Oct. 2, 1951 B. T. HOLTER 2,569,891

AUTOMATIC INJECTION FEED APPLIANCE FOR RIVETS AND HEADED FASTENINGS

Filed Oct. 13, 1950 3 Sheets-Sheet 1

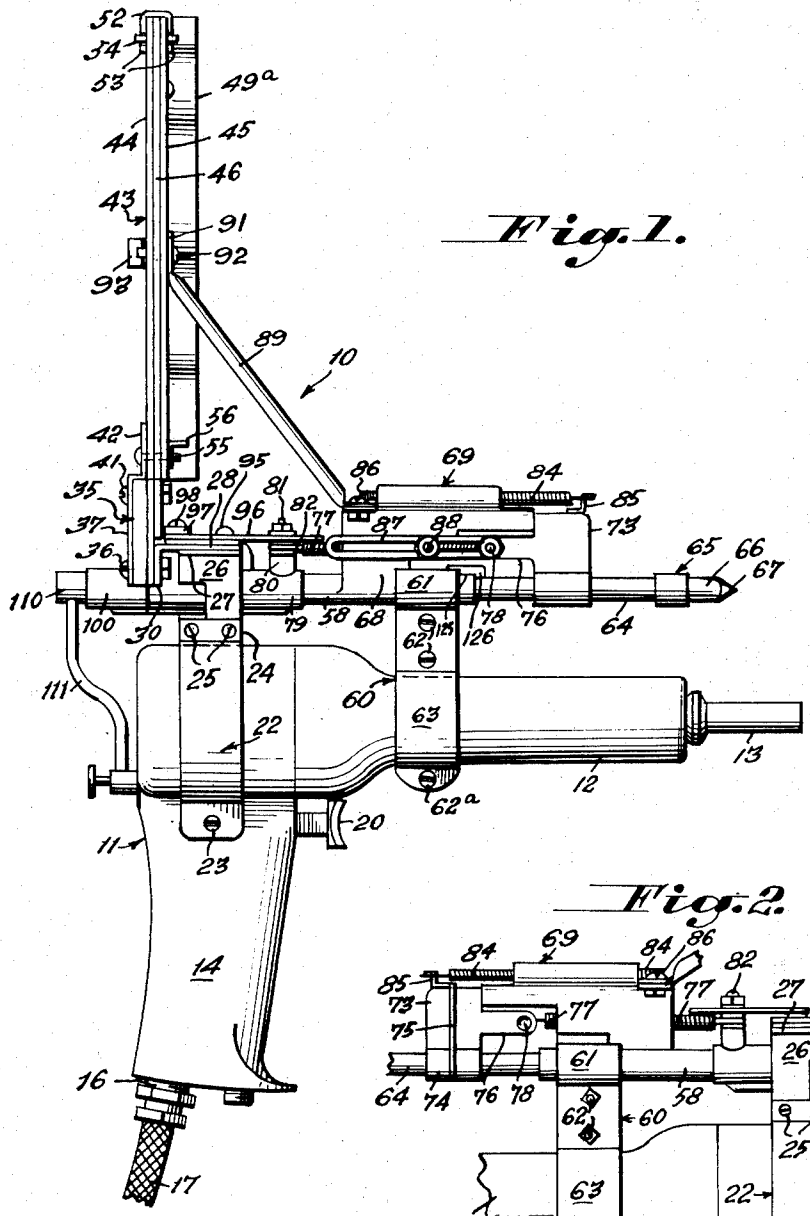


Fig. 1.

Fig. 2.

INVENTOR.
Bruce T. Holter
BY John N. Randolph
ATTORNEYS

Oct. 2, 1951 B. T. HOLTER 2,569,891

AUTOMATIC INJECTION FEED APPLIANCE FOR RIVETS AND HEADED FASTENINGS

Filed Oct. 13, 1950 3 Sheets-Sheet 2

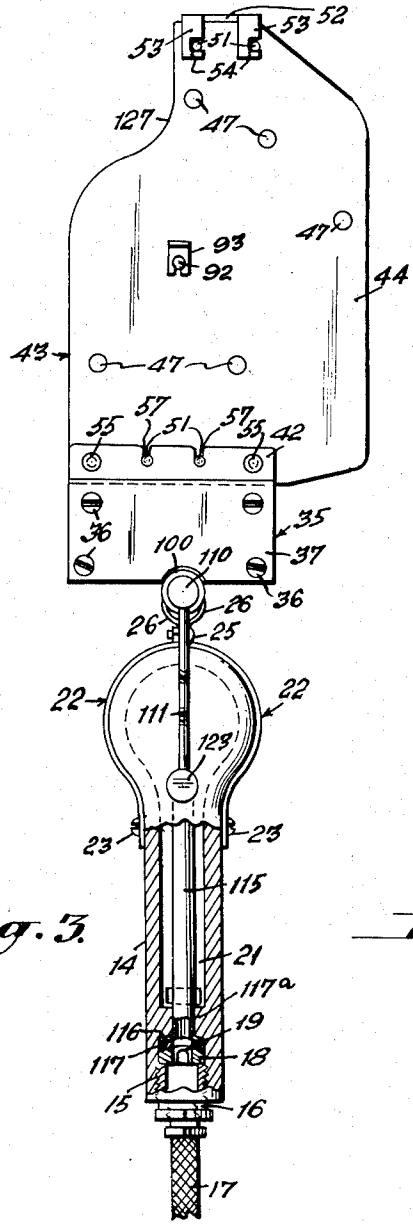


Fig. 3.

