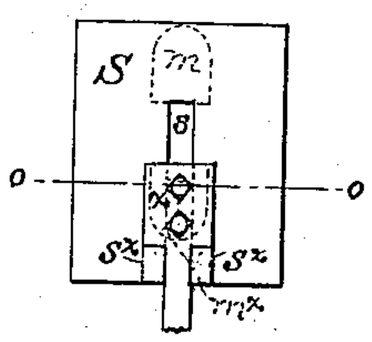


Fig. 10.

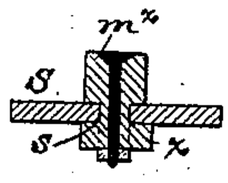


Fig. 7.

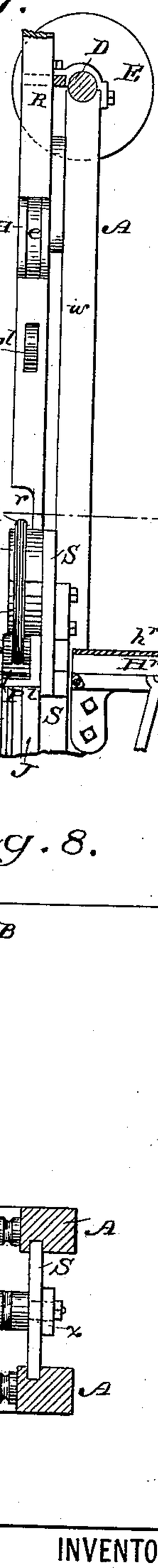
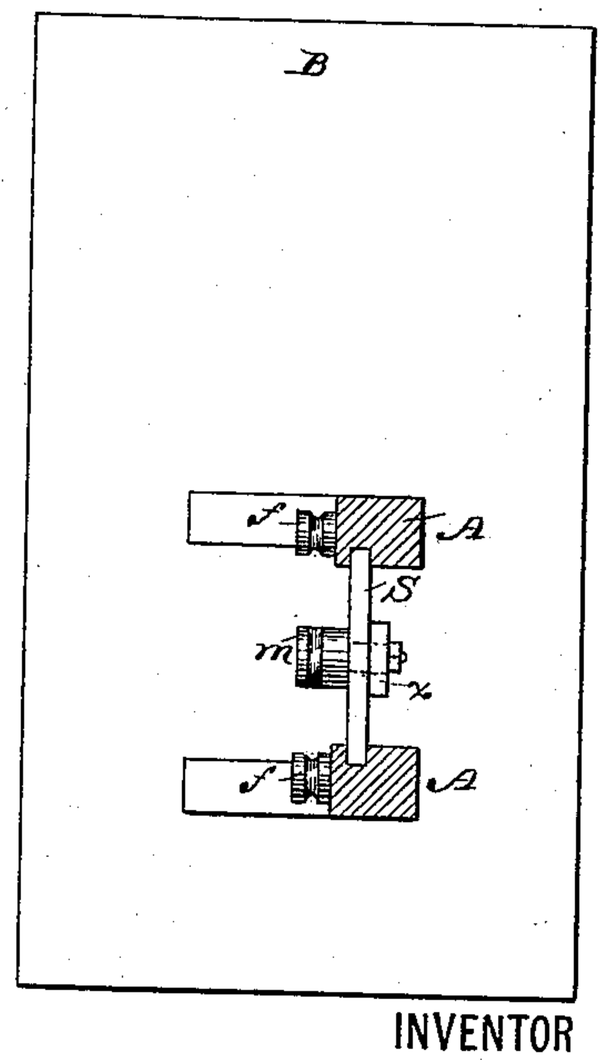


Fig. 8.



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UNITED STATES PATENT OFFICE.

JAMES I. CHEESMAN, OF ALTOONA, PENNSYLVANIA.

LINK-MAKING MACHINE.

SPECIFICATION forming part of Letters Patent No. 332,993, dated December 22, 1885.

Application filed May 27, 1885. Serial No. 166,885. (No model.)

To all whom it may concern:

Be it known that I, JAMES I. CHEESMAN, a citizen of the United States, residing at Altoona, in the State of Pennsylvania, have invented a new and useful Improvement in Machines for Bending and Welding Links, of which the following is a specification.

