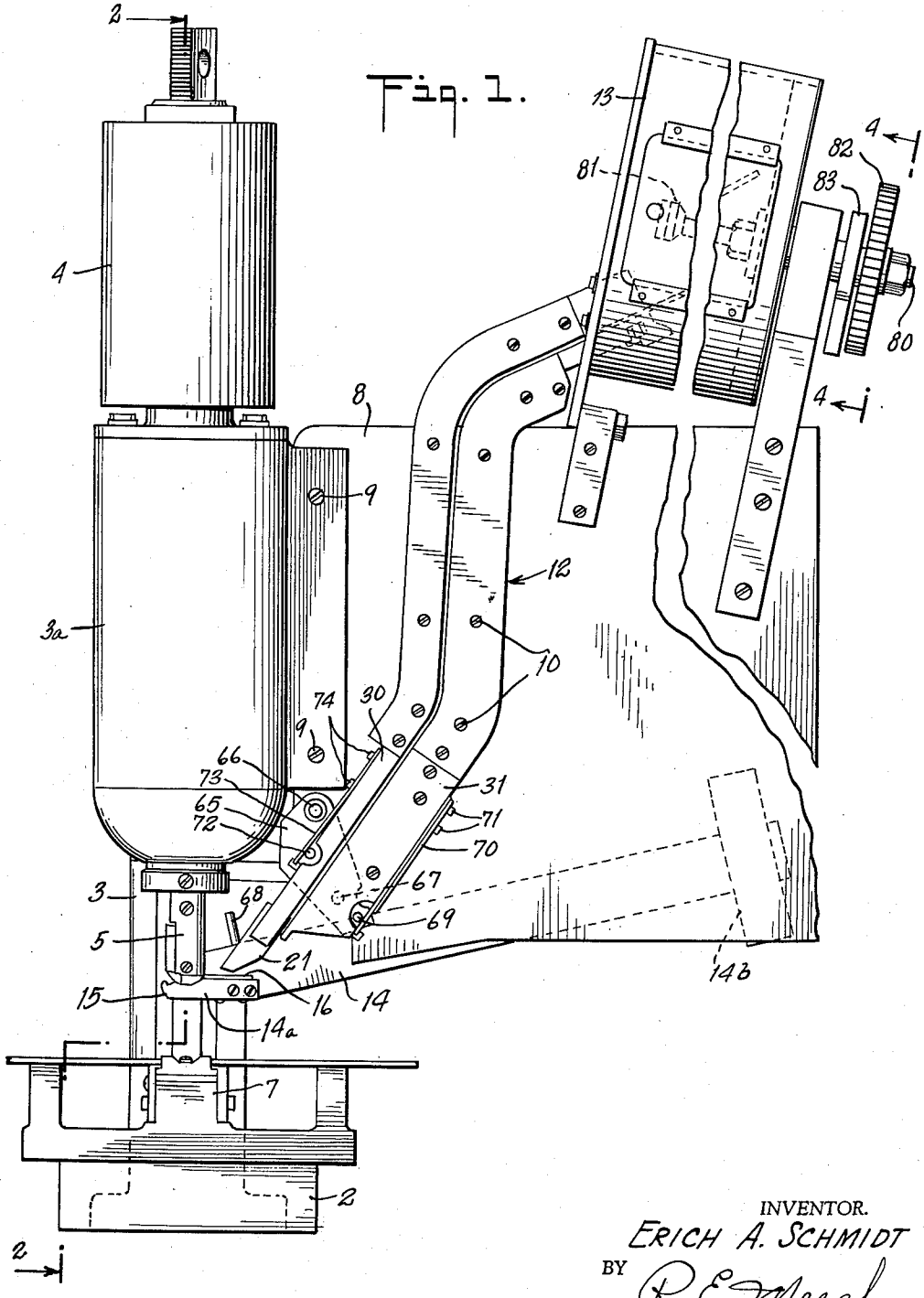
Nov. 27, 1962 E. A. SCHMIDT 3,065,470

STAPLING MACHINE

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Fig. 1.