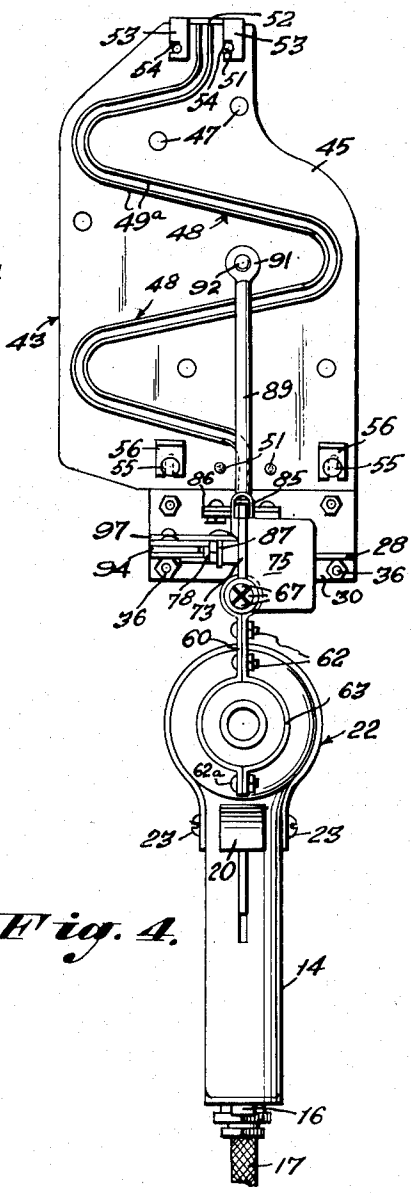


Fig. 4.

INVENTOR.
Bruce T. Holter,
BY John N. Randolph
ATTORNEYS

Oct. 2, 1951 B. T. HOLTER 2,569,891

AUTOMATIC INJECTION FEED APPLIANCE FOR RIVETS AND HEADED FASTENINGS

Filed Oct. 13, 1950 3 Sheets-Sheet 3

Fig. 5.

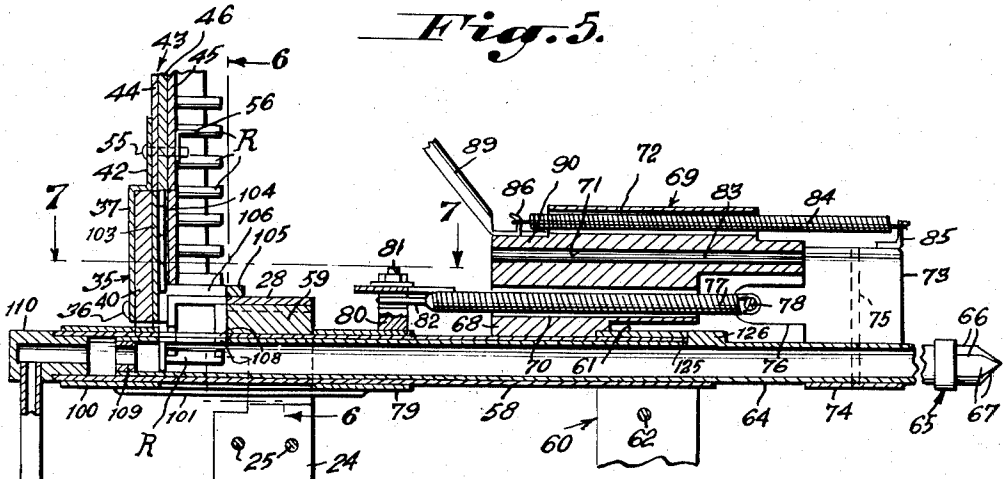


Fig. 6

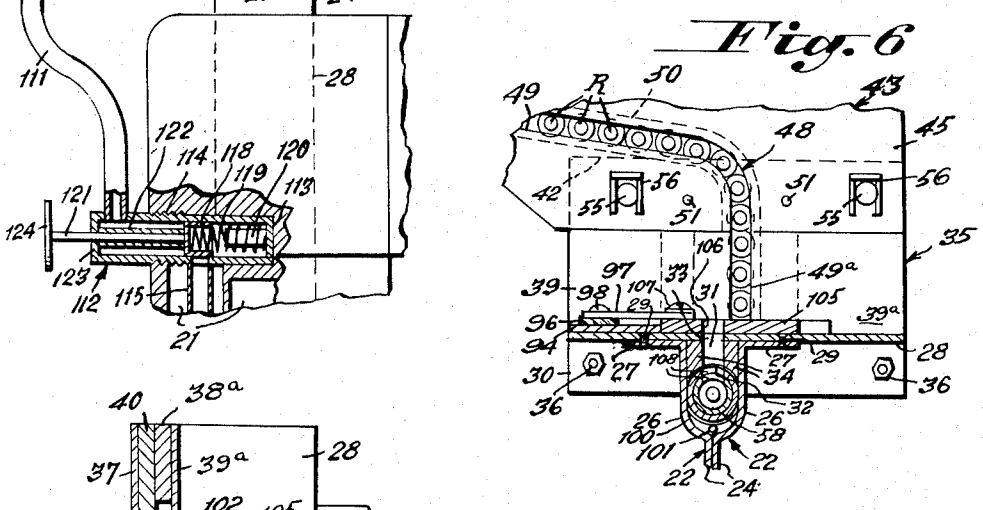
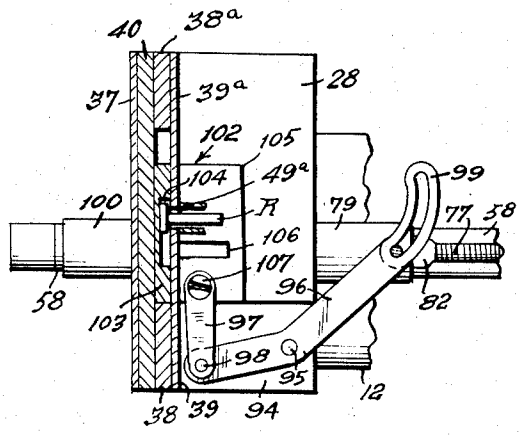


Fig. 7.



