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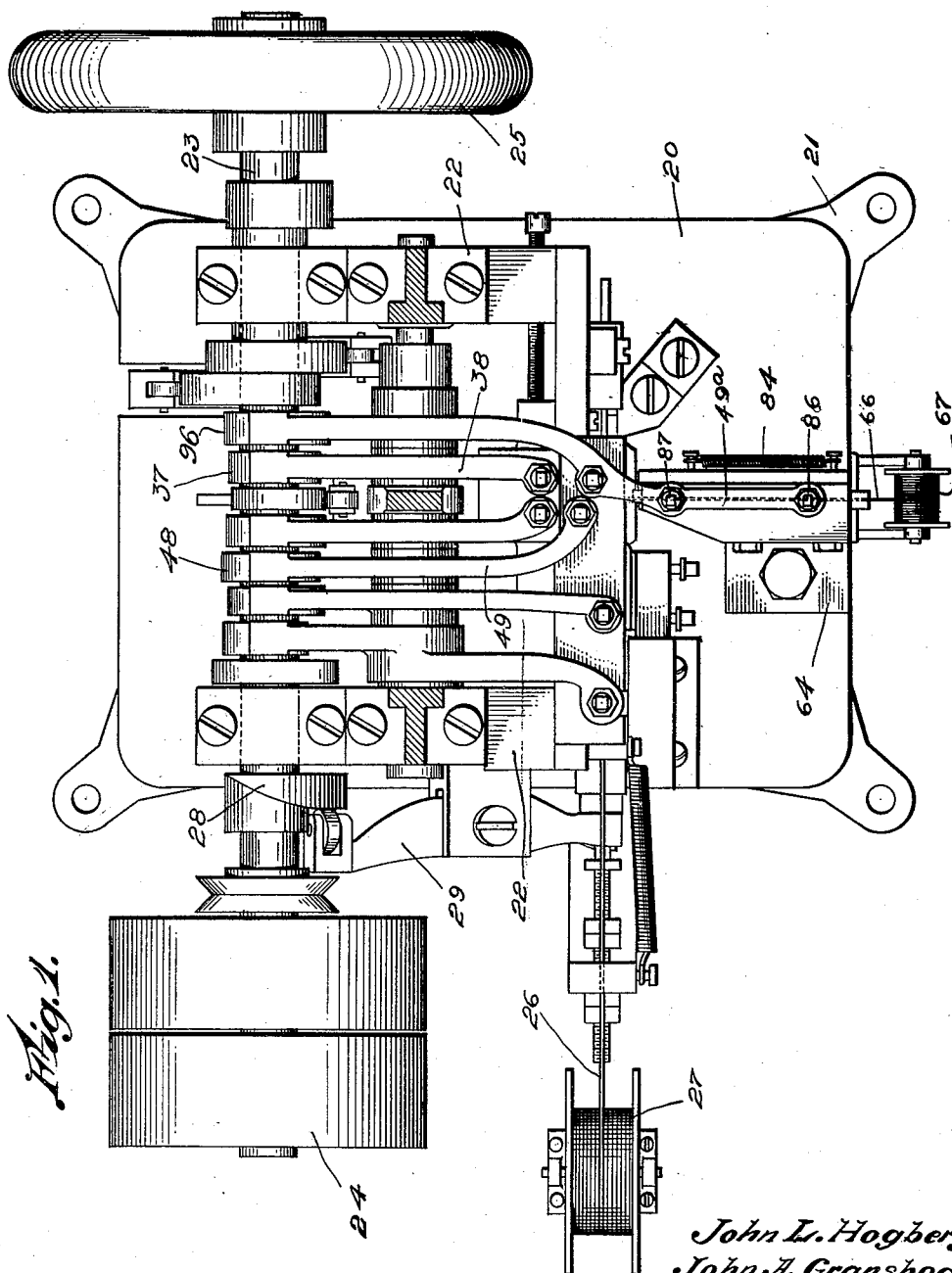
J. L. HOGBERG ET AL

1,835,598

CHAIN MAKING MACHINE

Filed June 1, 1925

5 Sheets-Sheet 1



John L. Hogberg.
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INVENTORS.

