Dec. 16, 1952 B. HEILMAN ET AL 2,621,326

CLIP FORMING AND APPLYING MACHINE

Filed Nov. 6, 1951 2 SHEETS—SHEET 1

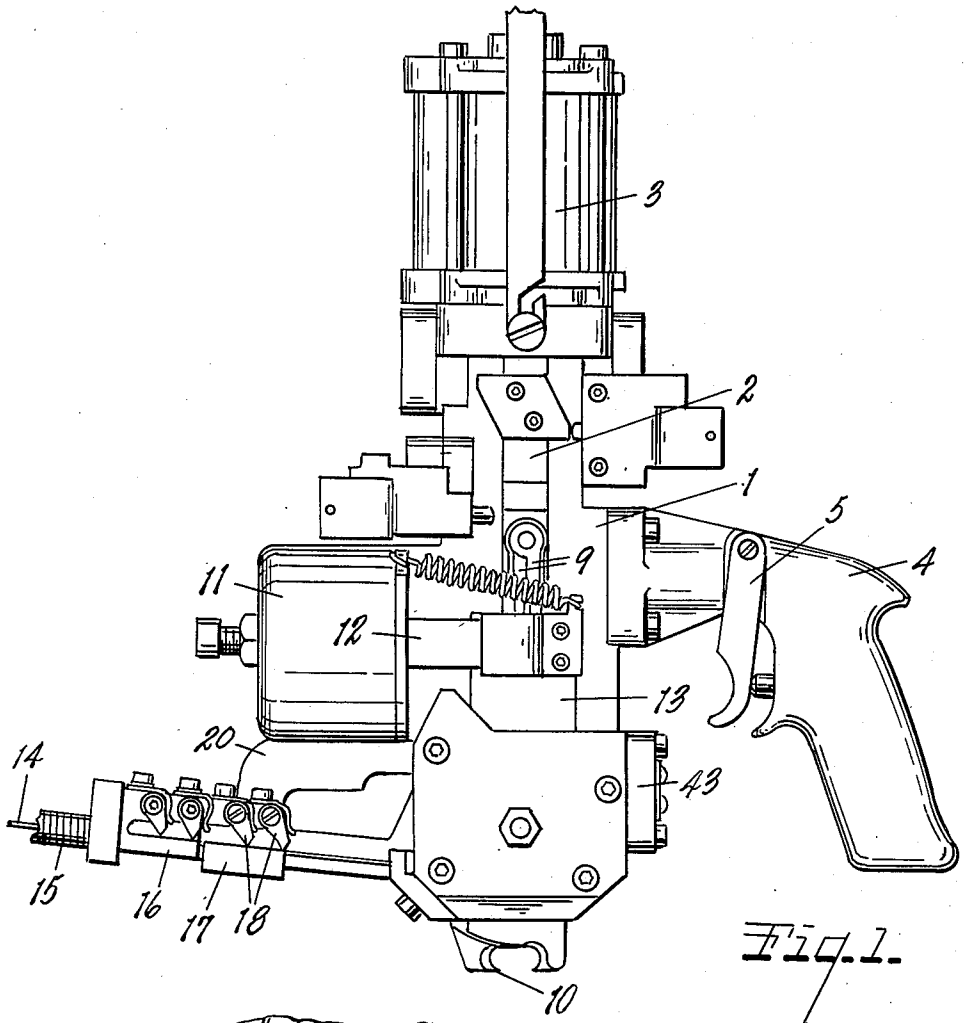


Fig. 1.

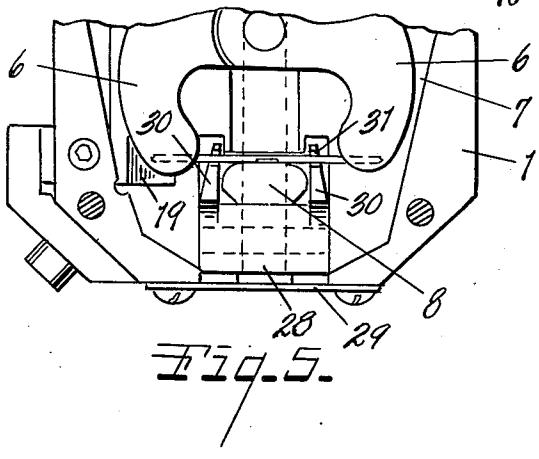


Fig. 5.