INVENTOR.
Bruce T. Holter
BY John N. Randolph
ATTORNEYS

Patented Oct. 2, 1951 2,569,891

UNITED STATES PATENT OFFICE

2,569,891

AUTOMATIC INJECTION FEED APPLIANCE FOR RIVETS AND HEADED FASTENINGS

Bruce T. Holter, Newberry, Pa.

Application October 13, 1950, Serial No. 190,023

15 Claims. (Cl. 78—48)

1

This invention relates to an automatic injection feed appliance for feeding rivets or headed fastenings to openings and which is adapted to be mounted on a portable pneumatic riveting tool for supplying rivets to openings so that the rivets or headed fastenings may thereafter be operated upon or upset by the riveting hammer to thereby eliminate the need for manually inserting the rivet or fastening by hand or by a separate rivet feeding device and to further provide an appliance to function as an attachment for a portable pneumatic riveting hammer which will greatly facilitate the riveting work and enable rivets to be much more rapidly applied and set.

More particularly, it is an object of the present invention to provide an automatic means by which rivets or headed fastenings may be gravity fed to a barrel and pneumatically ejected from the barrel into an opening and which may be operated readily in conjunction with a portable pneumatic hammer on which the feeding device is applied as an attachment to eliminate the manual handling of the rivets or fastenings.

Another object of the invention is to provide an attachment for riveting hammers which is so constructed that the opening into which the rivet is to be applied will not be obstructed from the view of the operator by the hammer or the feeding appliance and wherein the injection tube or barrel moves forward for injecting the rivet or fastening into an opening and thereafter is automatically retracted out of the way of the peening element of the hammer.

Still a further object of the invention is to provide a feed appliance of extremely simple construction which may be economically manufactured and sold, which will be extremely efficient and durable for accomplishing its intended purpose and wherein a loaded magazine may readily replace an unloaded magazine on the appliance so that the hammer and appliance will not have to remain inoperative while the appliance magazine is being reloaded.

A further object of the invention is to provide a device wherein air pressure is applied to the ejection tube of the appliance through a part of the rivet hammer, utilizing the same air pressure employed to operate the hammer under the control of an actuating element disposed to be operated by the same hand which grasps the handgrip of the hammer and operate the trigger valve thereof.

Still a further object of the invention is to provide an appliance constructed and adapted to function with a portable pneumatic rivet hammer wherein the hands of the operator do not have to be removed from the hammer and appliance in accomplishing the feeding and rivet setting operation.

2

Various other objects and advantages of the invention will hereinafter become more fully apparent from the following description of the drawings, illustrating a presently preferred embodiment thereof, and wherein:

Figure 1 is a side elevational view showing the appliance secured to and mounted on a conventional pneumatic rivet hammer;

Figure 2 is a fragmentary side elevational view of a portion of the hammer and appliance looking toward the side thereof opposite the side as seen in Figure 1;

Figure 3 is a rear elevational view of the rivet feed and hammer looking from left to right of Figure 1 and with a portion shown in section;

Figure 4 is an end elevational view looking in the opposite direction or from right to left of Figure 1;

Figure 5 is a fragmentary longitudinal substantially central sectional view, partly in side elevation of a portion of the feed appliance and including a portion of the hammer;

Figure 6 is a vertical sectional view, partly in elevation showing a portion of the appliance taken substantially along a plane as indicated by the line 6—6 of Figure 5, and

Figure 7 is a fragmentary horizontal sectional view taken substantially along a plane as indicated by the line 7—7 of Figure 5.

Referring more specifically to the drawings, the feeding and injection appliance for rivets and headed fastenings, constituting the invention, is designated generally 10 and for the purpose of illustrating a preferred application and use of the appliance or attachment 10 a conventional pneumatic rivet hammer of the portable type is illustrated in the drawings and is designated generally 11. The rivet hammer 11 is generally pistol-shaped including a barrel 12 containing a piston not shown, which is projected from left to right of Figure 1 or toward the muzzle of the barrel 12 by air pressure for projecting a peening element 13 outwardly of the muzzle end of the barrel 12 for upsetting a rivet. Any suitable means such as a spring engaging around the stem of the peening element 13 and attached to the barrel 12 may be utilized for returning the peening element to a retracted position, said spring not being illustrated. The hammer 11 also includes a handgrip 14 having a threaded opening 15 (Figure 3) in the bottom thereof for receiving a threaded stem or coupling 16 which is attached to an end of an air hose 17, the opposite end of which hose is adapted to be connected to a source of compressed air, not shown. Above the stem 16 a washer 18 is disposed in the upper portion of the recess 15 having a radial opening 19 communicating with a passage, not shown, in the

handgrip 14 through which the compressed air from the hose 17 may pass to a trigger-type valve 20 which is reciprocally mounted in the handgrip 14 beneath the barrel 12 and which is adapted to be displaced inwardly of the handgrip to release the air for passage into a cavity 21 of the handgrip which is in communication with the rear end of the barrel 12 to thus supply compressed air for projecting the piston, not shown, toward the peening element 13. The parts heretofore described are of conventional construction and have merely been briefly described and partially illustrated to afford a better understanding of the appliance 10. Further, the power tool 11 is shown solely for the purpose of more clearly illustrating and describing the feeding appliance 10 and represents only one of many types of pneumatic power tools on which the appliance 10 may be mounted and in connection with which it may be utilized and it is to be understood that the invention is not intended to be limited to a pneumatic hammer of the type disclosed in the patent application.