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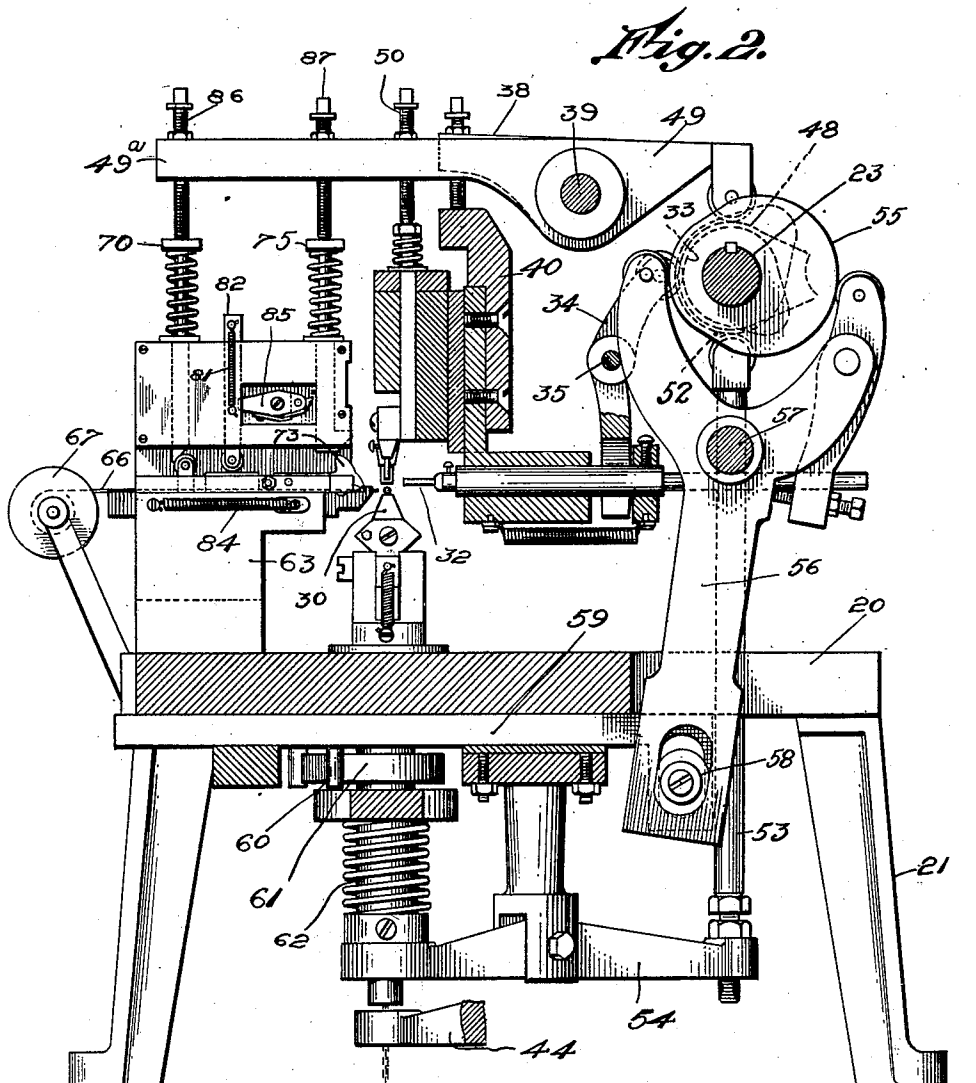
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5 Sheets-Sheet 3