This invention relates, primarily, to improvements in machinery for making coupling-links for railway-cars; but my improved machine is or may be adapted to produce welded iron or steel links for other uses. The machine is of the drop-hammer type, and is designed to produce a neatly-finished lap-weld link for each stroke of the hammer, and without reheating or handling the blank between the bending and welding operations.

The present invention consists more particularly, first, in a novel combination of parts for bending the straight rod or bar blank into U shape; secondly, into a novel combination of parts for holding the bent blank while its ends are lapped for welding; thirdly, in a novel combination of parts for lapping the ends of the blank by motion transmitted from the hammer during its descent; fourthly, in a novel combination of parts for shifting the welded link upward "by hand" preparatory to the "finishing" operation; fifthly, in a novel combination of parts for imparting a smooth finish to the weld in the machine by hammering in the fins or lateral swells formed at the welding operation; sixthly, in a novel combination of parts whereby the finished link is again elevated, and is loosely held in a convenient position for withdrawal from the machine when the machine is brought to its position of rest; seventhly, in a novel combination of parts for performing the several operations which complete the link independent of the means by which the same are actuated; eighthly, in a novel combination of parts for automatically unclutching the main shaft of the machine from a loose driving-pulley at the end of each bending-stroke; ninthly, in a similar combination of parts for automatically unclutching said shaft from said pulley at the end of each return-stroke of the bending-slide; and, tenthly, in a combined bending-mandrel and welding-anvil which collapses in a peculiar manner to release the welded link, as hereinafter set forth.

Three sheets of drawings accompany this specification as part thereof.

Figures 1 and 2 of the drawings represent, respectively, a front elevation and a side view of my link bending and welding machine in its condition of rest. Fig. 3 represents a front elevation of the same, partly in section, on the line 3 3. Fig. 2, showing some of the parts in two positions by full and dotted lines, and illustrating the bending operation. Fig. 4 represents a similar view of the upper part of the machine, with the bending parts at rest in the position in which they are shown by dotted lines in Fig. 3, and the front of the welding hammer broken away, showing this hammer and other parts in three positions, by full, broken, and dotted lines respectively, and illustrating the end lapping and welding operations. Fig. 5 represents a front view of that portion of the machine immediately below its waist, partly in section, illustrating the shifting of the link preparatory to the finishing operation. Fig. 6 represents a vertical section of the machine in the plane indicated at 6 6, Fig. 5, illustrating said finishing operation. Fig. 7 represents a similar view of the upper part of the machine restored to rest, with the finished link hanging loosely on the welding-anvil, ready for removal from the machine. Fig. 8 represents a horizontal section in the plane indicated at 8 8, Fig. 7, and a plan view of the parts immediately below the plane of section. Fig. 9 is a back view of the mandrel-slide shown in the preceding figures, and Fig. 10 is a section on the line 0 0, Fig. 9.

Like letters of reference indicate corresponding parts in the several figures.

An upright frame, A, with a base-plate, B, and a pedestal, C, on the latter parallel with the sides of the frame, support the working parts of the machine, including, preferably, an elevated horizontal driving-shaft, D, parallel with the face of the machine, instead of which a convenient section of line-shafting, or a counter-shaft distinct from the machine, may be used. In and on the inner surfaces of the uprights of said frame A vertical ways w w^x are formed, and in the lower portion of said ways w and said ways w^x the said mandrel-slide, Figs. 9 and 10, shown at S in the other figures, with the cross-head X of its rod part, work freely up and down. Said slide S, with the