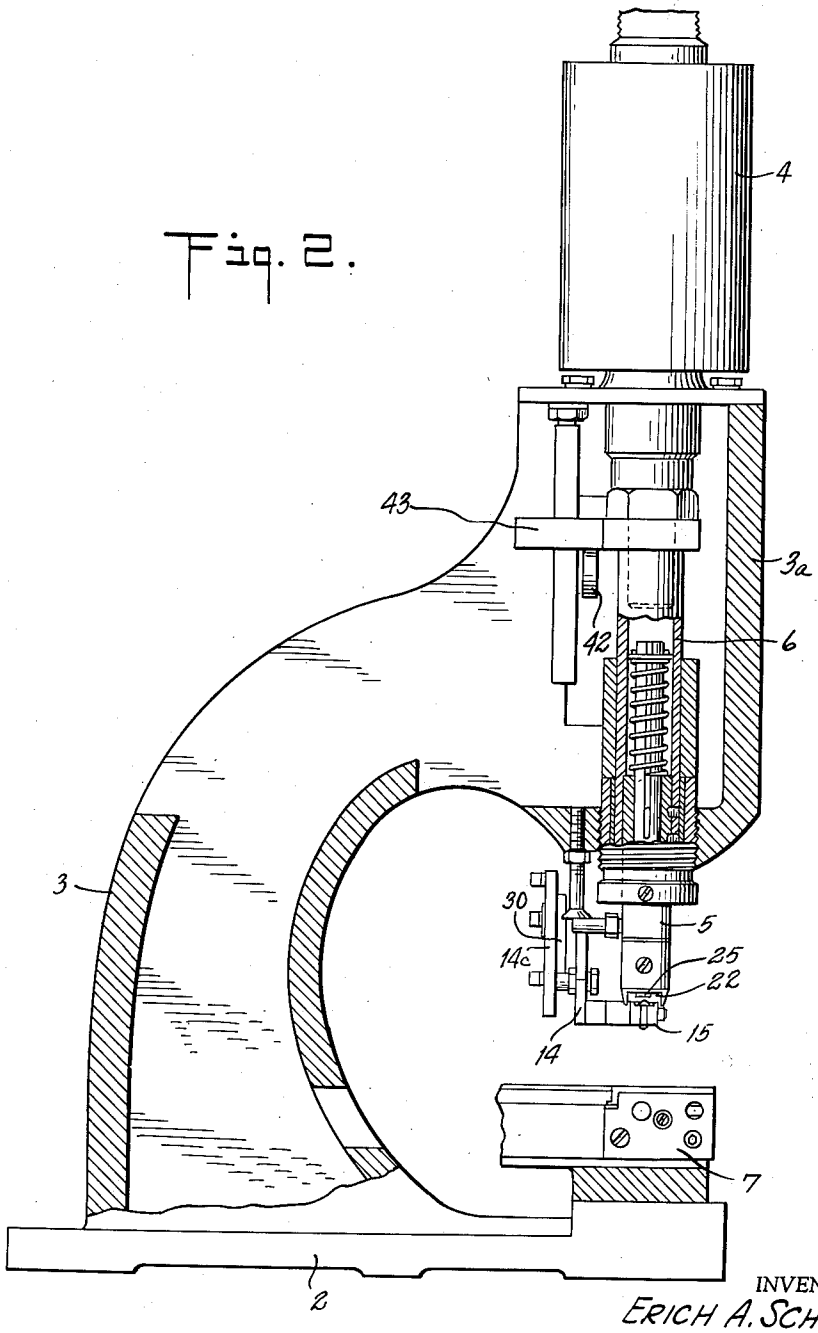
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Fig. 2.



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Fig. 3.

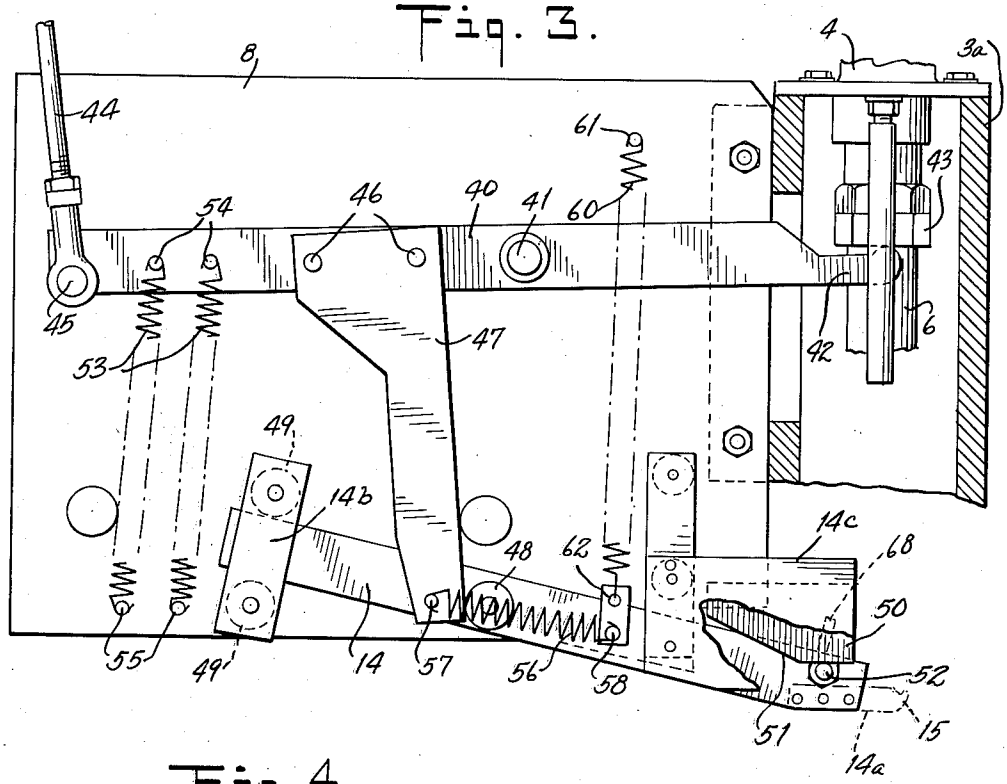
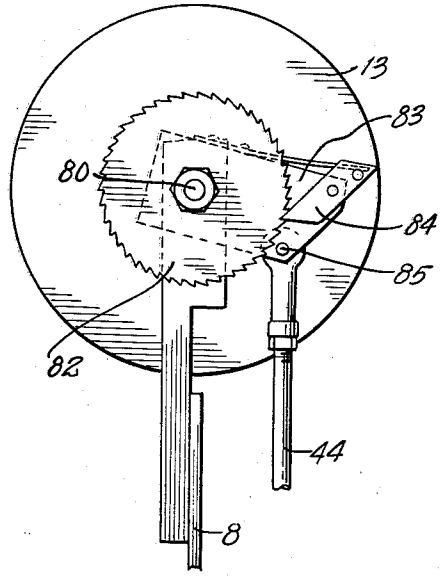


Fig. 4.