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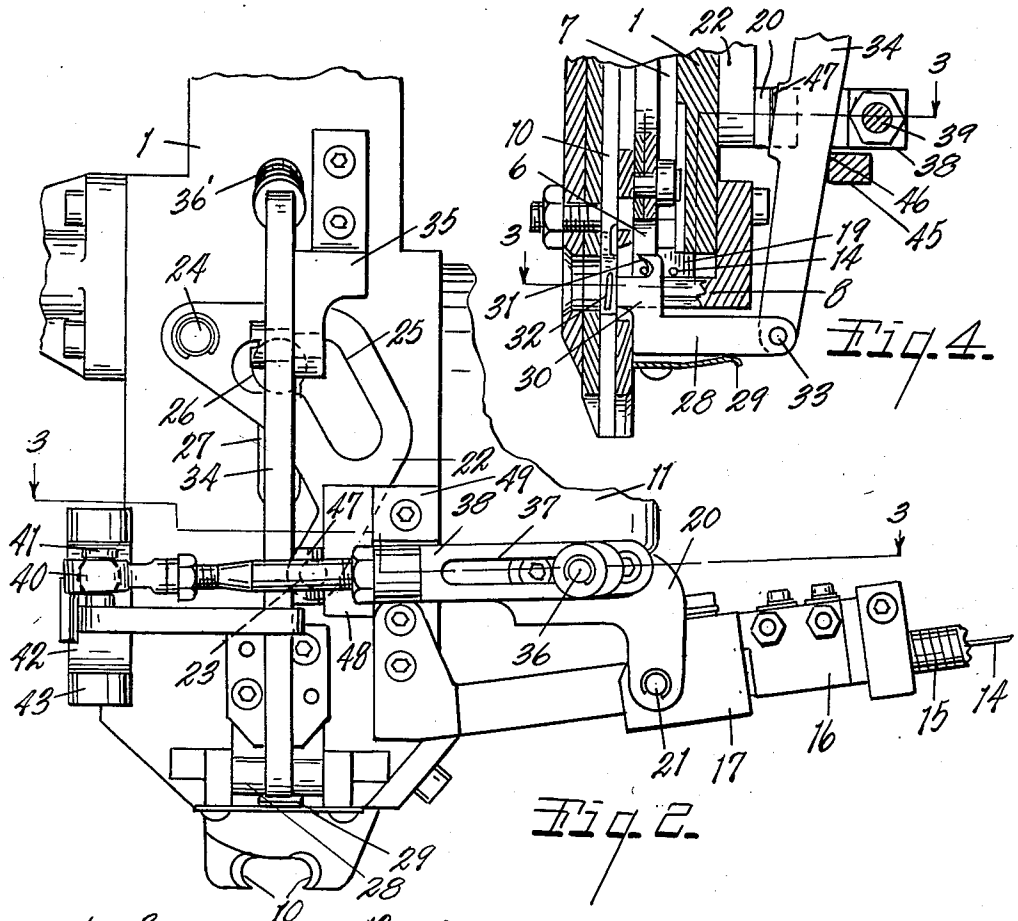


Fig. 2.