mandrel proper on its face, is in two parts, as clearly shown in the several face views, and in Figs. 9 and 10, to which reference is made for all details, the mandrel proper being divided horizontally into equal or nearly equal sections m m^x, carried, respectively, by the upper part of the slide and its rod part, which carries said cross head X. The upper end of said rod part works in a vertical slot, s, in said upper part of the slide, and is provided with a pulling cross-head, x, and said upper part of the slide is provided on its back, Fig. 9, with strong shoulder projections s^x s^x, to engage with said cross-head x, said slot s being extended to the lower edge of said upper part of the slide to avoid weakening the rod part. The lower mandrel-section, m^x, is strongly attached to the upper extremity of the rod part by through-bolts. The upper mandrel-section, m, may be cast on the face of the upper part of the slide, or attached thereto in any approved way. The lower extremity of said rod part of the slide S is connected by a pitman, P, with a crank-wheel, W, between the lower ends of the uprights of said frame A, which crank-wheel is carried by the inner end of a main shaft, M. the outer end of which is mounted in a bearing on said pedestal C. This shaft is provided centrally with a loose driving-pulley, L, which is connected by a driving-band, F, Figs. 1 and 2, and pulley E with said driving-shaft D. Rotary motion is thus transmitted continuously to said pulley L.

For transmitting motion to the main shaft M for lowering and re-elevating said mandrel-slide S, a pair of clutch-slides, C^a C^b, are mounted on splined portions of said main shaft, and clutch-projections a b are formed on the respective sides of said pulley L, to engage with the respective clutch-slides. Hand-levers H^a H^b are connected with forks F^a F^b, for engaging the respective clutch-slides, the latter directly, (by a pivot pin or bolt,) and said hand-lever H^a, through the medium of a supplemental lever, L^a, and a horizontal slide-bar, S^a, as shown, the several parts being appropriately fulcrumed and coupled together. Short horizontal tappet-slides T^a T^b, for disengaging the respective clutch-slides automatically at the respective ends of the stroke of said mandrel-slide, are coupled with said lever L^a and said fork F^b, respectively, by the pivots which connect therewith said hand-levers, and corresponding cam-surfaces, c c, are formed on the respective ends of the cross-head X, to coact with the inner ends of said tappet-slides.

In the state of rest (represented in Figs. 1, 2, and 7) said mandrel-slide S is in its uppermost position, and the mandrel m m^x projects in front of a recessed face portion, r, of the frame-uprights. Near the lower extremity of this recessed portion a pair of feed-rollers, f f, are mounted on short stud-shafts which project from the respective uprights parallel to the sides of the mandrel, the plane of the tops of these rollers being a short distance below the lower end of the elevated mandrel, so that a straight link-blank, l, may be adjusted upon said rollers beneath the mandrel, as shown in Fig. 1. Immediately below this point said uprights of the frame A project forward sufficiently to accommodate in front of the plane of the madrel-slide certain parts which will now be described. An inner frame, I, in connection with the uprights of said frame A, partly incloses a pair of clamping-jaws, J J, having opposing inner faces, and pivoted at their lower ends, as shown in Fig. 3, upon the sill of said frame I.

Normally the jaws J stand in retracted position, as indicated in Fig. 1, and in full lines in Fig. 3. For forcing them inward to clamp the link-blank l after it has been bent to U shape, as represented in Fig. 4, and by dotted lines in Fig. 3, a sliding outer frame, O, composed of a bottom cross-bar and two uprights, embraces said inner frame, I, which is of like form. The cross-bar of said outer frame extends outward through vertical slots s^o s^o in the uprights of the frame A, and the upper ends of the uprights of said outer frame, which are articulated to its said cross-bar, work in housings h, bolted to said uprights of the frame A externally, and each is provided at this point with a cam-recess, c^o, Fig. 3, to receive at times and coact with a tappet projection, t^j, on the corresponding jaw; and a central vertical thrust bar, T, sliding through said sill of the inner frame, I, is coupled to the cross-bar of said outer frame, O, for transmitting motion through the latter to the jaws. A spring, S^j, at the back of each jaw, suitably-accommodated and coupled to the jaw, as indicated in Fig. 3, provides for retracting the jaw when said outer frame is re-elevated. Said thrust-bar T receives its said motion from the mandrel-slide, in the downstrokes of the latter, through the mandrel and link-blank, as illustrated by dotted lines in Fig. 3. This device is further utilized to cushion said downstrokes of the mandrel-slide by combining therewith a spring or springs, S^t, interposed between said cross-bar of the outer frame, O, and a parallel sub-sill, S^s. One or more springs of any approved form may be used. A hand-lever, H^o, also coupled centrally to said cross-bar, pivoted at its right-hand end, and accommodated at its left-hand end by a vertical slot, s^h, Fig. 6, in the left-hand upright of the frame A, provides, with the aid of said cushioning-springs S^t, for partially re-elevating said outer frame, thrust-bar, link-blank, and mandrel by hand, as illustrated by Fig. 5, after the end lapping and welding operations illustrated by Fig. 4.