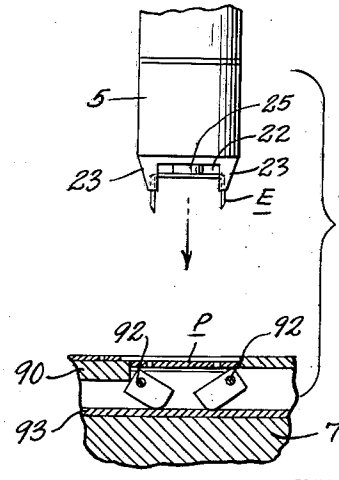


Fig. 10.

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Fig. 5.

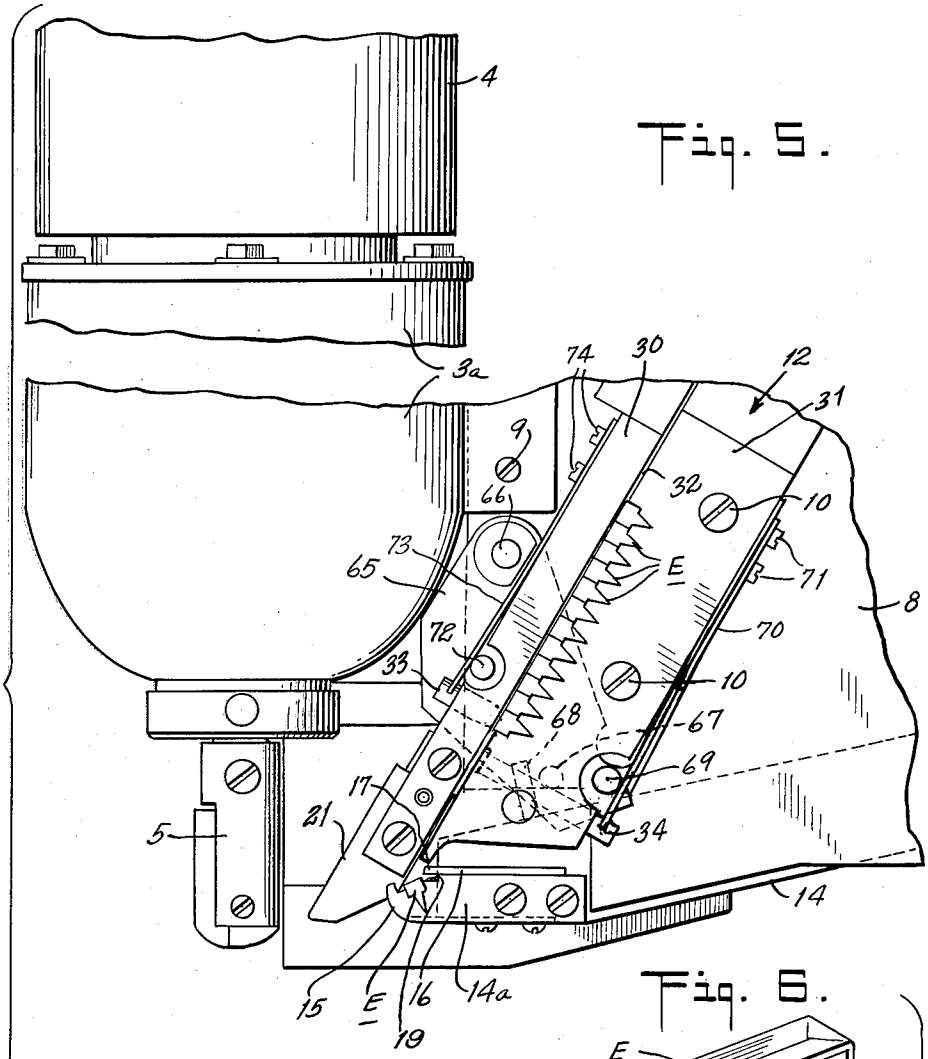
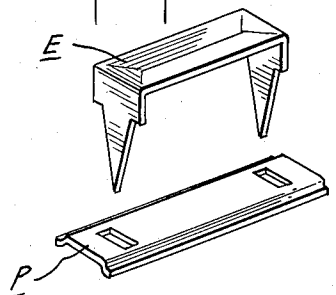
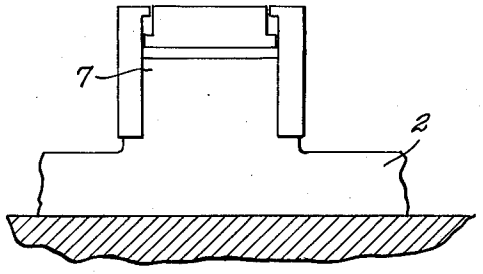


Fig. 6.





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Fig. 7.