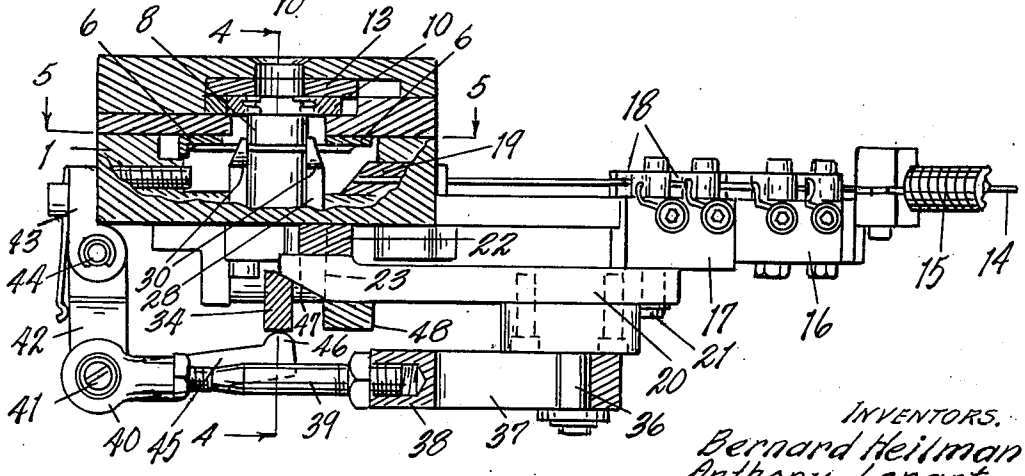


Fig. 3.

Fig. 4.

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UNITED STATES PATENT OFFICE

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CLIP FORMING AND APPLYING MACHINE

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Application November 6, 1951, Serial No. 254,998

8 Claims. (Cl. 1—177)

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This invention relates to improvements in clip forming and applying machines.

The principal objects of this invention are:

First, to provide an improved apparatus for successively advancing partially formed clip blanks and completed clips through the forming and applying jaws of a clip forming and applying machine.

Second, to provide an apparatus of the type described which is rapid and positive in operation and yet simple and inexpensive.

Third, to provide actuating mechanism for the clip advancing shoe of a clip forming and applying machine, which mechanism is not distorted or deflected by the operating loads applied thereto.

Other objects and advantages of our invention will be apparent from a consideration of the following description and claims:

The drawings, of which there are two sheets, illustrate a preferred form of our clip and blank advancing apparatus as applied to a clip forming and applying machine.

Fig. 1 is a side elevational view of the machine to which our advancing apparatus is applied.

Fig. 2 is a fragmentary elevational view of the opposite side of the clip forming and applying machine illustrating the external actuating apparatus for our advancing mechanism.

Fig. 3 is a fragmentary horizontal cross sectional view through the actuating linkage of our advancing mechanism, and the forming and applying machine taken along the plane of line 3—3 in Figs. 2 and 4.

Fig. 4 is a fragmentary vertical cross sectional view through the forming and applying machine and the clip advancing mechanism taken along the plane of the line 4—4 in Fig. 3.

Fig. 5 is a fragmentary vertical cross sectional view taken along the plane of line 5—5 in Fig. 3 illustrating the forming jaws and clip advancing mechanism of our machine in elevation.

The clip and blank advancing mechanism which is the subject of this invention is designed primarily for use in a clip forming and applying machine of the type more particularly described and claimed in our copending application for Clip Forming and Applying Machine, Serial 156,444 filed April 17, 1950, and is an improved substitute for the blank and clip feeding apparatus disclosed therein.

The clip forming and applying machine to which our advancing structure is applied consists generally of a vertically extending body

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plate 1 having a ram 2 vertically reciprocably mounted thereon. A hydraulic or other fluid operated cylinder 3 is mounted on top of the body 1 for reciprocating the ram, and a handle 4 provided with a control trigger 5 is secured to the front of the body. As is more particularly described in our above copending application, the ram 2 is connected to and operates a pair of vertically reciprocable forming jaws 6 which are positioned in a recess 7 in the body 1. The forming jaws are arranged to be advanced downwardly by the ram and to close around a mandrel 8 projecting transversely from the left side of the body 1. The ram 2 is also connected through links indicated at 9 in Fig. 1 to a pair of reciprocable and swingably mounted closing jaws 10 positioned to reciprocate across the end of the mandrel 8 to project below the body 1 as indicated in Figs. 1 and 2. The closing jaws 10 are adapted to receive a formed clip from the forming jaws 6 along the mandrel 8 and to project the clip downwardly where it can be attached around two wires to be connected. A second hydraulic or fluid operated cylinder 11 has its piston rod 12 connected to a jaw closing plate 13, and the plate 13 overlaps one of the closing jaws to move the closing jaws to closed position.