The end-lapping and welding devices consist of a drop-hammer, H, working in said ways w in the frame A above the mandrel-slide, and having a long rod, R, by which it is connected with a piston in a steam-cylinder above, or other approved means for working the same in customary manner, and a pair of lateral tappet-slides, T^r T^l, a pair of levers, L^r L^l, and a pair of horizontal lapping-

pushers, P^r P^l, with a retracting-spring, S^p, and a guide-housing for each pusher, and other appurtenances, as indicated, said hammer having grooved cam-edges *e*, to coact with said tappet-slides T^r T^l successively during each descent thereof, as illustrated, and hereinafter set forth; and the lower end of the hammer and the inner end of each pusher are shaped correspondingly with the upper mandrel-section, *m*, which possesses additionally the functions of an anvil in the end lapping and welding operations.

For making links from round rod iron or steel, for which the machine is specially designed, the upper and lower ends of the mandrel *m* m^x, the peripheries of the feed-rollers *f f*, the inner surfaces of the clamp-jaws J J, and the effective concavity in the lower end of the hammer H are appropriately grooved, as shown, so as to preserve the shape of the metal in cross-section and to facilitate guiding it. In a machine for working up square bar-iron into links such grooves would be omitted.

For finishing the link after it has been re-elevated by hand, as aforesaid, and as illustrated by Fig. 5, a last set of devices is employed, the operation of which is illustrated by Fig. 6, as aforesaid. These are a pair of horizontal finishing-hammers, H^f H^r, located centrally front and rear, and working in housings h^f h^r, a pair of levers or rock-frames, R^f R^r, coupled at their upper ends to the hammers, and a pair of crank-shafts, C^f C^r, for oscillating said rock-frames, with crank-disks $D^f D^r$, fast on the right-hand ends of said crank-shafts, an intermediate crank-disk, D^i, on a stud-shaft projecting from the right-hand upright of the frame A, a rod, R^d, connecting the wrist-pins of said disks, a driving-band, F^z, Fig. 1, embracing said disk D^r, which forms a pulley, a loose driving-pulley, E^z, on said driving-shaft D, and a hand-lever fork, H^z, for clutching and unclutching said pulley E^z with and from a fast pulley, P^a, through which said shaft D receives its motion, said pulleys having interlocking clutch projections, as shown. Said pulley P^a being connected, directly or indirectly, with a steam-engine or other motor in motion, and said hammer-rod R depending from the cylinder of a suitable drop-press, for example, in working condition, the machine belted and in a state of rest, as shown in Figs. 1 and 2, is ready for work.