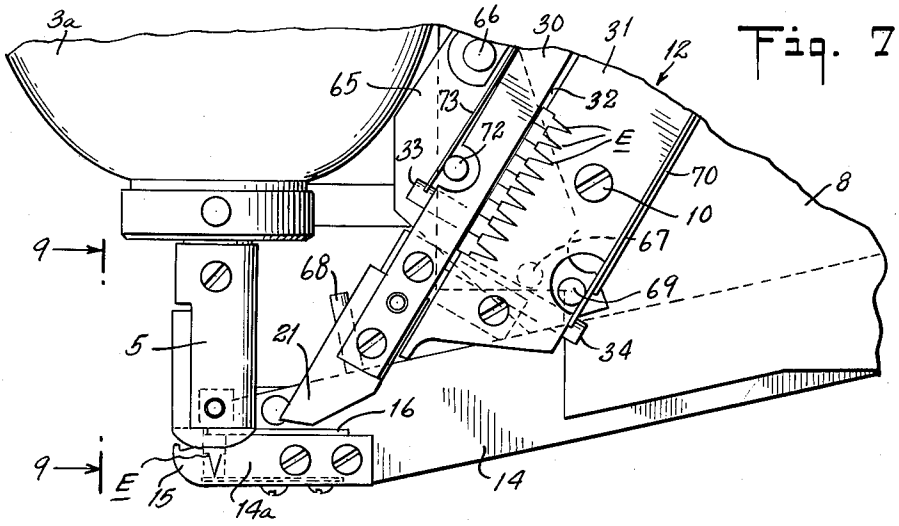


Fig. 8.

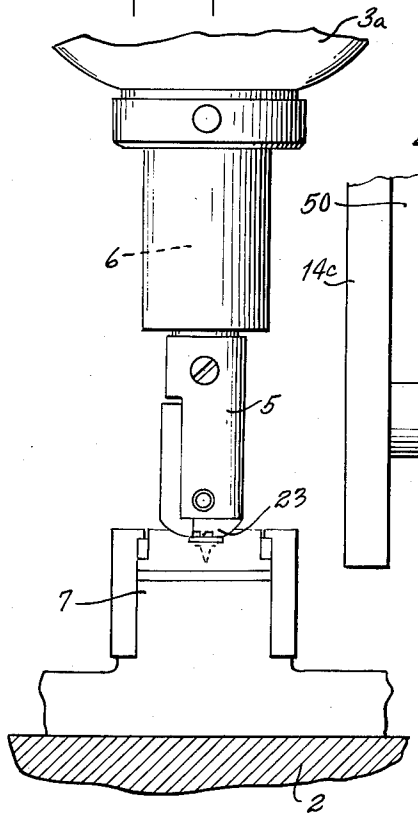
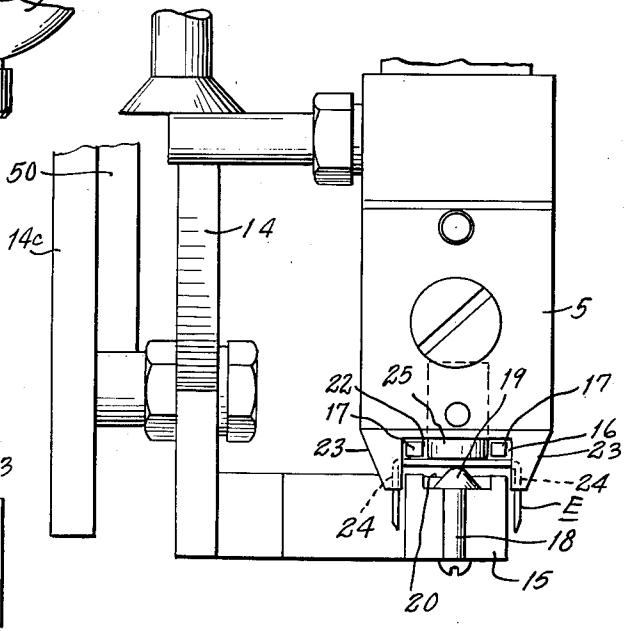


Fig. 9.



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United States Patent Office

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3,065,470

STAPLING MACHINE

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Filed Apr. 19, 1961, Ser. No. 104,111
11 Claims. (Cl. 1—325)

This invention relates to a stapling machine, and more particularly to a machine for automatically attaching garment fastener members, such as so-called trouser hooks or eyes to garments.

It is now the customary practice to use preformed sheet metal, hooks and eyes in the waistbands of men's trousers and the like. These hook and eyes are usually secured to the garment parts by riveting or stapling through the garment part to suitable backing plates.

Various types of machines have been heretofore suggested and used for securing such hooks and eyes to the garment. While some of these machines have been satisfactory in their use, others were complicated, expensive and unsatisfactory. Some of these machines employed a tape as a carrier for the fastener members which obviously necessitated the positioning the fastener members on the tape as a separate step before the tape together with the fastener elements was introduced into the machine. Other machines employed magazines in which the fastener elements were disposed for introduction into the machine. This method also necessitated the step of loading of the magazines. Both of these methods were expensive and usually required expensive and complicated machines and equipment. In other machines, oftentimes difficulties were encountered in their operation in feeding the fastener members and backing plates to the stapling anvils.

It is the general object of the present invention to provide an improved and simplified stapling machine for attaching hooks and eyes to a garment and the associated backing plate.

It is another object of the invention to provide an improved stapling machine having a simple and reliable means to feed fastener members to the movable anvil of the machine.

It is a further object of this invention to provide an improved stapling machine having a movable anvil in which the fastener members are assured against accidental displacement therefrom while the anvil is moving and the fastener members are being secured to the garment.

It is still another object of the invention to provide an improved stapling machine having feeding means arranged therewith whereby a single hook or eye is fed to the movable anvil from a quantity of hooks and eyes into position for movement by the anvil during each cycle of operation of the machine.

Various other objects and advantages of this invention will be more apparent in the course of the following specification, and will be particularly pointed out in the appended claims.