Stock for forming the clips in the machine is supplied in the form of a continuous wire 14 through a flexible conduit 15 to a feed rail 16 projecting from the back of the machine. A slide 17 reciprocably mounted on the rail 16 is provided with spring pressed dogs 18 arranged to grip and advance a length of the wire stock into the chamber 7 with each forward advancing motion of the slide and jaws. The stock 14 enters the chamber through a fixed shear block 19 cooperative with a vertically reciprocable shear block carried by the ram 2 but not illustrated herein. It will be noted that the stock 14 is advanced across the mandrel 8 inwardly of the recess 7 from the forming jaws 6.

The stock feeding slide 17 is reciprocated in timed relationship with the ram 2 by interconnection of a link 20 pivotally secured to the slide at 21 and pivotally connected to a cam 22 at 23, see Fig. 2. The cam 22 is pivotally mounted on the right side of the body at 24 and is provided with an angled cam slot 25. A pin 26 carried by the ram 2 extends through a vertical slot 27 in the body plate and is received in the slot 25 to oscillate the cam upon reciprocation of the ram.

The foregoing structure all constitutes part of

our forming and attaching machine as claimed in the above mentioned copending application. The structure by which the incoming clip blanks and formed clips are advanced along the mandrel will now be described. The advancing mechanism consists first of a dog 28 supported along the under side of the mandrel 8 by a spring 29. The inner or left end of the dog is provided with upstanding ears 30 positioned on opposite sides of the mandrel 8 and projecting thereabove. The upper ends of the ears 30 are notched as at 31 to receive and advance the clip blank from the shear block 19 to the forming jaws 6. The inner edges of the ears 30 lie closely alongside of the mandrel 8 to engage the sides of a clip after it has been formed around the mandrel, and advance the clip into the closing jaws as indicated at 32 in Fig. 4.

The outer or right end of the dog 28 is pivotally connected at 33 to a vertically extending operating lever 34. The lever is pivotally mounted on a bracket 35 secured to the right side of a body plate. A spring 36' operative against the upper end of the lever 34 biases the lever and shoe 28 toward clip advancing position, but the strength of the spring is insufficient to positively advance completed clips along the mandrel, particularly when the clips are tightly clamped around the mandrel by the forming jaws.

In order to oscillate the lever 34 and clip advancing shoe 28 we provide a pin 36 projecting to the right from the link 20. The pin 36 is slidably extended through a slot 37 in a tension link 38, and the forward end of the link 38 is adjustably connected through a pull rod 39 to an eye 40. The eye 40 is loosely and tiltably received over a pin 41 carried by a crank element 42. The crank element 42 is pivoted to a bracket 43 on the base plate as at 44, and is provided with a rearwardly extending arm 45 having a nose 46 positioned to press against the lever 34 below its pivot. Thus the last outward or retracting motion of the feed slide 17 will draw the link 37 and rod 39 to the rear concurrently swinging the crank 46 into advancing engagement with the lever 34.

In order to retract the lever arm 34 and shoe 28 from clip advancing position the forward end of the slide actuating link 20 is transversely beveled as at 47 and engageable with the inner or left side of the lever 34. Thus as the slide 17 is advanced forwardly with a new strip of stock, the beveled surface 47 and the link 20 engage the left or inner edge of the lever 34 to retract the lever and the shoe 28. The forward end of the link 20 is held against deflection away from the body plate 1 by an ear 48 extending from the bracket 49 that connects the slide rail 16 to the body plate.

This disclosure is intended only as an example of our clip blank and clip advancing mechanism, and not as a limitation of our invention as set forth in the claims.