The appliance 10 includes a pair of strap members 22 having outwardly bowed intermediate portions which engage around the enlarged, rear end of the barrel 12, each engaging an opposite side thereof, said strap members having lower terminal portions each of which is secured to a side of the grip 14 by a screw fastening 23. The straps 22 have inwardly offset abutting portions 24 disposed above the barrel 12 which are secured together by nut and bolt fastenings 25. Above the fastenings 25, the portions 24 are bowed outwardly in opposite directions to provide laterally offset upwardly extending portions 26 which terminate in outturned flanges 27 constituting the opposite ends of the straps 22 and which project away from one another and are disposed in substantially the same plane. A plate 28 is supported on and secured to the flanges 27 by flush rivets or similar fastenings 29, as best seen in Figure 6, and said plate 28 is provided with a downturned rear edge portion forming a depending transverse flange 30 which is located behind the strap members 22 and which is provided with a downwardly extending slot 31 having a flared substantially semicircular lower portion 32 which opens outwardly of the bottom edge of the flange 30. The upper end of the slot 31 which opens outwardly of the upper edge of the plate 28 registers with a transverse slot 33 in said plate 28 which extends forwardly from its rear edge and from the depending flange 30. The depending flange 30 is provided with enlargements 34 on its forward side, as best seen in Figure 6, which are disposed between the strap portions 26 and which straddle the slot 31 and are disposed above the arcuate notch 32, for a purpose which will hereinafter become apparent.

A switch assembly, designated generally 35 is secured to the flange 30 adjacent its bottom edge by nut and bolt fastenings 36 and is disposed behind said flange and projects upwardly to above the plate 28. The switch assembly 35 is composed of a plurality of plates or plies, which will hereinafter be described in detail including a rear plate 37, an intermediate ply formed of end sections 38 and 38*a*, a front ply formed of end sections 39 and 39*a* and a spacing ply 40 interposed between the back plate 37 and the sections 38 and 38*a*. The parts 37, 38, 38*a*, 39, 39*a*, and 40 are connected by additional nut and bolt fastenings 41. The front sections 39 and 39*a* terminate above the level of the plate 28 and

the front surfaces of the plate sections 38 and 38*a* are disposed with their bottom edge portions in abutting engagement with the rear surface of the flange 30. The back plate 37 is provided with a forwardly offset flange 42 forming an extension of its upper edge and which rises from the assembly 35 adjacent the front face of the spacing plate 40, as best seen in Figure 1.

A magazine, designated generally 43 is detachably mounted on the upper edge of the switch assembly 35 and is composed of a back plate 44, a front plate 45 and an intermediate plate 46 which plates are secured together by suitable fastenings 47. The front plate 45 and intermediate plate 46 are actually formed of sections each extending from top to bottom or end to end of the magazine 43 to form a sinuous feed slot for rivets or headed fastenings, designated generally 48 including an outer portion 49 formed by the sections of the front plate 45 and which is substantially narrower than the bed portion 50 of the slot 48 and which is formed by the sections of the intermediate plate 46. Said sinuous rivet or headed fastening feed slot 48 extends from the upper to the lower end of the magazine 43 and opens outwardly of said ends and is adapted to be filled through either end, preferably the upper end of the slot 48 with rivets or headed fastenings R, as illustrated in Figure 6, the heads of which fit slidably in the bed portion 50 of the slot and the shanks or stems of which extend outwardly therefrom through the restricted slot portion 49 which is narrower than the rivet or fastening heads to retain the rivet heads in the slot portion 50. The sections defining the front plate 45 have outturned flanges 49*a* at their inner edges which define the outer slot portion 49, which flanges are disposed on opposite sides of said slot portion 49 and perpendicular to the front plate 45, for supporting the stems or shanks of the rivets or headed fastenings R while in engagement with the feed slot 48 to maintain said shanks substantially perpendicular to the plane of the magazine 43 to prevent any part of the fastenings from binding in the feed slot 48. The magazine 43 is provided adjacent each of its ends with a pair of pins 51 which extend therethrough and which straddle the ends of the slot 48. Each end of the rivet slot 48 is adapted to be closed, after said slot has been filled with rivets or headed fastenings, by a closure plate 52 which detachably engages an end of the magazine 43 and which is provided at each end and each side edge with a strap 53 disposed perpendicular to the plate 52 and which straps engage opposite sides of the magazine 43 and are provided with notches 54 opening outwardly of corresponding side edges thereof to receive the ends of the pins 51. It will thus be seen that each cover plate 52 may be applied against an end of the magazine 43 and then displaced laterally to engage the strap notches 54 thereof with the adjacent pins 51 to detachably retain the cover in an applied position. By moving the cover 52 in the opposite direction the notches 54 are disengaged from the pin 51 so that the cover can be removed.

The lower end of the magazine 43 rests upon the upper edge of the forward portion of the switch assembly 35 when detachably applied thereto and in front of the flange 42 and is provided with openings, not shown, adjacent its lower edge for receiving headed fastenings 55 which extend forwardly through the flange 42 and through said openings of the magazine 43 and

which are provided with slotted shank portions for receiving a slotted catch 56 which abuts the forward side of the magazine 43 to detachably retain the shanks of the fastenings 55 in engagement with the magazine to thereby detachably secure the magazine to the flange 42. The fastenings 55 are preferably fixed to the flange 42. The flange 42 is provided with upwardly opening notches 57, as best seen in Figure 3 for accommodating corresponding ends of the pins 51 located adjacent the bottom edge of the magazine 43 and it will be readily apparent that the bottom cover 52, not shown, would be removed before the magazine is thus attached to the switch assembly 35 and is ordinarily disposed in an inverted position and the switch assembly inverted while the magazine is being connected to the flange 42 to prevent the rivets or headed fastenings R from escaping through the lower end of the slot 48 after removal of the bottom cover and before the magazine is attached to the switch assembly 35.