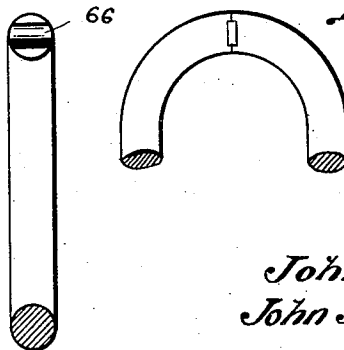
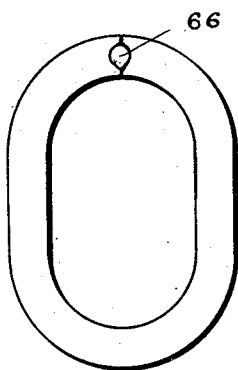
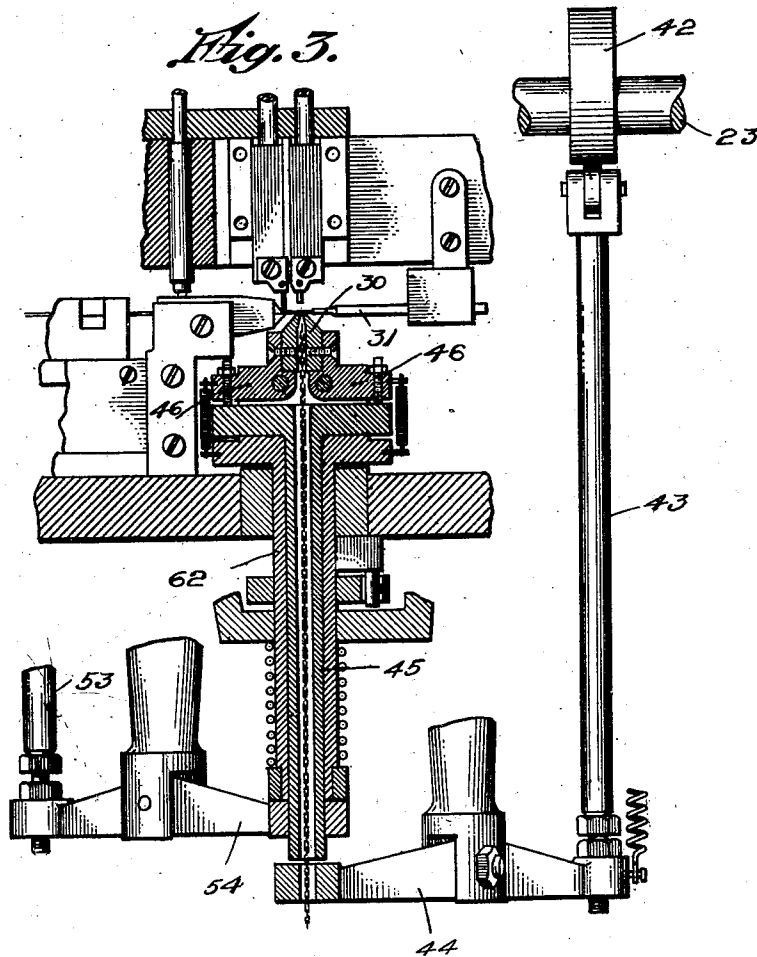


Fig. 19.