Provision having been made for a rapid supply of straight blanks *l*, Fig. 1, cut of suitable length, with properly-scarfed ends, and each so heated that its ends are at or slightly above welding-heat and its middle a dull red, two operators take their positions at the respective sides of the machine and the operation proceeds as follows: The man at the right thrusts a heated straight blank, *l*, upon the feed-rollers *f*, beneath the elevated mandrel *m* m^x, as seen in Fig. 1, with its scarfs up and down, and, drawing back, pulls the hand-lever H^a, which instantaneously forces in the tappet-slide T^a, and through the lever L^a, slide-bar S^a, and fork F^a throws the clutch-slide C^a into mesh with the rotating loose pulley L, as shown in full lines in Fig. 3. The shaft M now makes a half-turn with said pulley L, and through said crank-wheel W, pitman P, and mandrel-slide S, draws the mandrel *m* m^x in an instant into the position and expanded condition represented in dotted lines in Fig. 3, and therewith the link-blank *l*, now reduced to U shape. Bending to this shape is mainly accomplished when the parts reach half-stroke, as represented in full lines in Fig. 3, and is effected to this extent by the coaction of the lower mandrel-section, m^x, the feed-rollers *f f*, and the upper ends of the open jaws J J. To and for a short distance below half-stroke the upper part of the mandrel-slide S moves with the remainder by its own gravity. The lower ends of the guides *w* arrest it in proper position for the end lapping and welding operations represented by Fig. 4, and during the completion of the stroke the slide and mandrel open to the extent represented in Fig. 9 and in dotted lines in Fig. 3. Immediately before the completion of the stroke the lower bend of the link comes in contact with the thrust-bar T, and as the stroke is completed motion is thus transmitted from the mandrel-slide to the sliding frame O, which, by its cam-recesses c^o c^o and the tappet projections t^j t^j on the jaws J, presses the latter against the sides of the mandrel and clamps the bent link-blank tightly preparatory to the said end lapping and welding operations. The retracting-springs S^j are put in tension, moreover, the cushioning-springs S^t are compressed, and the re-elevating hand-lever H^o, Figs. 1 and 5, is left in its lowermost position. Finally, at the conclusion of the stroke the cross-head X comes in contact with said tappet-slide T^a, and by its coacting cam-surface *c*, through said tappet-slide T^a, lever L^a, slide-bar S^a, and fork F^a, unclutches the clutch-slide C^a, as represented by dotted lines in Fig. 3, and stops the machine. The hammer H is now dropped, with the end lapping and welding effects illustrated by Fig. 4. The descending hammer first acts on the upper tappet-slide, T^l, and through this and the lever L^l actuates the left-hand end lapping pusher, P^l, and thereby bends over the left-hand end of the link-blank *l*, as shown in full lines in the figure. A moment later, as represented by broken lines, the hammer H passes below said tappet-slide T^l, which is immediately retracted by its spring S^p acting on said lever L^l, and the hammer H then strikes the lower tappet-slide, T^r, and through the lever L^r actuates the right-hand pusher P^r, and thereby bends down the right-hand end of the blank upon the left-hand end previously bent. Finally, as represented by dotted lines, said pusher P^r is retracted by its spring S^p, exposing the lapped ends upon the anvil-top of the mandrel-section m^x beneath the descending hammer, and an instant later the latter crushes

the lapped ends together and securely welds them. The hammer H is at once re-elevated, which restores the upper part of the machine to normal condition. The man on the left-hand side of the machine now raises said hand-lever H^o, assisted by said springs S^t, and thereby partially re-elevates said sliding frame O and thrust-bar T, elevating therewith the welded link *l*, and with the latter, of necessity, the lower part of the mandrel-slide, lifting the weld end of the link above and clear of said mandrel-section *m*, and so that the edges of the weld are in line with the finishing-hammers H^f H^r, as illustrated by Fig. 6. The man on the right-hand side of the machine now moves the hand-lever H^z so as to clutch the pulley E^z with the driving-pulley P^a, and motion is immediately transmitted, through the band F^z, pulley-disk D^r, rod R^d, and disks D^f D^i, to the front and rear crank-shafts, C^f C^r, and therefrom, through the rock-frames R^f R^r, to the front and rear finishing-hammers, H^f H^r, causing them to strike the weld edges simultaneously and drive in any fins or swells formed thereon at the welding operation. A reverse movement of said hand-lever H^z by the same man unclutches said pulley E^z and stops the finishing-hammers, which are made to rest in retracted position, as shown in Figs. 2 and 7. Finally, the man on the left-hand side of the machine pulls the hand-lever H^b, which, forcing in the tappet-slide T^b, actuates the fork F^b, and therethrough throws the clutch-slide C^b into mesh with the loose driving-pulley L and causes the main shaft M to be started again. This, through said crank-wheel W and pitman P, fully re-elevates the mandrel-slide, the mandrel collapsing as it rises to the point hereinbefore indicated, after which the anvil-section *m* of the mandrel again comes into contact with the upper end of the link and lifts the finished link *l* between the retracted jaws J J to the position in which it is represented in Fig. 7, where it hangs loosely upon the mandrel, as indicated. The mandrel is now in its uppermost position, as aforesaid, and is here stopped automatically by the coaction of said cross-head X with said tappet-slide T^b, the latter, through said fork F^b, retracting said clutch-slide C^b and restoring the machine to its condition of rest. The man on the left-hand side now removes the finished link from the machine while the man on the right-hand side introduces another straight blank, and thus the operation proceeds.