A tube 58 is disposed longitudinally above the barrel 12 and adjacent its rear end extends between the strap portions 26 and is clamped therein. A wedge block 59, as best seen in Figure 5, is disposed between the upper portion of the barrel 58 and the plate 28 and may be welded or otherwise suitably secured to said parts. A strap member, designated generally 60 has an intermediate portion 61 clamped around the barrel 58, adjacent its forward end by fastenings 62 which extend through abutting portions of the strap 60 which extend downwardly from the barrel 58. The terminal portions of the strap 60 are bowed outwardly to provide clamp portions 63 which are clamped around the barrel 12 by the fastenings 62 and an additional fastening 62a which engages the terminals of the strap beneath the barrel 12. The barrel or tube 58 is thus rigidly supported above the barrel 12 and provides a guide for an ejection tube or barrel 64, the rear end of which is reciprocally disposed in the barrel 58 and the forward end of which extends from the forward end of said barrel and terminates in an ejection head or nozzle 65 having four circumferentially spaced forwardly extending spring fingers or strips 66 terminating in tapered converging free ends 67, for a purpose which will hereinafter become apparent.

A bracket 68 is fixed to and rises from the barrel 58 behind and adjacent the strap portion 61 and supports a guide 69 which is preferably formed integral with the bracket 68 and which is disposed above the forward end of the barrel 58 and over a part of the barrel 64 which is disposed in advance of the barrel 58. The guide 69 is positioned longitudinally of the barrel 58 and includes three longitudinally disposed bores which extend longitudinally therethrough, as best seen in Figure 5, including a lower bore 70 an intermediate bore 71 and an upper bore 72. A plate 73 rises from the barrel or tube 64 and is secured thereto by a sleeve portion 74 which is clamped around the barrel 64 forwardly of the barrel 58. The plate 73 is disposed longitudinally of the barrel 64 and has a flange 75 projecting transversely from one side thereof. An arm 76 is formed integral with and extends rearwardly from the rear upright edge of the plate 73 toward the bottom bore 70. One end of a contractile spring 77 is anchored to the arm 76 by a fastening 78 and extends rearwardly therefrom loosely through the bore 70. A sleeve 79 is slidably mounted on the barrel 58 between the bracket 68

and the strap portions 26. A post 80 is fixed to and rises from the forward end of the sleeve 79 and has an upwardly projecting stem 81 which is engaged by an eye member 82 connected to the opposite, rear end of the spring 77. A guide rod 83 is fixed to and extends rearwardly from the upper portion of the rear edge of the plate 73 and reciprocally engages the intermediate guide bore 71 for guiding the ejection tube 64 in its reciprocating movement and for preventing said tube from turning in the barrel 58. A contractile coil spring 84 extends loosely through the upper bore 72 and is anchored at its forward end to the upper edge of the plate 73 by a hook member 85 and is anchored at its rear end to the rear portion of the guide 69 by a hook 86.

On the right-hand side of the appliance, as seen in Figure 1, a slotted bar 87 is supported at its forward end on the arm 76 by the fastening 78 and extends rearwardly therefrom along the right-hand side of the guide 69. A fastening including a bolt shank 88 extends transversely from the right-hand side of the guide 69 and slidably engages the slot of the bar 87 to form a stop for limiting the forward movement of the tube 64 and the plate 73 which is fixed thereto.

A diagonal brace 89 is secured at its lower, forward end to a stepped rear portion 90 on the guide 69, which is disposed below the upper bore 72, as seen in Figure 5, and extends upwardly and rearwardly therefrom and has an apertured opposite end 91 which abuts against the front side of the magazine 43 intermediate of its upper and lower ends and which is detachably secured thereto by a headed pin 92, corresponding to the headed fastenings 55, which extends through the magazine 43 and is detachably secured thereto by a slotted plate 93 corresponding to the clips or plates 56.

A plate 94, forming a stop, is secured to the upper side of the plate 28 at its right-hand end and is provided with an upstanding headed pivot pin 95 which extends through and provides a journal for a lever 96 which swings in a horizontal plane. The lever 96 is pivoted near one of its ends and has its shorter end disposed for swinging movement on the plate 94. A link 97 is pivotally connected at one end by a pivot pin 98 to the shorter end of the lever 96. The opposite end of the lever 96 is arcuately curved and slotted as seen at 99 and the stem 80 extends upwardly through and slidably engages said arcuate slotted portion, for a purpose which will hereinafter become apparent. A sleeve 100 is mounted on the rear end of the barrel 58 and is connected rigidly to the sleeve 79 by a rod 101 which extends between said sleeves and slidably through the strap portions 26 beneath the barrel 58, as best seen in Figure 6.