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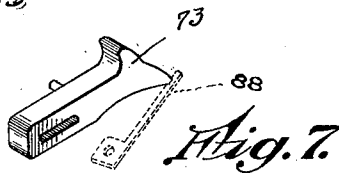
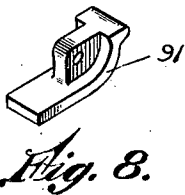
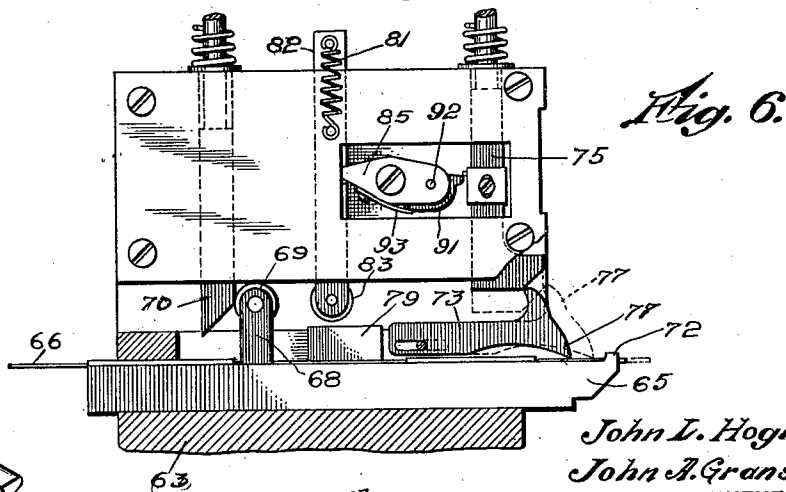
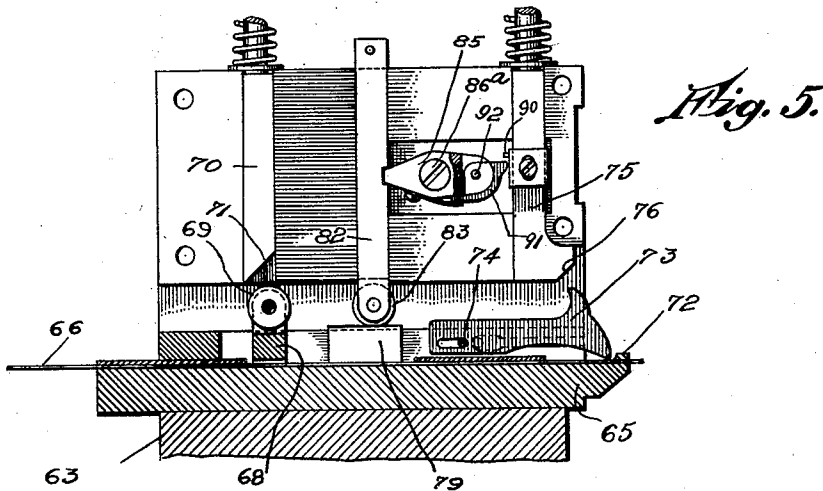
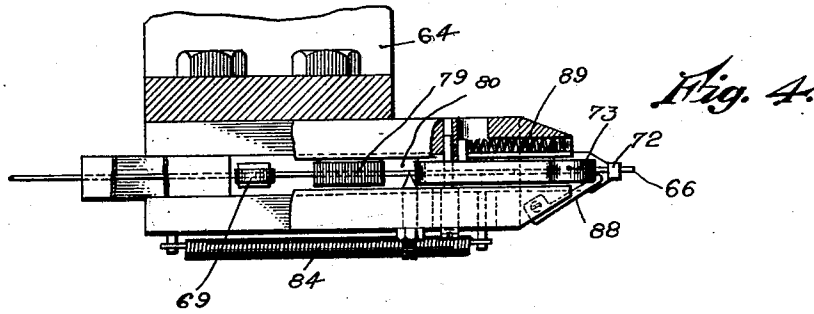
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Fig. 9.

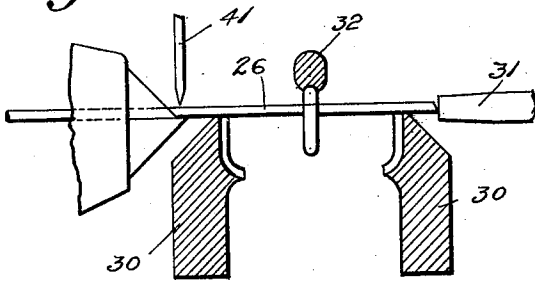


Fig. 10.

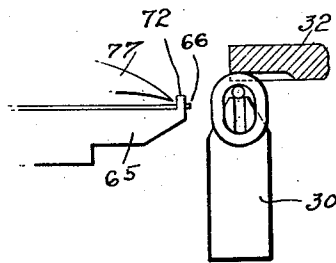


Fig. 11.

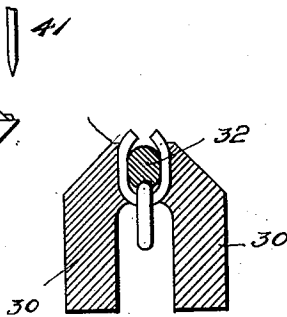


Fig. 12.

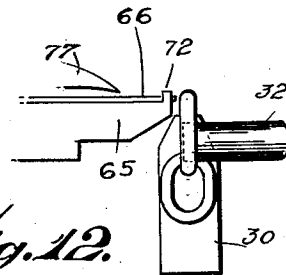


Fig. 13.

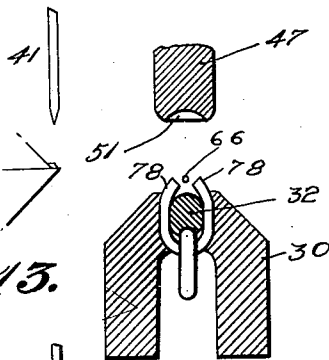


Fig. 14.