Having thus described our invention, what we claim as new and desire to secure by Letters Patent is:

1. In a wire working machine, a support plate having a mandrel projecting normally therefrom, a pair of work forming jaws reciprocable on said plate to and from said mandrel to form work therearound, a pair of closing jaws reciprocable to and from said mandrel at a longitudinally spaced position from the ends of said mandrel, a stock feeding element carried by said plate and reciprocable toward said mandrel from the side thereof to feed wire stock across the mandrel at a point spaced longitudinally from said forming jaws, a reciprocable ram connected to actuate said jaws, a link cam actuated by said ram and connected to said feeding element to actuate said feeding element in timed relationship with said jaws, a work advancing element slidable longitudinally along said mandrel, a lever pivotally supported on said plate on a pivot transverse to said mandrel and spaced therefrom and connected at its swinging end to said work advancing element to actuate the latter, an angle shaped lever having one end pivotally supported on said plate about an axis parallel to the line of movement of said ram and spaced from said first lever, said angle shaped lever having its other end abuttingly engaged with a swinging portion of said first lever to advance the latter, a second link having one end pivotally connected to said angle shaped lever at a point between the ends thereof, means longitudinally adjustably connected to the other end of said second link forming a lost motion connection to said work feeding element, the pivotal connection between said second link and said angle shaped lever permitting vertical tilting of said second link with respect to said angle shaped lever, and a bar reciprocable with said stock feeding element and having a cammed nose engageable with said first lever in opposition to said angle shaped lever to retract said work advancing element upon feeding motion of said stock feeding element.

2. In a wire working machine, a support plate having a mandrel projecting therefrom, a pair of work forming jaws reciprocable on said plate to and from said mandrel to form work therearound, a pair of closing jaws reciprocable to and from said mandrel at a longitudinally spaced position from the ends of said mandrel, a stock feeding element carried by said plate and reciprocable toward said mandrel from the side thereof to feed wire stock across the mandrel at a point spaced longitudinally from said forming jaws, a reciprocable ram connected to actuate said jaws, a link cam actuated by said ram and connected to said feeding element to actuate said feeding element in timed relationship with said jaws, a work advancing element slidable longitudinally along said mandrel, a lever pivotally supported on said plate on a pivot transverse to said mandrel and spaced therefrom and connected at its swinging end to said work advancing element to actuate the latter, an angle shaped lever having one end pivotally supported on said plate about an axis parallel to the line of movement of said ram and spaced from said first lever, said angle shaped lever having its other end abuttingly engaged with a swinging portion of said first lever to advance the latter, a second link having one end pivotally connected to said angle shaped lever at a point between the ends thereof, means connected to the other end of said second link forming a lost motion connection to said work feeding element, and a bar reciprocable with said stock feeding element and having a cammed nose engageable with said first lever in opposition to said angle shaped lever to retract said work advancing element upon feeding motion of said stock feeding element.

3. In a wire working machine, a support plate having a mandrel projecting therefrom, a plurality of pairs of working jaws spaced from each other longitudinally of said mandrel and reciprocable on said plate transversely to and from

said mandrel to operate on work located at positions spaced longitudinally of said mandrel, a stock feeding element carried by said plate and reciprocable to and from said mandrel from the side thereof to feed wire stock across the mandrel at a point spaced longitudinally from said working jaws, a reciprocable ram connected to actuate said jaws, means actuated by said ram and connected to said feeding element to actuate said feeding element in timed relationship with said jaws, a work advancing element slidable longitudinally along said mandrel to advance work therealong from said feeding element and successively to said pairs of jaws, a lever pivotally supported on said plate and connected at its swinging end to said work advancing element to actuate the latter, a second lever having one end pivotally supported on said plate and having its other end abuttingly engaged with a swinging portion of said first lever, a link having one end pivotally connected to said second lever at a point offset from a line between the ends thereof, means connected to the other end of said link forming a lost motion connection to said work feeding element, the pivotal connection between said second link and said angle shaped lever permitting vertical tilting of said second link with respect to said angle shaped lever, and a bar reciprocable with said stock feeding element and having a cammed portion engageable with said first lever in opposition to said second lever to retract said work advancing element upon feeding motion of said stock feeding element.