A rivet carrier, designated generally 102 includes an upright plate portion 103, as best seen in Figure 7, which is disposed between the front plates 39 and 39a and the spacer plate 40 for transverse reciprocating movement between the stop plates 38 and 38a. The plate or portion 103 of the rivet carrier 102 is provided with a relatively wide groove 104 in its front side extending from top to bottom thereof and which is at all times in communication with the slot 49a formed by the gap between the front plates 39 and 39a and which constitutes a continuation of the lower end of the restricted slot portion 49 in the magazine 43. The rivet carrier 102 is also provided with a horizontal portion 105 which extends outwardly from the vertical portion 103

beneath the adjacent portions of the bottom edges of the front plates 39 and 39a and which slidably engages on plate 28 and has one end moveable into and out of abutting engagement with the stop plate 94. The plate portion 105 is provided with a slot 106 which extends rearwardly from adjacent its forward edge and which opens at its rear end into the recess 104 but which is substantially narrower than said recess 104 and of substantially the same width as the slot 49a. The opposite end of the link 97 is pivotally connected by a pivot member 107 to the end of the plate portion 105 which is located adjacent the stop plate 94. The barrel 58 and tube 64 are provided with elongated substantially T-shaped openings 108, as best seen in Figure 5, which register with the slots 31 and 33 and with the space between the enlargements 34. The plate 105 is normally retained by the spring 84, as will hereinafter become apparent, in its position of Figures 5, 6 and 7 in which position its slot 106 is in registry with the slot 33 and out of registry with the slot 49a so that a portion of the plate 105 will normally close the lower end of the slot 49a, as best seen in Figure 6. Likewise when the carrier 102 is thus disposed the sleeves 79 and 100 are in their retracted positions of Figure 5 with the sleeve 100 disposed behind the registering barrel openings 108 so that a rivet R the stem of which is engaging in the slot 106 may drop therefrom through the slots 33 and 31 and through the registering openings 108 into the ejector tube 104. Said tube 104 is provided with a restrictor sleeve 109 which is disposed behind the openings 108 to prevent a rivet in the tube 64 from sliding rearwardly to beyond its position of Figure 5.

A nozzle 110 is secured in the rear end of the barrel 58 behind the rear end of the tube 64 and behind the restrictor 109 and is connected to and communicates with the outlet end of an air supply pipe 111 which extends downwardly therefrom and is connected at its opposite end to the outer end of a valve casing 112. The valve casing 112 is closed at each end thereof and fits into a rearwardly opening recess 113 of the hammer 11, as best seen in Figure 5 and is connected thereto by a threaded connection 114. As best seen in Figures 3 and 5, a supply pipe 115 is disposed in the cored out bore portion 21 of the pneumatic hammer 11 and has its upper end secured to and opening into the chamber of the valve housing 112. Said supply pipe 115 has its lower end flared as seen at 116 in Figure 3 and fitting in the upper end of the recess 15 and against the lower end of an annularly restricted portion 117a through which the pipe 115 extends. An annular sealing gasket or washer 117 is disposed in the recess 15 between the flange 116 and the washer 18. A valve body 118 is slidably mounted in the housing 112 and is urged toward the outer end thereof by an expansion spring 119, one end of which abuts against the inner end of the housing 112 and is supported in a centered position by a stem 120 which extends from said inner end of the housing and the opposite end of the spring 119 fits into and abuts against the valve 118 which is cup-shaped and opens toward the stem 120. A valve stem 121 extends from the opposite side of the valve 118 through a stop sleeve 122 and outwardly through an opening in the outer end 123 of the housing 112, which end may be detachably connected in any suitable manner to the remainder of said housing. The valve stem 121 is provided with a thumb plate or disk 124 at its outer end. The stop sleeve 122 is of a length to permit the spring 119 to move the valve 118 to the left only to its position of Figure 5 in which position it is disposed to close the end of the supply tube 115 which opens into the casing 112.

The forward end of the barrel 58 and the forward edge of the strap portion 61 are provided with a forwardly opening substantially V-shaped notch 125 to receive a rearwardly tapered projection 126 which is secured to the tube 64, longitudinally thereof, and which engages in the notch 125 when the tube 64 is in a fully retracted position to insure that the tube 64 and valve 58 will be correctly disposed so that their openings 108 will fully register.

Assuming that a loaded magazine 43 is demountably supported as a part of the device 10 by the fastening means 55, 56 and 92, 93 and that the parts are in their normal positions as illustrated in Figures 1, 2 and 5 to 7, the rivets R will feed downwardly in the magazine feed slot 48 by gravity so that the bottom three rivets will pass downwardly from the feed slot 48 by gravity into the switch assembly 35. The heads of the rivets R which enter the switch assembly 35 will be disposed in the rivet carrier recess 104 which is always in registry with the feed slot portion 50 and the stems of these rivets will loosely fit in and project outwardly from the slot 49a which forms an extension of the restricted slot portion 49. The carrier or switch plate 105 will be normally disposed as illustrated in Figure 6 to close the lower end of the slot 49a to support the lowermost rivet R and the rivets disposed thereabove. To operate the rivet or headed fastening feeding appliance 10 in conjunction with the hammer 11, the hammer grip 14 is grasped in the right hand and the operator then grips the flange 75 with the fingers of the left hand and pushes outwardly to project the ejection tube 64 toward an opening into which a rivet is to be fed. The recessed upper left-hand corner of the magazine 43, as illustrated in Figure 3 and designated 127 will afford the operator an unobstructed view of the nozzle 65 and the opening into which a rivet is to be inserted, not shown, so that as the tube 64 is projected forwardly, as just previously described, the right hand may be utilized to guide the appliance 10 so that the spring fingers 66, 67 may be inserted into the rivet opening when the tube 64 has been moved to a fully projected position. This forward displacement of the tube 64 through the barrel 58 will be against the action of the spring 84 which will be expanded and the tube will be guided in its travel by the barrel 58 and the guide rod 83 which slidably engages the bore 71. As the plate 73 moves forward with the tube 64 the spring 77 will likewise initially expand and will thereafter exert a sufficient pull on the stem 81 to displace the sleeve 79 forwardly until it abuts or substantially abuts the rear end of the bracket 68 and at which time the stop fastening 88 will have engaged the rear end of the slot of the bar 87 to limit further movement of the tube 64 and plate 73. As the sleeve 79 thus moves forwardly the stem 80 slides to the outer end of the arcuate slotted portion 99 to cause the lever 96 to swing clockwise as seen in Figure 7. This will cause the link 97 and the carrier or switch unit 102 to move away from the stop plate 94 and until the carrier portion 103 contacts and is stopped by engagement with the stop plate 33a at which time the slot 106 will be in registry with the slot 49a to accommodate the stem of the bottom rivet R which then drops downwardly into