In the accompanying drawings, there is shown for the purpose of illustration, an embodiment which my invention may assume in practice.

In these drawings:

FIG. 1 is a front elevational view, partly broken away, of the improved stapling machine of the present invention,

FIG. 2 is a sectional view taken on line 2—2 of FIG. 1;

FIG. 3 is a rear elevational view of the machine, partly broken away, showing the feed-arm in its protracted position,

FIG. 4 is a sectional view taken on line 4—4 of FIG. 1,

FIG. 5 is an enlarged front elevational view of the lower portion of the machine as shown in FIG. 1, showing the feed-arm in its retracted position,

FIG. 6 is an exploded perspective view of an eye assembly with which the present attaching machine is concerned,

FIG. 7 is an enlarged front elevational view of the lower portion of the machine, similar to FIG. 5, showing the feed arm in its protracted position,

FIG. 8 is a front elevational view of the movable and stationary anvils showing the former in its protracted position,

FIG. 9 is a sectional view taken on line 9—9 of FIG. 7, and

FIG. 10 is a front elevational view, partly in section, of the movable and stationary anvils showing the former in its retracted position.

General Arrangement of the Stapling Machine

Referring more particularly to the drawings, the stapling machine of the present invention comprising a base 2 which may be supported on a table or the like. This base extends upwardly so as to provide a yoke portion 3 having a cylindrical front housing portion 3*a* on which there is mounted an air cylinder 4. On the lower end of the air cylinder piston rod 6 there is arranged an anvil 5 which is spring loaded so as to maintain the anvil in a retracted or rest position with the anvil 5 raised normally above the lower stationary anvil 7 positioned on the base 2, as shown in FIGS. 2 and 5 of the drawings.

There is provided a vertically extending plate member 8 which is attached, as at 9, to one side of the yoke portion 3 and extends outwardly to one side thereof. There is attached to one side of this plate member 8 by means of screws 10, a chute 12. At the upper end of this chute 12, there is mounted on the plate member 8, a suitable hopper 13 for delivering the fastener members E to the chute 12 in a well known manner.

Adjacent the lower end of the chute 12 at the lower edge of this plate member 8, there is mounted for substantially horizontal reciprocating movement in suitable guide and supporting plate members 14*b* and 14*c*, a feed arm 14 having a lower outwardly extending member 14*a* arranged on the end thereof which has preferably an inclined hook-shaped portion 15 on the extreme end thereof. There is arranged with this lower outwardly extending member 14, an upper resilient member 16 having its outer end bifurcated, as at 17.

As more clearly shown in FIG. 9 of the drawings, there is carried by the lower outwardly extending member 14*a* inwardly of the inclined hook portion 15 thereof, preferably a rivet member 18, so as to provide a beveled head or raised projection 19 which is positioned centrally of the member 14*a* and disposed in the space 20, between this lower member and the bifurcated end portion 17 of the upper member 16.

There is also arranged adjacent the lower end of the chute 12 and directly opposite the members 14*a* and 16, a stationary member 21 in the form of a guide plate which is also suitably attached to the lower inner end of the rail cover 30 and which cooperates with the members 14*a* and 16 in a manner hereinafter to be described.

As more clearly shown in FIGS. 9 and 10 of the drawings, there is arranged in the lower end of the upper or reciprocating anvil 5, a transversely extending slot 22 so as to provide a pair of opposed side encompassing walls 23. Each of these side encompassing walls 23 has a vertically extending guide groove 24 arranged therein which are disposed directly opposite one another for receiving the prongs of fastener member E in a manner hereinafter to be described. In the anvil 5, directly above the transverse slot 22 and extending thereinto, there is mounted a

permanent magnet 25 for holding a fastener element E in the slot and on the lower end of the anvil.

Referring now more particularly to FIGS. 1, 5 and 7, the fastener chute 12 is arranged in a generally vertical position with the upper and lower portion thereof being inclined. The lower inclined portion of this chute consists of a guide feed rail 31 and rail cover 30 which are spaced apart so as to provide a space 32 therebetween. A plurality of fastener members E are normally retained in this space and straddle the rail 31 and are adapted to move therealong when the machine is in operation.

Intermediate the length of the lower inclined portion of this chute 12, there is positioned a fastener feeding escapement mechanism. This escapement mechanism includes an upper stop pin 33 and a lower stop pin 34 for the purpose of controlling the movement of the fastener members down the chute whereby they move by the force of gravity.

Detailed Description of Actuating Mechanism

On the rear side of the vertical plate member 8, there is arranged the driving mechanism for actuating the various parts of the machine which mechanism is more clearly shown in FIG. 3 of the drawings. Such mechanism includes a horizontally extending lever 40 pivotally attached to the plate 8, centrally thereof, as at 41. One end 42 of this lever extends into the cylindrical housing 3*a* in under and in contact with a member 43 securely affixed to the piston rod 6 of the air cylinder 4. The opposite end of this lever 40 is pivotally attached to one end of a rod 44, as at 45, for actuating the hopper 13 in a manner to be described.