I have described somewhat in detail my machine as shown in the drawings, which illustrate the best means now known to me for producing the effects and carrying out the modes of operation of my invention, apart from mechanical details of construction, adjusting devices, and the like, which I have not considered it necessary to represent, as they form no part of this invention, and the machine admits of numerous modifications in form and arrangement of parts, and the employment of known mechanical substitutes within the scope of my invention, as hereinafter claimed.

Having thus described my said improvement in machines for bending and welding links, I claim as my invention and desire to patent under this specification—

1. The combination of the loose driving-pulley L, clutch-slide C^a, shaft M, crank-wheel W, pitman P, and vertical mandrel-slide S, the latter carrying a bending-mandrel on its face, with the horizontal feed-rollers *f f*, and the open jaws J J, below said rollers, substantially as herein specified, for bending a straight link-blank to U shape, in the manner set forth.

2. The combination of the vertical mandrel-slide S, carrying a bending-mandrel on its face, the vertical thrust-bar T, the sliding frame O, having cam-recesses in its uprights, and the jaws J J, pivoted at their lower ends and having tappet projections engaging with said cam-recesses, substantially as herein specified, for clamping the bent link-blank laterally, in the manner set forth.

3. The combination of the drop-hammer H, tappet-slides T^r T^l, levers L^r L^l, and pushers P^r P^l, with their appurtenances, and the upper part of the vertical mandrel-slide S, supported by its ways beneath said hammer, and having an anvil-section of the bending-mandrel upon its face, substantially as herein specified, for lapping the ends of the link-blank, one over or upon the other, and welding them together, in the manner set forth.

4. The combination of the hand-lever H^o, sliding frame O, thrust-bar T, and cushioning-spring S^t, with the lateral jaws J J, and vertical mandrel-slide S, substantially as herein specified, for loosening and partially re-elevating the welded link, in the manner set forth.

5. The combination of the parallel crank-shafts C^f C^r, rock-frames R^f R^r, and finishing-hammers H^f H^r, with a driving-shaft, clutch, band and pulleys, and connecting-gear for driving said crank-shafts simultaneously at will, substantially as herein specified, for finishing the links, in the manner set forth.

6. The combination of the loose driving-pulley L, clutch-slide C^b, shaft M, crank-wheel W, pitman P, and vertical mandrel-slide S, the latter having on its face a vertically-collapsing mandrel, the upper section of which carries the finished link upward and supports it loosely until it is taken from the machine, substantially as herein specified.

7. The combination, in an upright machine for bending and welding links, of a horizontal pair of feed-rollers, a vertical mandrel-slide carrying a combined bending-mandrel and anvil on its face, and a pair of clamping-jaws for bending a straight link-blank to U shape, and holding it tightly in this shape, with a pair of end-lapping pushers and a welding-hammer, substantially as herein specified, for making a lap-weld link, in the manner set forth.

8. In an upright machine for bending and

welding links, the combination, with a vertical mandrel-slide, of the cross-head X, tappet-slide T^a, fork F^a, and clutch-slide C^a, substantially as specified, for automatically unclutching the shaft which drives said mandrel-slide from its driving-pulley at the end of each bending-stroke, in the manner set forth.

9. In an upright machine for bending and welding links, the combination, with a vertical mandrel-slide, of the cross-head X, tappet-slide T^b, fork F^b, and clutch-slide C^b, substantially as specified, for automatically unclutching the shaft which drives said mandrel-slide from its driving-pulley at the end of each return-stroke, in the manner set forth.

10. In a machine for bending and welding links, a combined mandrel and anvil carried by a two-part slide, and itself divided transversely, substantially as herein specified, the bending-section of the mandrel being adapted to slide away from the anvil-section in each bending-stroke, and to reapproach the same in each return-stroke, for releasing a link formed and welded on the mandrel, in the manner set forth.

JAMES I. CHEESMAN.

Witnesses:
LEVI CLABAUGH,
MICHAEL SCHENCK.