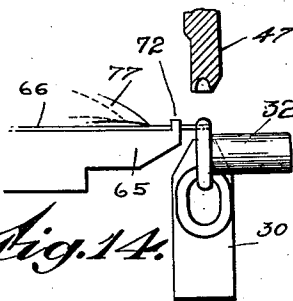


Fig. 15.

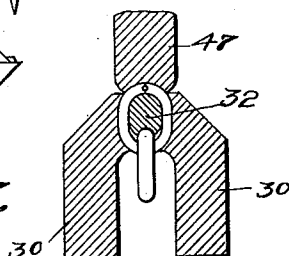
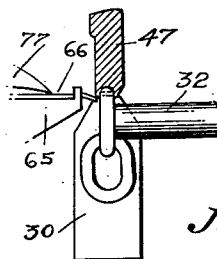


Fig. 16.



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CHAIN MAKING MACHINE

Application filed June 1, 1925. Serial No. 33,969.

This invention relates to an improvement in chain-making machines, and has for its object to provide in such a machine means for feeding, severing and bending a length of wire into open link loop form and positioning a portion of solder between the separated ends of the loop wire, means being provided for subsequently closing the ends of the loop onto the solder to form a link having a sufficient amount of solder retained at the joint so that when fluxed the abutting ends at the joint will be soldered together.

A further object of this invention is the provision of means for feeding a continuous length of solder wire at intervals operated in time with a link-forming mechanism for positioning a portion of the solder wire between the separated ends of the link loop and subsequently closing these ends onto the solder and then severing the solder wire.

A further object of this invention is the positioning of a short length of solder wire of a diameter less than that of the wire of the link to which it is applied and the forcing of the link ends against this solder with such force as to imbed the solder into the softer metal of the link.

The invention further consists in the provision of means for feeding the solder wire in time with the operation of the link-forming means of the machine and to provide in this solder wire feeding mechanism a support for the end of the wire which advances in close proximity to the link to which the wire has been fed for directing the solder wire into position between the open ends of the link wire, means being also provided for subsequently withdrawing this wire support to permit an unobstructed rotating action of the link-forming jaw-operating mechanism.

With these and other objects in view, the invention consists of certain novel features of construction, as will be more fully described, and particularly pointed out in the appended claims.

In the accompanying drawings:—

Figure 1 is a plan view of a chain-making machine showing the means for feeding the wire from which the different links are formed, also showing a supply of wire solder

and means for feeding this solder into position to be subsequently fused to close the joint thereof.

Figure 2 is a sectional side elevation showing the solder wire feeding mechanism which is operated in time with the link-closing mechanism to position a short length of solder between the ends of the link prior to closing the same.

Figure 3 is a central sectional elevation through the link bending jaws and their operating mechanism.

Figure 4 is a top view of the solder wire feeding mechanism partly in section.

Figure 5 is a side elevation of the solder wire feeding mechanism partly in section illustrating the wire carrier as withdrawn from advanced position.

Figure 6 shows this solder wire feeding mechanism with the wire carrier in advanced position and the wire feed pawl, the latter being also shown in dotted lines in advanced position.

Figure 7 is a perspective detail view of this wire feed pawl with the spring adapted to normally hold it out of wire-engaging position.

Figure 8 is a perspective view showing a portion of the trip latch operated by the feed pawl mechanism to release the wire clamping block and permit the pawl to advance the same wire.

Figure 9 is a detail illustrating the link wire as being fed across the bending jaws and through the previously formed link and in position to be severed by the cutter.

Figure 10 is a side elevation of the parts shown in Figure 9 with the addition of the solder wire as supported on its carrier in position to be subsequently advanced.

Figure 11 shows the length of wire as having been severed and the forming mandrel as having moved downwardly and cooperating with the link-forming jaws to shape this length of wire into open loop form.

Figure 12 is a side elevation showing the parts illustrated in Figure 11 and also illustrating the solder wire carrier as having been advanced and the feed pawl as being in posi-

tion to feed a length of this solder wire between the open ends of the link.

Figure 13 shows the solder wire as having been fed between the open ends of the link wire and the link-closing anvil in position to descend and close the ends of the open loop wire onto the solder wire.

Figure 14 is a side elevation of the parts shown in Figure 13 and illustrating the solder wire as having been advanced between the ends of the link wire.