Intermediate the length of this lever 40 there is securely attached thereto, as at 46, a downwardly extending camming member 47 one side of which cooperates with a cam roller 48 arranged on the feed-arm 14 to actuate the same. The outer end of the arm 14 is positioned between a pair of guide rollers 49 positioned between the guide plate member 14*b* and the side of the plate 8. The opposite end of this arm 14 is free and is positioned between the guide plate member 14*c* and the rear side of the plate 8. There is also securely arranged between this guide plate member 14*c* and the plate 8, a cam plate member 50 having a lower cam edge portion 51. There is mounted in the arm 14 adjacent the lower end thereof, a cam roller 52 which cooperates with this cam edge 51 to guide the lower tongue member 14*a* attached to the arm 14 in its reciprocable movement so as to position the same correctly relative to the anvils 5 and 7.

There is provided a pair of springs 53 having one end thereof attached to the lever 40, as at 54, with the opposite ends attached to the plate 8, as at 55, for biasing the lever 8 about its pivotal connection at 41, so as to maintain the end 42 of the lever in contact with the member 43 on the piston rod 6. There is also provided a spring 56 having one end attached to the lower end of the camming member 47, as at 57, with the opposite end of this spring being attached to the arm 14, as at 58, so as to bias the edge of the camming member 47 against the cam roller 48 and to return the same and maintain the arm 14 in its retracted or normal position. There is provided still another spring 60 having one end attached to the plate 8, as at 61, and with the opposite end attached to the feed arm 14, as at 62, for biasing the cam roller 52 against the lower cam edge 51 of the cam guide plate 50.

Detailed Description of Escapement Mechanism

The escapement mechanism will now be described more in detail. Such mechanism includes an irregularly shaped jigger arm 65 pivotally attached to the outer side of the plate 8, as at 66. There is carried by this jigger arm 65 adjacent the lower end edge thereof a pin 67 which cooperates with an upwardly extending jigger arm actuator pin 68 affixed to feed arm 14, as more clearly shown in FIGS. 1, 5 and 8 of the drawings. There is also carried by this jigger arm 65, another pin 69 adjacent the lower edge thereof which cooperates with a lower pin leaf spring 70 which is attached at one end to the lower side of the feed rail 31, as at 71, and in which the lower stop pin 34 is mounted in the opposite end thereof. Also, on this jigger arm 65, there is arranged still another pin 72 which cooperates with an upper stop pin leaf spring 73 which is attached at one end to the upper side of the rail cover 30, as at 74, and in which the upper stop pin 33 is mounted in the opposite end thereof.

Now referring to FIGS. 1 and 4 of the drawings, on outer wall of the hopper 13, there is mounted a rotatable shaft 80 having an agitating means 81 arranged therewith within the hopper for agitating the fastener element or eyes E in the hopper for orientation to the chute 12 in a well known manner. On the outer end of this shaft 80, there is arranged a ratchet wheel 82 and an oscillating member 83 having a pawl 84 mounted thereon for cooperation with the ratchet wheel. The rod 44 is connected to this member 83, as at 85, for actuating the same together with the pawl 84 carried thereby which in turn rotates the shaft 80.

Description of Operation

Having described the construction of the stapling machine of my invention, it functions in the following manner. It will be understood that the initiation of each reciprocation of the feed-arm 14 for transferring the fastener elements E from the chute 12 to the stapling anvil 5 is timed to occur at about the time the anvil 5 starts its initial movement. The air cylinder 4 for reciprocating the movable anvil 5 towards the stationary anvil 7 is controlled by a manual air control valve (not shown) which may be positioned in any suitable location for convenient operation by the machine operator. Each time the manual control valve is manipulated to admit air to the air cylinder 4, the anvil 5 is moved towards the anvil 7 and at the end of the stroke of the piston rod 6, the air is discharged from the cylinder and the piston within the cylinder is automatically returned by an interior spring to again raise the anvil 5 and move it to its normal or retracted position above the anvil 7 as shown in FIGS. 1, 2, 5 and 7 of the drawings.

It will be understood that the feed arm 14, as shown in FIG. 3, is in its fully protracted position and that it has been moved to such position by the springs 53 which have been previously loaded through the action of the arm 47 in cooperation with roller 48. When the air is admitted to the air cylinder 4, as above described, and the piston is moved to its protracted position, the lever 40, as shown in FIG. 3, is moved about its pivotal connection at 41 due to the cooperation of the end 42 of this lever with the member 43 carried by the piston rod 6 of the air cylinder. In such movement it will be seen that lever 40 will be moved in a clock-wise direction about its pivotal connection at 41 against the action of the springs 53. Also, in such movement it will be seen that the arm 47 carried by the lever 40 will also move in a clockwise direction or to the left thereby moving the feed arm 14 to the left and to its retracted position due to the action of spring 56, in readiness for the next feeding operation.

It will be understood that when the piston moves to its retracted position after the air has been expelled from the air cylinder, the lever 40 is moved in a counter-clockwise direction about its pivotal connection 41 due to the action of the springs 53 which have been previously loaded. It will also be seen that the springs 53 tend to move the lever 40 about its pivotal connection at 41 in a counter-clockwise direction at all times so that the end 42 of this lever 40 is always maintained in contact with the member 43.

As the lever 40 together with the arm 47 carried thereby moves to the right or in a counter-clockwise direction, the arm 47 strikes the cam roller 48 carried by the member 14 thereby moving this member 14 to the right or to

its protracted position to feed an element E to the anvil, due to the action of the springs 53 which have been previously loaded as hereinbefore described.

Also, in such movement of this lever 40, it will be seen that the rod 44 is actuated thereby rotating the agitating means 81 in the hopper 13 through the action of shaft 80, ratchet wheel 82 and pawl 84 which cooperates therewith so as to orientate the elements E and deliver them to the chute 12 along which they downwardly pass, as shown in FIGS.1, 5 and 7.