4. In a wire working machine, a support plate having a mandrel projecting therefrom, a plurality of pairs of working jaws spaced from each other longitudinally of said mandrel and reciprocable on said plate transversely to and from said mandrel to operate on work located at positions spaced longitudinally of said mandrel, a stock feeding element carried by said plate and reciprocable to and from said mandrel from the side thereof to feed wire stock across the mandrel at a point spaced longitudinally from said working jaws, a reciprocable ram connected to actuate said jaws, means actuated by said ram and connected to said feeding element to actuate said feeding element in timed relationship with said jaws, a work advancing element slidable longitudinally along said mandrel to advance work therealong from said feeding element and successively to said pairs of jaws, a lever pivotally supported on said plate and connected at its swinging end to said work advancing element to actuate the latter, a second lever having one end pivotally supported on said plate and having its other end abuttingly engaged with a swinging portion of said first lever, a link having one end pivotally connected to said second lever at a point offset from a line between the ends thereof, means connected to the other end of said link forming a lost motion connection to said work feeding element, and a bar reciprocable with said stock feeding element and having a cammed portion engageable with said first lever in opposition to said second lever to retract said work advancing element upon feeding motion of said stock feeding element.

5. In a wire working machine, a support plate having a mandrel projecting therefrom, a plurality of pairs of working jaws spaced from each other longitudinally of said mandrel and reciprocable on said plate transversely to and from said mandrel to operate on work located at positions spaced longitudinally of said mandrel, a reciprocable ram connected to actuate said working jaws, a work advancing element slidable longitudinally along said mandrel to advance work therealong between said pairs of jaws, a first lever pivotally supported on said plate and connected at its swinging end to said work advancing element to actuate the latter, a second lever having one end pivotally supported on said plate and having its other end abuttingly engaged with a swinging portion of said first lever, a link having one end pivotally connected to said second lever at a point offset from a line between the ends thereof, means connected to the other end of said link forming a lost motion connection to said ram whereby retracting motion of said ram will pull said link to advance said second lever and said work advancing element at the end of the retracting motion of said ram, and a bar reciprocably driven in timed relationship with said ram and having a portion cammingly engageable with said first lever in opposition to said second lever to retract said first lever and said work advancing element at the beginning of the work advancing motion of said ram.

6. In a wire working machine, a support plate having a mandrel projecting therefrom, a plurality of pairs of working jaws spaced from each other longitudinally of said mandrel and reciprocable on said plate transversely to and from said mandrel to operate on work located at positions spaced longitudinally of said mandrel, a reciprocable ram connected to actuate said forming jaws, a work advancing element slidable longitudinally along said mandrel to advance work therealong between said pairs of jaws, a first lever pivotally supported on said plate and connected at its swinging end to said work advancing element to actuate the latter, a second lever having one end pivotally supported on said plate and having its other end abuttingly engaged with a swinging portion of said first lever, a link having one end pivotally connected to said second lever at a point offset from a line between the ends thereof, and means connected to the other end of said link forming a lost motion connection to said ram whereby retracting motion of said ram will pull said link to advance said second lever and said work advancing element at the end of the retracting motion of said ram.

7. In a clip forming and applying machine having a reciprocable ram and forming and closing jaws reciprocably operated thereby, and a mandrel carried by said machine and cooperative with said forming jaws to have a clip formed therearound, the combination of a clip blank and clip advancing shoe positioned to advance work along said mandrel to said forming jaws and said closing jaws and reciprocably supported below said mandrel, an actuating lever pivotally connected to said shoe and said machine, a reciprocable slide arranged to advance stock into said machine, means connecting said slide to said ram for reciprocation thereby, a crank pivotally supported on said machine about a pivot parallel to the path of said ram and having its swinging end engaged with said lever in work advancing relationship, and an adjustable link pivotally connected between said crank and said slide to positively advance said lever and said shoe upon retracting motion of said slide, said link having a lost motion connection with said slide.

8. In a clip forming and applying machine having a reciprocable ram and forming and closing

jaws reciprocably operated thereby, and a mandrel carried by said machine normal to the paths of movement of said jaws and cooperative with said forming jaws to have a clip formed therearound, the combination of a clip blank and clip advancing shoe positioned to advance work along said mandrel and supported below said mandrel for reciprocation therealong, an actuating lever pivotally connected to said shoe and said machine, a slide arranged to advance stock into said machine, a crank pivotally supported on said machine and having its swinging end engaged with said lever in work advancing relationship, and an adjustable link pivotally connected between said crank and said slide to positively advance said lever and said shoe upon retracting motion of said slide, said link having a lost motion connection with said slide.

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No references cited.