Jan. 10, 1950 H. McM. GRIFFIN 2,493,868

AIR GUN RIVET FEED

Filed Oct. 26, 1943

Fig. 1

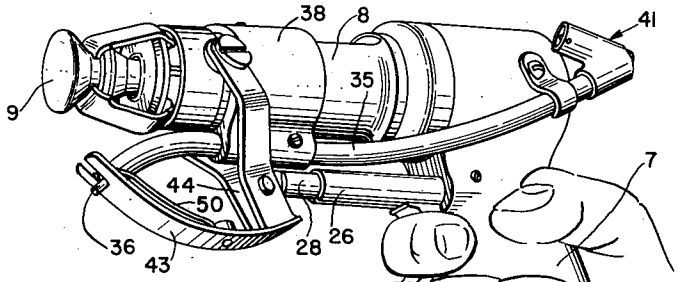


Fig. 2

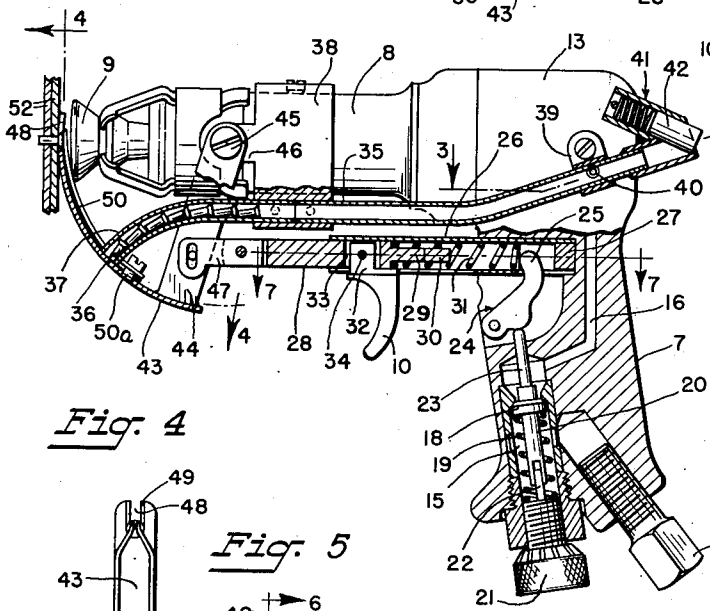


Fig. 8

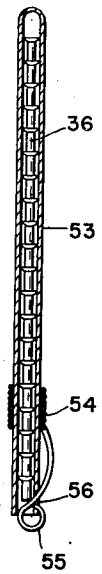


Fig. 4

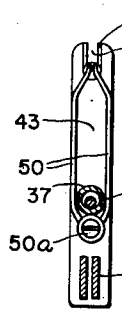


Fig. 5

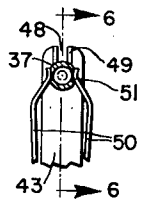


Fig. 3

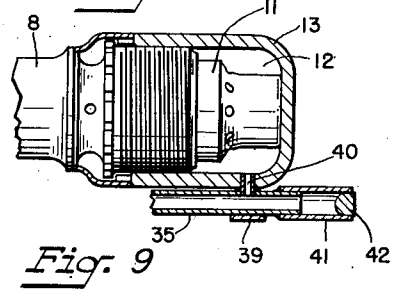


Fig. 6

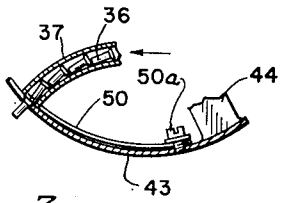


Fig. 9

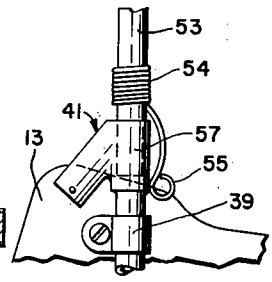
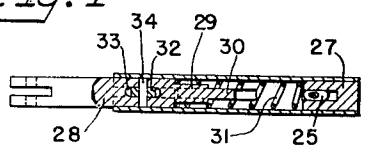


Fig. 7



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AIR GUN RIVET FEED

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Application October 26, 1943, Serial No. 507,767

11 Claims. (Cl. 78—48)

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This invention relates generally to percussion tools and more particularly is concerned with a riveting gun which is adapted to carry the rivets to be acted upon and which may be manipulated to present the rivets to the work preparatory to the upsetting operations.

One object of the invention is to provide a tool of the character generally described which is so designed that as it is manipulated to present a rivet to the work it is moved to the position which it must occupy to upset the rivet, any special or additional movements of the tool solely for the purpose of inserting the rivet being thereby rendered unnecessary.