the slot 106 and into a position resting on the plate 28. The tube 64 and parts fixed thereto are then permitted to return to their positions of Figures 1 and 5 by retraction of the spring 84; however, instead of permitting the tube 64 to actually move rearwardly and which would displace the spring fingers 66 out of engagement with the opening to which a rivet is to be fed, the remainder of the appliance 10 and the hammer 11 are instead actually displaced forwardly as the tube slides rearwardly in the barrel 58. As this occurs, the spring 77 rapidly goes solid and thereafter exerts a push against the stem 81 to force the sleeve 79 back to its position of Figure 5 as the tube 64 reaches a fully retracted position. When this occurs, the carrier or switch unit 102 moves back to its position of Figure 6 to close the lower end of the slot 49a and so that the slot 106 will register with the slots 31 and 33 to allow the rivet which is then engaging the slot 106 to drop through the slots 33 and 31 and through the registering openings 108 into a position in the barrel or tube 64 as illustrated in Figure 5. The operation just previously described would then be repeated to feed a rivet from the tube 64 if there were no rivet previously in said tube or the rivet previously in the tube would have been applied while the tube 64 was in an extended position in a manner now to be described.

Assuming that the tube 64 is in an extended position and with the fingers 66, 67 in an opening into which a rivet is to be fed, the thumb of the hand gripping the hammer portion 14 is pressed against the button 124 to displace the valve 118 inwardly against the spring 119 to uncover the tube 115 so that compressed air supplied through the hose 17 may pass through the valve housing 112 and pipe 111 to the nozzle 110. This compressed air will pass under pressure through the restrictor 109 to propel the rivet R through the tube 64 and outwardly through the spring fingers 66 into the opening engaged by said spring fingers. In order to prevent escape of the air through the registering openings 108, the sleeve 100 is connected by the rod 101 to the sleeve 79 so that when said sleeve is displaced forwardly or from left to right of Figures 1 and 5, as previously described, the sleeve 100 will move over and close the openings 108 until the rivet R has been ejected and when the tube 64 is returned to its retracted position of Figure 5 by the spring 84 the sleeve 100 will also assume its position of Figure 5 to expose the openings 108. The enlargement 126 engages the notches 125 as the tube 64 reaches its fully retracted position to insure complete registration of the openings 108. It will also be obvious that another rivet will have been fed into the carrier plate slot 106 while the tube 64 was projected for applying the rivet and this rivet will then drop into the tube 64 as said tube is retracted to its position of Figure 5, so that each time that a rivet is fed and applied and the tube thereafter retracted, another rivet will be fed into said tube 64.

It will be obvious that a supply of magazines 43 may be maintained loaded with rivets having stems of different sizes so that a magazine may be at any time removed from the appliance 10 and replaced with a fully loaded magazine having rivets or headed fastenings of the same or different size and without the appliance 10 being rendered inoperative during a reloading period.

Various modifications and changes are contemplated and may obviously be resorted to, without departing from the spirit or scope of the invention as hereinafter defined by the appended claims.

I claim as my invention:

1. A fastener feeding and applying device for use with a portable pneumatic impact tool comprising a guide barrel, supporting members secured to said guide barrel and adapted to be detachably fastened to a pneumatic impact tool for supporting the guide barrel above the impact tool, an ejection tube reciprocally mounted in the guide barrel having a forward end terminating in an outlet extending forwardly from a forward end of the guide barrel, a switch assembly secured to one of said supporting members and disposed above the guide barrel adjacent its opposite, rear end, a magazine having a lower end detachably connected to and supported on said switch assembly, said magazine having a rivet or headed fastening slot extending from top to bottom thereof and opening outwardly of its upper and lower ends adapted to be filled with rivets or headed fastenings fed downwardly through said magazine slot by gravity, said switch assembly including a front plate having an upright slot communicating with a portion of the magazine slot for receiving stems of headed fastenings or rivets fed downwardly by gravity from the magazine, a carrier reciprocally mounted in the switch assembly for movement transversely of the guide barrel and having an upright portion provided with a recess to accommodate the heads of the rivets or fastenings the stems of which engage the slot of the switch assembly front plate, said carrier having a horizontal plate portion normally closing the bottom of said front plate slot and including a slot normally disposed out of registry therewith, said ejection tube and guide barrel having T-shaped openings normally disposed in registration when the tube is in a retracted position, said T-shaped openings normally registering with the slot of the horizontal portion of the carrier, a slide reciprocally mounted on the guide barrel and connected to said tube, link and lever means connecting said slide and carrier for reciprocating the carrier transversely of the barrel as the ejection tube is reciprocated longitudinally therein for moving the slot of the horizontal carrier portion into and out of registry with the front plate slot of the switch assembly and the T-shaped openings of the barrel and tube for feeding the rivets or headed fastenings one-by-one from the front plate slot to the ejection tube, an air nozzle mounted in the rear end of the guide barrel for directing air under pressure through the ejection tube toward its outlet end from a point behind said T-shaped openings for propelling a rivet or headed fastening through the ejection tube and outwardly of its outlet end, a conduit for supplying air under pressure to said nozzle having an outlet end connected to the nozzle and an inlet end adapted to be connected to an air pressure conduit of the pneumatic impact tool, and a manually opened normally closed valve interposed in said air pressure conduit.