Figure 15 is a sectional elevation illustrating the anvil as having descended and closed the open ends of the link wire onto the solder wire.

Figure 16 is a side elevation of the parts shown in Figure 15 illustrating the anvil as having closed the ends of the link wire onto the solder wire and also as having severed the solder wire an end of which is shown as being sprung downwardly from its original feeding plane.

Figure 17 is a greatly enlarged view showing the link and the strip of solder wire as positioned at the joint of the link, the body of the solder being imbedded into the metal of the link.

Figure 18 is a sectional view illustrating the position of the solder as lying across the abutting ends of the link joint thereby providing the key of solder which serves to strengthen the joint of the link.

Figure 19 is a view illustrating the solder wire as being in flat or ribbon form instead of circular in cross section, as shown in Figures 17 and 18.

In practice where chain is formed with joints soldered together the usual method employed is that of using a so-called solder core wire from which the links are formed on the usual chain-making machine, and after the forming operation the chain is subjected to heat of a temperature sufficient to melt the solder core causing it to expand and so unite the links at the joints. Solder core wire of this construction is much more expensive than the unfilled wire and by the use of our improved attachment to the chain machine just the proper amount of solder is placed between the ends of the link wire at the joint thereof at the only point where it is required thus permitting the use of the less expensive unfilled wire and greatly reducing the cost of chain thus formed. After the chain is constructed with the insertion of the portion of solder at the joint, it is subjected to a fluxing heat to unite the ends thereof, the same as is a chain formed of a solder core wire. This construction, however, has an advantage over the solder core wire in that only enough solder is provided at the joint to close the same and each and every joint is positively supplied with solder, thus insuring a chain in which the joint of every link is properly soldered which is not

the case with the solder core wire as in many instances the solder in a solder core wire is not continuous in the core thereof and thus an open space where solder is absent, when it comes at the joint, fails to close as no solder is present, thus making weak links which will break under the test. Then again the solder core wire in addition to its higher cost and slight unreliability as to its soldering action, when subjected to a fluxing heat often runs out over the ends of the link wire sufficiently to solder the adjacent links together at the joints, which is quite unsatisfactory. To obviate all these difficulties and at the same time reduce the cost of the chain and produce a stronger and better chain, we have provided simple and effective means for feeding a portion of solder between the ends of the link wire prior to closing these ends which closing action tightly grips the solder between them thus firmly holding the same in position until finally being subjected to a fluxing heat. Also, it is found in practice of advantage to use the so-called hard solder in this soldering operation which in many instances is harder than the metal of the link wire so that when the ends of the link wire are forced against the harder surface of the solder, the solder imbeds itself into the metal of the link and forms a laterally-disposed bar extending across the joints which serves as a key to assist in resisting an opening strain and also at the same time presents a greater soldering area which again assists in increasing the strength of the soldered joints; and the following is a detailed description of the present embodiment of our invention showing one means by which the solder wire may be positioned between the ends of the link wire whereby the above advantageous results may be accomplished:—

With reference to the drawings, 20 designates the bed of the usual chain-making machine, which is supported on legs 21 and on this bed are supported standards 22 in which is mounted a cam-shaft 23 driven from the pulleys 24, a hand wheel 25 being also mounted on this shaft for convenience in manipulating the mechanism. By this shaft 23, the link wire 26 is fed from the reel 27 by the feeding cam 28 through the lever 29 across the bending jaws 30 against the stop 31 after which the forming mandrel 32 is advanced by means of the cam 33 through the lever 34 pivoted at 35 and is advanced over the length of wire fed across the open jaws 30, after which this mandrel 32 is depressed by the cam 37 through the lever 38, which is pivoted at 39, and the slide 40 to move the mandrel from the position shown in Figure 9 to that shown in Figure 11, after the usual severing operation by the downward movement of the knife 41 by cam 48 through lever 49 and at this time the jaws 30 are brought together by action of the cam 42 through the connector