A further object is to provide for speed, facility and ease of operation of the tool, this object contemplating a tool having trigger and rivet feeding and holding mechanisms interconnected in such a manner that when the trigger is released upon completion of each upsetting operation the rivet to be acted upon in the following operation is automatically advanced to, and held in, a position in which it may be presented to the work.

A still further object is to provide a rivet feeding and holding mechanism which may be applied as an attachment to, or may be incorporated in, rivet guns of standard design.

A still further object is to provide a feeding and holding mechanism which may be associated with a riveting gun in such a manner that a rivet, when held for presentation to the work, will be clearly visible for substantially its full length while during the upsetting operation the feeding and holding mechanism will be located wholly at one side of the zone of operation of the rivet set.

A still further object is a novel design and arrangement of the parts of the gun, whereby to enable the rivets to be advanced to the feeding mechanism by the same agency which actuates the rivet set and in this respect, and in other respects, achieve simplicity and compactness in construction.

Other objects will be apparent from the following description when considered in connection with the accompanying drawings, wherein:

Figure 1 is a perspective view of a riveting gun embodying the features of the invention.

Figure 2 is a view, partially in elevation and partially in section, of the gun, the parts of the rivet feeding and holding mechanism being shown in the positions which they occupy when the gun is manipulated to present a rivet to the work.

Figure 3 is a fragmentary section taken along line 3—3 of Figure 2.

Figure 4 is a detail section taken along line 4—4 of Figure 2 and shows the rivet feeding and holding tongue in the same position as in the latter figure.

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Figure 5 is a fragmentary section along the same line as Figure 4 with the rivet feeding and holding tongue being shown in its retracted, or rivet receiving, position.

Figure 6 is a longitudinal section through the rivet feeding and holding tongue and is taken along line 6—6 of Figure 5.

Figure 7 is a longitudinal section taken along line 7—7 of Figure 2.

Figure 8 is a longitudinal section through a device for loading the gun.

Figure 9 is a fragmentary view, in elevation, illustrating the manner in which the gun may be loaded by the said device.

Although the features of the invention are not so limited, they are shown, by way of example, in connection with a pneumatic gun of standard construction. The gun, in so far as conventional features are concerned, is sufficiently illustrated for the purpose in view by a showing of the handle 7, barrel 8, rivet set 9 and trigger-like control element 10, the barrel 8 having a threaded end in which the usual air motor 11 is accommodated and which screws into an air chamber 12 formed in an enlargement 13 at the upper end of the handle. Compressed air for operating the air motor is introduced into the gun through a connection 14 extending from the lower end of the handle. Compressed air entering the connection 14 passes to a valve chamber 15 which is connected by a passage 16 to the chamber 12, the flow of compressed air to the chamber 12 being controlled by a valve 18. Normally the latter is held closed by a spring 19 which is arranged around a downwardly extending stem 20 between the valve and the inner end of a threaded plug 21, the lower end of the stem 20 being forked to straddle an extension 22 on the plug 21 and cooperating with the said extension to limit the opening movement of the valve. A pin 23 which is carried by the valve is engageable with a pivotally mounted finger 24, the free end 25 of which extends into a sleeve 26 between the spaced ends of a stop 27 located at the inner end of the sleeve.

A plunger 28 extends into the outer end of the sleeve, the inner end of the plunger being formed with a tail-piece 29 which terminates in a reduced extension 30 (Figure 7). A spring 31 which is located in the sleeve between plunger and the stop 27 normally acts against the plunger to hold it in the extended position shown in Figure 2. An extension 32 on the trigger-like control element 10 projects upwardly through an elongated slot formed in the underside of the

sleeve 26 and into a slot 33 formed in the plunger, the control element being connected to the plunger by a pin 34. When the control element is moved toward the handle 7 the reduced extension 30 will, after the control element has moved a predetermined distance, enter the space between the ends of the stop 27 and pivot the finger 24 to open the valve 18 and thereby actuate the rivet set, the rearward movement of the plunger 28 being arrested by the engagement of the tail-piece 29 with the spaced ends of the stop. Upon release of the control element the spring 31 restores the plunger 28 to its original position as the spring 19 closes the valve 18 to cut off the supply of compressed air to the chamber 12.

In accordance with the invention the gun carries a rivet magazine 35. The latter is in the form of a tube, the rivets 36 being arranged end-to-end in the magazine with the shank ends extending in the feeding direction. At its forward end, the magazine tube is located under the barrel and terminates in a downwardly curved nozzle 37. From the central portion toward the rear end, it curves outwardly from under the barrel and upwardly alongside the enlargement 13. The magazine, as illustrated in Figure 2, comprises two tube sections arranged end-to-end, the abutting ends of the tube sections being secured together and to the gun by a band 38 which is arranged around the barrel of the gun. In the vicinity of its rear end the rear section of the magazine is clamped against the enlargement 13 by a bracket 39. Referring to Figure 3, it will be noted that the magazine 35 communicates with the chamber 12 through a branch tube 40, whereby compressed air will be admitted to the magazine whenever the valve 18 is opened to admit compressed air to the chamber 12. A cap-piece 41 is secured over the rear end of the rear section of the magazine, the said cap-piece having a spring-loaded plug 42 which normally closes the entrance to the magazine.