2. A feeding device as in claim 1, said valve being disposed adjacent the handgrip portion of the pneumatic impact tool to be operated by the thumb of the hand gripping and supporting the tool and feeding device.

3. A feeding device as in claim 1, and a handle member secured to the ejection tube forwardly of the guide barrel adapted to be manually operated for displacing the ejection tube outwardly of the guide barrel into a position for directing a rivet or headed fastening from the outlet end of the ejection tube into a rivet open-

ing and for removing the carrier to a position to align the slot of its horizontal portion with the front plate slot of the switch assembly for receiving the stem of a rivet therein by gravity feed.

4. A feeding device as in claim 1, and a handle member secured to the ejection tube forwardly of the guide barrel adapted to be manually operated for displacing the ejection tube outwardly of the guide barrel into a position for directing a rivet or headed fastening from the outlet end of the ejection tube into a rivet opening and for moving the carrier to a position to align the slot of its horizontal portion with the front plate slot of the switch assembly for receiving the stem of a rivet therein by gravity feed, and contractile spring means for returning the ejection tube to a retracted position in the guide barrel and for moving the carrier slot into registry with the T-shaped openings of the guide barrel and ejection tube and out of registry with said front plate slot.

5. A feeding device as in claim 1, and a handle member secured to the ejection tube forwardly of the guide barrel adapted to be manually operated for displacing the ejection tube outwardly of the guide barrel into a position for directing a rivet or headed fastening from the outlet end of the ejection tube into a rivet opening and for moving the carrier to a position to align the slot of its horizontal portion with the front plate slot of the switch assembly for receiving the stem of a rivet therein by gravity feed, a guide member secured to the guide barrel having a bore disposed parallel to the axis of said guide barrel, a rod fixed to said handle and reciprocally engaging in said bore and retaining the ejection tube against rotation relatively to the guide barrel to maintain the T-shaped openings in full registration when the ejection tube is in a fully retracted position.

6. A feeding device as in claim 1, and a fastening or rivet discharge nozzle mounted on the outlet end of the ejection tube including a plurality of outwardly projecting spring fingers having inwardly converging free ends through which a rivet or headed fastening is adapted to be ejected from the ejection tube and guided by said spring fingers into a rivet opening.

7. A feeding device as in claim 1, and guide means including a part fixed to the guide barrel and a part fixed to the ejection tube, said guide means part having inter-engaging relationship for guiding the tube in its reciprocating movement in the barrel to position the T-shaped opening of the tube in full registration with the T-shaped opening of the barrel when the tube is in a fully retracted position.

8. A feeding appliance as in claim 1, and a closure sleeve reciprocally mounted on the guide barrel and connected to said slide and moveable from a position behind the T-shaped opening of the guide barrel into a position for closing said opening to prevent the escape of air therefrom when the tube is moved forwardly to a projected rivet discharging position.

9. A feeding device as in claim 1, said rivet or headed fastening feed slot of the magazine being of a sinuous shape and including an inner head receiving portion of a greater width than the outer, stem receiving portion thereof.

10. A feeding device as in claim 1, and closure members detachably mounted on the ends of the magazine for closing the open ends of its feed slots, the closure member on the lower end of a loaded magazine being adapted to be removed before the magazine is connected to the switch assembly.

11. A feeding device as in claim 1, and a diagonal brace having one end rigidly secured to the guide barrel and an opposite end provided with fastening means detachably connecting the brace to the magazine intermediate of its upper and lower ends.

12. A feeding device as in claim 1, and a restrictor fixed in the ejector tube behind the T-shaped opening thereof to prevent the rivets or headed fastenings sliding rearwardly from the ejector tube into the guide barrel.

13. A feeding device as in claim 1, and a handle member secured to the ejection tube forwardly of the guide barrel adapted to be manually operated for displacing the ejection tube outwardly of the guide barrel into a position for directing a rivet or headed fastening from the outlet end of the ejection tube into a rivet opening and for moving the carrier to a position to align the slot of its horizontal portion with the front plate slot of the switch assembly for receiving the stem of a rivet therein by gravity feed, and a contractile spring connecting the handle and link and lever means and forming a resilient connection between the slide and ejection tube.

14. A feeding device as in claim 1, and stop members forming a part of the switch assembly limiting the sliding movement of the carrier to position the slot of the carrier in registration with the T-shaped openings at one extremity of movement of the carrier and in registration with the front plate slot of the switch assembly at the other extremity of movement of the carrier.

15. A fastener feeding and applying device for use with a portable pneumatic impact tool, comprising a guide barrel means adapted to detachably mount the guide barrel on a pneumatic impact tool and longitudinally thereof, an ejection tube reciprocally mounted in the guide barrel having an outlet end extending from a forward end of the guide barrel, a switch assembly supported by said means above and transversely of the guide barrel adjacent its opposite, rear end, a magazine detachably connected to the switch assembly and supported thereabove in an upright position, said magazine having a rivet or headed fastening slot opening outwardly of its lower end adapted to be filled with rivets or headed fastenings to be fed therefrom by gravity to the switch assembly, said guide barrel and ejection tube having rivet or headed fastening receiving openings adjacent their rear ends disposed in registration when the ejection tube is in a retracted position, said openings being laterally offset relatively to the lower end of the magazine slot, a carrier reciprocally mounted in the switch assembly for movement transversely of the guide barrel between a position beneath the outlet end of the magazine slot and above said T-shaped openings for conveying rivets or headed fastenings one by one from the magazine to the ejection tube, and link and lever means connecting the ejection tube and carrier for reciprocating the carrier transverse to the guide barrel as the ejection tube is reciprocated longitudinally in the guide barrel for feeding the rivets or headed fastenings one by one to the ejection tube.

BRUCE T. HOLTER.

No references cited.