As the fastener elements E pass down the chute, it will be understood that the foremost element of the group lodged in the chute will be positioned against the upper stop pin 33, the end of which contacts this foremost element and arrests the flow and passage of the group of elements along the chute so as not to cause a jam at the lower end thereof and so as to permit escape of the foremost element one at a time from the group to a lower position in the chute. This escapement of the foremost element and movement of this stop pin 33 out of contact therewith is accomplished through the action of the jigger arm 65, the pin 72 carried thereby which contacts leaf spring 73 thereby moving the stop pin 33 upwardly as shown in FIG. 5. It will be understood that this jigger arm 65 is moved to the left, as shown in FIG. 5, due to the cooperation of pin 68 carried by the feed arm 14 with the pin 67 carried by the jigger arm 65 against the action of the spring 73.

The foremost fastener element E is thereby permitted to pass along the chute until it comes in contact with the lower stop pin 34 which also in one position extends into the path of the elements along the chute. The actuation of this stop pin 34 is also controlled by the jigger arm 65 through the action of pin 69 carried thereby which cooperates with leaf spring 70, the end of which is connected to the stop pin 34. This foremost fastener element is then permitted to move downwardly along the chute on the rail 31 after this lower stop pin 34 is moved to its retracted position due to the action of the jigger arm 65. It will be seen that this jigger arm 65 is actuated by the actuation pin 68 carried by the feed-arm 14 which cooperates with the pin 67 carried by the jigger arm 65 thereby moving the same about its pivotal connection at 66 against the action of the spring 70. After the foremost element is permitted to pass along the rail 31 by the retraction of the lower stop pin 34, it moves to a straddle position onto the hook portion 15 of the lower member 14*a*, as shown in FIG. 5 of the drawings.

As the lever 40 moves in a counter-clockwise direction as previously described, the member 47 attached thereto is also moved to the right, as shown in FIG. 3, which in turn moves the feed-arm 14 to the right, as shown, due to the cooperation of the right hand edge of this member 47 with the cam roller 48 carried by the feed-arm 14. As the feed-arm 14 moves to the left from its position, as shown in FIG. 5, it carries with it the foremost element E which has been deposited on the hook-shaped member 15. In such movement the member 21 contacts the element E and moves it upwardly on this hook portion 15 and onto the beveled head portion 19 of the rivet member 18 where it is held in position thereagainst by the upper spring tongue 16 so that the element is held firmly and securely until it is transferred by further movement of the feed-arm 14 to position under and opposite the movable anvil 5, as shown in FIGS. 1, 8 and 9 of the drawings.

At about the same time, the anvil 5 is moved downwardly by the air cylinder 4, as hereinbefore described, over the fastener element E on the member 14*a* so that the side encompassing walls 23 of the anvil will straddle the member 14*a* with the prong portions of the fastener element E positioned in the grooves 24 of the anvil directly opposite the magnet 25 which holds the element on the end of the anvil, as shown in FIG. 9. After the fastener element is positioned in the anvil 5, the arm 14 moves to its retracted position and the fastener element is wiped off of the arm 14*a* and held solely by the anvil. It will be understood that the mechanism of the air cylinder and piston are timed so that the anvil will not be caused to move further in a downward direction until the end of the feed arm has been moved out from thereunder.

In further movement of the anvil 5 by the air cylinder 4 the fastener element E is moved downwardly thereby to a position opposite the lower stationary anvil 7 and in cooperation therewtih the eye or element E is attached to a rivet or backing plate P of the type shown in FIG. 6 of the drawings in a well known manner.

It will be understood that the feed-arm 14 in returning to its normal or retracted position actuates the escapement mechanism through the action of the member 68 carried thereby in cooperation with the pin 67 carried by the jigger arm 65, in a manner as hereinbefore described. After the element 15 has been attached as described, the anvil 5 is moved to its retracted position by the action of the loaded spring in the housing, as shown in FIGS. 2 and 5 of the drawings. This completes one cycle of operation of my improved stapling machine.

The stationary anvil 7 may be of the conventional type employed in this type of stapling machine and constitutes no part of the present invention. However, for the purpose of illustration, as shown in FIG. 10, the anvil 7 shown includes a movable plate member 90, having a pair of opposed lever members 91 having one end of each pivotally attached thereto, as at 92, with opposite ends of these lever members resting on a stationary base plate 93.

It will be understood that various modifications to the stapling machine of the present invention may occur to those skilled in the art within the scope of the invention. For example, while the invention has been rather specifically described in connection with the transfer and attaching of an eye fastener element from a hopper to a movable anvil, it will be apparent that a hook or other type of fastener element may be effected toward and transferred to the movable anvil in a similar fashion without department from the spirit of the invention.

While I have shown and described an embodiment which my invention may assume in practice, it will be understood that this embodiment is merely for the purpose of illustration and description, and that other forms may be devised within the scope of my invention as defined in the appended claims.