43 and lever 44 which lifts the sleeve 45 to act through the jaw arms 46 to bring the jaws 30 into the position illustrated in Figure 11; all of which movements are usual in a standard chain-making machine. After this operation the anvil 47 descends under action of cam 48, lever 49 pivoted at 39 and adjusting screw 50, whereby the grooved portion 51 of this anvil engages the open ends of the link to force them together into the position best illustrated in Figure 15 and at the same time the edge of the anvil 47 shears or cuts the solder, as shown in Fig. 16, after which the anvil and the mandrel are removed back to their starting position and the jaws through the action of the cam 52, rod 53 and lever 54 are lifted so as to bring the closed link into position to receive the next length of wire to be fed therethrough, and the jaws are then rotated by means of the cam 55 through the lever 56 pivoted at 57, the lower end of which is connected at 58 to the slide 59 which slide has a pin 60 to engage a dog 61 on the sleeve 62 whereby the action of this cam 55 simultaneously rotates this jaw-carrying head into position to present the closed link in position to permit the next feeding of link wire to extend through this link into the position best illustrated in Figure 9, the operation above described being repeated. All of this chain link forming mechanism is employed in the usual chain-making machine.

The present invention lies in the application of a solder wire feeding mechanism which presents the solder in wire form to the link after it has been formed into open loop shape and just prior to the closing of the ends of the link wire, and this mechanism may be described as follows:—63 designates the frame of this solder wire feeding mechanism which is provided with a foot 64 bolted to the table 20 of the chain-making machine. In this frame is mounted a sliding carrier bar 65 over which the solder wire 66 is fed from the reel 67. This carrier bar is provided with an upstanding lug 68 having an anti-friction roll 69 adapted to be engaged by the beveled end 71 of the vertical reciprocating feed bar 70 to advance the carrier bar into position and guide the wire which extends along its face and along and through the guide end 72 thereof so as to support the wire in proximity to the link being formed while the wire is being positioned between the ends of this link. After this carrier has been advanced by its bar 70 the feed slotted pawl 73 which is slidable on the pin 74 is engaged by the pawl end 76 of the reciprocating feed bar 75 to force the edge 77 of this pawl down onto the wire and to then advance the pawl from the position shown in full lines in Figure 6, to that shown in dotted lines, whereby the wire is advanced the required length to be projected between the open ends 78 of the link as illustrated in Figure 13, whereby

when these link ends are closed by the anvil 47 they will grip this portion of the solder wire between them.

In order to control the movement of the wire back and forth with the carrier bar, we have mounted a loose block 79 in the slot 80 in this carrier bar to ride thereon, which block is of substantially the width of the slot and rests against the wire extending along the carrier bar and is normally pressed against the carrier bar by the spring 81 through the presser bar 82 so that the roll 83 in pressing the block onto the wire, and the wire onto the bar, rolls along its surface as the block moves with the bar, with just sufficient tension to cause the wire to move back and forth with the bar. In order to permit this wire to be fed along relatively to the carrier bar by the advancing of the pawl it has been arranged so that the pin 90 on the feed bar 75, just prior to engaging the pawl, will engage the latch 91 to operate the lever 85 which is pivoted at 86a so as to lift this rod 82 from its block 79 and release the wire 66 to be advanced by the advancing movement of the feed pawl, and at the latter end of the downward movement of the pin 90 this pin snaps past the latch 91 and so permits the bar 82 to be released for pressing action upon the block 79 and wire 66. The latch 91 being pivoted at 92 to the lever 85 permits the return of the pin 90 past the same without obstructing the action of presser bar 82, the latch being returned to normal position under pressure of the spring 93.

The feed bar 70 and the pawl feed bar 75 are operated by cam 96 through lever 49a and the adjustable screws 86 and 87, whereby the feeding action of the solder wire is in time with the link-forming mechanism; after each feeding action this lever 49a and the feed bars 70 and 75 are permitted to rise to release the pawl 73 and the carrier bar for return under action of its spring 84 to its starting position and the pawl for return to its starting position under action of its spring 89 upon the lifting of the feed bar 75 from the pawl 73. The spring 88 acts upon the engaging edge of this pawl at one side of its point of engagement with the wire to normally lift the same clear of the wire after each feeding operation thus permitting the wire under action of the presser block to be carried back with the carrier bar upon its return movement. The spring 88 is of thin flat stock of a thickness less than the diameter of the solder wire and being at one side of the wire will not prevent engagement of the pawl therewith.

This attachment for feeding solder wire to a chain making machine does not in any way interfere with the operation of the machine. This mechanism is operated in time with and from the usual mechanism of the link forming parts and is very simple in its construction

and practical in its operation and the chain formed by our improved machine is less expensive owing to the fact that solid wire may be employed rather than the usual solder core wire, and the chain is much stronger as a whole than is chain formed of the solder core wire, owing to the fact that just the proper amount of solder is positively placed at the joint when the link is formed thereby eliminating the uncertainty of obtaining proper amount of solder being at the joint which is the case where a solder core wire is used as it is often found in the drawing of solder core wire that the core is broken and a space left along the core of the wire which often affects the soldering action of the links.

The foregoing description is directed solely towards the construction illustrated, but we desire it to be understood that we reserve the privilege of resorting to all the mechanical changes to which the device is susceptible, the invention being defined and limited only by the terms of the appended claims.

We claim:

1. In a chain machine, means for bending a length of wire into open loop form, means for closing the loop, a reciprocating gripper for feeding a length of solder wire from a supply between the ends of said loop, a movable carrier for supporting the end of said wire in proximity to the open loop during the bending operation, and means for withdrawing said carrier to permit unobstructed subsequent operations of the link-forming mechanism, means for supporting said formed link in position to have passed therethrough the wire for another loop, and means for transferring the bending means to the subsequently inserted wire for a repeated link forming operation.

2. In a chain machine, means including a pair of jaws for bending a length of wire into open loop form, means for rotating said jaws, a slidable carrier for feeding a length of solder wire from a supply between the ends of said loop, said carrier also serving to support the end of said wire in proximity to the open loop during the bending operation, and means for withdrawing said carrier to permit an unobstructed rotation of said jaws.

3. In a chain-making machine, means for bending a length of wire into open loop form, a slidable carrier for advancing solder wire, means actuating said carrier bodily to position the solder wire adjacent the loop, means operable subsequent to the operation of said carrier for feeding said solder wire along said carrier to project the same between the separated ends of said loop, and means for closing the ends of said loop about the solder wire, all of said means operating automatically and in timed relation.

4. In a chain making machine, means for bending a length of wire into open loop form,

a carrier for supporting solder wire, means for moving said carrier forward to a point adjacent the ends of the wire loop, means operable at substantially the completion of forward movement of the carrier for moving the solder wire relative to said carrier to a position between the ends of the loop, means for closing the ends of the loop onto the solder to form a link and means for severing the solder wire.

5. In a chain making machine, means for bending a length of wire into open loop form, a carrier for supporting solder wire, means for moving said carrier forward to a point adjacent the ends of the wire loop, means operable after the start forward and before the return of said carrier for moving the solder wire relative to the carrier and to a position between the ends of the loop.

6. In a chain making machine, means for bending a length of wire into open loop form, a carrier for supporting solder wire, means for moving said carrier forward to a point adjacent the ends of the wire loop, a pawl mounted for sliding movement on said carrier and positioned above said solder wire, means for actuating said pawl to move said solder wire forward relative to said carrier, the movement of said carrier and pawl serving to position the solder wire between the ends of the loop.

7. In a chain making machine, means for bending a length of wire into open loop form, a carrier for supporting solder wire, a pawl mounted for sliding movement on said carrier and positioned above the solder wire, a lever, feed bars actuated by said lever, one bar serving to move said carriage forward and the other serving to actuate said pawl and move the solder relative to said carriage, means for actuating said lever, and means for closing the ends of the loop and severing the solder wire.

8. In a chain making machine, means for bending a length of wire into open loop form, a carrier for supporting solder wire, means for clamping said solder wire on said carrier, means for moving said carrier forward toward the open wire loop, means for releasing said clamping means and feeding the solder wire forward relative to said carrier to position the solder wire between the ends of the loop, means for closing the ends of the loop onto the solder to form a link, and means for severing the solder wire.

9. In a chain making machine, means for bending a length of wire into open loop form, a carrier for supporting solder wire, means for clamping said solder wire on said carrier, means for moving said carrier forward to a point adjacent the ends of the wire loop, means operable at substantially the completion of forward movement of the carrier for releasing said clamping means and feeding

the solder further forward to a position between the ends of the loop, means for closing the ends of the loop and means for severing the solder wire.

In testimony whereof we affix our signatures.

JOHN L. HOGBERG.
JOHN A. GRANSKOG.