I claim:

1. In a stapling machine of the class described, an inclined guide rail along which the fastener members are conveyed into the machine by the force of gravity, means for temporarily arresting the movement of the fastener members down the rail and intermittently permitting them to move therealong, a movable anvil having a permanent magnet carried thereby, an outwardly extending transfer member arranged for substantially horizontal, reciprocating movement adjacent the lower end of said guide rail and said anvil for receiving the fastener members successively from said guide rail, said transfer member adapted to deliver the fastener members to the lower end of said movable anvil whereby they are held thereon by said permanent magnet, means carried by said transfer member for holding securely the fastener members thereon while they are being transferred from the lower end of said guide rail to the lower end of said movable anvil, said fastener members adapted to straddle said transfer member, said last mentioned means consisting of a resilient member carried by said transfer member in under which the fastener member is adapted to be positioned, a raised projection carried by said transfer member upon which the fastener member rests as it straddles said transfer member and which cooperates with said resilient member to hold the fastener member securely

in position thereon while the fastener member is moved to position opposite the lower end of said movable anvil which magnet is adapted to hold the fastener member securely in position on the end of said anvil, means for moving the fastener member along said transfer member to position on said raised portion in under said resilient member, and means for actuating said transfer member.

2. The combination as defined in claim 1, wherein the lower end of the movable anvil has a transversely extending slot arranged in the lower end thereof so as to provide opposed side encompassing walls, said transfer member adapted to be moved to position in said slot between said walls when in its protracted position so as to position the fastener member carried thereby centrally of said anvil directly opposite the permanent magnet therein, said side encompassing walls having opposed guide grooves arranged therein in which the fastener member is adapted to be disposed which grooves act to dislodge the fastener member from position on said transfer member when said transfer member is moved away from said anvil to its retracted position.

3. The combination as defined in claim 1, wherein the means for moving the fastener member along said transfer member to position on said raised portion in under said resilient member consists of a stationary member arranged along the side of said transfer member.

4. The combination as defined in claim 1, wherein the raised portion consists of a rounded rivet head.

5. In a stapling machine of the class described, an inclined guide rail along which the fastener members are conveyed into the machine by the force of gravity, an upper stop member for arresting the movement of the fastener members down the rail, a lower stop member which is actuated to permit a single fastener member at any one time to move down the rail to the lower end thereof, a movable anvil having a permanent magnet arranged therewith, a substantially horizontal transfer member arranged for reciprocable movement adjacent the lower end of said guide rail, a member arranged on the outer end of said last member having a hook-shaped portion on the extreme outer end thereof for receiving the fastener member from the lower end of said guide rail, the fastener member adapted to straddle said last mentioned member adjacent said hook-shaped portion, and means arranged on said last mentioned member rearwardly of said hook-shaped portion which engages the fastener member to hold the same securely in position thereon during the time the fastener member is being transferred from the end of the guide rail to position opposite said movable anvil, means for moving the fastener member along said last mentioned member away from said hook-shaped portion and into engagement with said last mentioned means upon movement of said transfer member, and means for actuating said transfer member.

6. The combination as defined in claim 5, wherein the lower end of the movable anvil has a transversely extending slot arranged in the lower end thereof so as to provide opposed side encompassing walls, said last mentioned member adapted to be moved to position in said slot between said walls when in its protracted position so as to position the fastener member carried thereby centrally of said anvil directly opposite the permanent magnet therein, said side encompassing walls having opposed guide grooves arranged therein in which the fastener member is adapted to be disposed which grooves act to dislodge the fastener member from position on said last mentioned member when said last mentioned member is moved away from said anvil to its retracted position.

7. The combination as defined in claim 5, wherein the means for moving the fastener member along said transfer member to position on said raised portion in under said resilient member consists of a stationary member arranged along the side of said transfer member.

8. In a stapling machine of the class described, an inclined guide rail along which the fastener members are conveyed into the machine by the force of gravity, an upper stop member for arresting the movement of the fastener members down the rail, a lower stop member which is actuated to permit a single fastener member at any one time to move down the rail to the lower end thereof, a movable anvil having a permanent magnet arranged therewith, a substantially horizontal transfer member arranged for reciprocable movement adjacent the lower end of said guide rail, a member arranged on the outer end of said last member having a hook-shaped portion on the extreme outer end thereof for receiving the fastener member from the lower end of said guide rail, the fastener member adapted to straddle said last mentioned member adjacent said hook-shaped portion, and means arranged on said last mentioned member rearwardly of said hook-shaped portion which engages the fastener member to hold the same securely in position thereon during the time the fastener member is being transferred from the end of the guide rail to position opposite said movable anvil, said last mentioned means consisting of a resilient member carried by said transfer member in under which the fastener member is adapted to be positioned, a raised projection carried by said transfer member upon which the fastener member rests as it straddles said transfer member and which cooperates with said resilient member to hold the fastener member securely in position thereon while the fastener member is moved to position opposite the lower end of said movable anvil which magnet is adaptde to hold the fastener member securely in position on the end of said anvil, means for moving the fastener member along said transfer member to position on said raised portion in under said resilient member, and means for actuating said transfer member.

9. The combination as defined in claim 8, wherein the lower end of the movable anvil has a transversely extending slot arranged in the lower end thereof so as to provide opposed side encompassing walls, said transfer member adapted to be moved to position in said slot between said walls when in its protracted position so as to position the fastener member carried thereby centrally of said anvil directly opposite the permanent magnet therein, said side encompassing walls having opposed guide grooves arranged therein in which the fastener member is adapted to be disposed which grooves act to dislodge the fastener member from position on said transfer member when said transfer member is moved away from said anvil to its retracted position.

10. The combination as defined in claim 8, wherein the means for moving the fastener member along said transfer member to position on said raised portion in under said resilient member consists of a stationary member arranged along the side of said transfer member.

11. The combination as defined in claim 8, wherein the raised projection consists of a rounded unit head.

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