The compressed air which enters the magazine acts against the column of rivets therein to feed the rivets toward the nozzle 37, the shank of the leading rivet in the tube being thereby forced against an arcuate tongue 43. The latter is supported by the branches of a forked lever 44 which, in turn, is pivotally mounted on pivot screws 45 to forwardly-extending ears 46 on the band 38. Supporting lever 44 for the tongue 43 is connected by a link 47 to the outer end of the plunger 28. The spring 31, therefore, through the agency of the plunger 28 and the link 47 normally holds the tongue in an extended position in which the tip thereof is located in front of the rivet set and in which the nozzle of the magazine lightly engages its rear face, the screws 45 providing pivot points located along a transverse line which intersects the axis of the rivet set.

Referring to Figure 2, it will be noted that the tail-piece 29 on the plunger 28 is normally held in spaced relation with respect to the valve-operating finger 24, thereby providing a lost-motion connection between the two. Hence when the trigger-like control element 10 is moved rearwardly it travels a predetermined distance before its movement is transmitted to the valve 18. In accordance with the invention the initial part of the rearward travel of the control element is transmitted by the plunger 28 and the link 47 to the tongue 43, thereby to retract the latter from in front of the rivet set before the valve 18 is opened to actuate the rivet set. The parts are so designed that as the tongue approaches the limit

of its retractive movement the tip thereof is located against, or in close proximity to, the nozzle 37. The tip of the tongue is slotted, as indicated at 48, the width of the slot being slightly greater than the diameter of the shanks of the rivets and the edges of the slot being beveled as at 49. Hence as the tongue moves to the retracted position described, the compressed air acting against the column of rivets in the magazine causes the shank of the leading rivet to be projected through the slot 48, in which position the head of the rivet is substantially flush with the inner face of the tongue. When the control element 10 is released and the spring 31 returns the plunger 28 to its normal position, the tongue 43 is also restored to its normal position, the rivet which has been caused to enter the slot 48 being carried by the tongue to a position in which it is supported in front of, and coaxially with respect to, the rivet set, with the head of the rivet being located in close proximity to the rivet set. In this connection it will be noted that the longitudinal axis of the path of movement of the tongue 43 is in the major plane of the gun and intersects, and terminates at, the axis of the rivet set. This has the advantage that the rivet supported in front of the rivet set can be clearly seen by the operator without necessitating the gun to be held unnaturally. Preferably the working face of the rivet set is convex as shown in order to permit close working cooperation between the tongue and the rivet set as the former moves in its arcuate path of travel.

The rivet which is caused to enter the slot 48 in the manner described is releasably held therein by spring fingers 50. The latter are secured to the tongue 43 by a screw 50a and have free ends which are engageable with the head of the rivet, as best shown in Figure 4. In this connection it will be noted that when the tongue 43 is moved to its retracted position to receive a rivet the tips of the fingers engage the nozzle 37 and are spread apart, as shown in Figure 5, to permit the rivet to enter the slot 48, transversely extending guide grooves 51 being formed in opposite sides of the nozzle for the fingers 50. As the tongue begins its return movement toward its normal position, the walls of the guide grooves release the ends of the fingers 50 and the latter move over and engage the head of the rivet to hold the rivet in the slot with its shank extended.

In the use of the gun, assuming a rivet to be held in the proper position in front of the rivet set, the gun may be manipulated to insert the shank of the rivet through the aligned holes in the parts 52 (Figure 2) which are to be riveted together. After the rivet has been inserted in the aligned holes, the control element 10 is drawn toward the handle of the gun. During the initial part of such movement the tongue 43 releases the rivet and moves out of the zone of action of the rivet set toward a rivet receiving position. During the final part of the movement of the control element 10 toward the handle of the gun, the finger 24 is actuated to open the valve 18. The rivet set is thereupon actuated to upset the rivet which has been presented to the work in the manner described, the gun having been advanced slightly to engage the rivet as soon as the tongue 43 has been moved out of the zone of action of the rivet set. At the same time compressed air having been introduced into the rivet magazine, the leading rivet is biased against the inner side of the tongue, the tongue sliding under the end of the shank of the rivet until the slotted tip moves into registration with the nozzle.

Thereupon the said rivet will be caused to enter the slot in the tongue. Hence when the control element **10** is released upon completion of the upsetting operation and the tongue is returned to its normal position the rivet will be automatically carried to a position in front of the rivet set, the screw **50***a* engaging the nozzle **37** to arrest the tongue **43** as the rivet reaches such position.

It will thus be apparent that the rivets from the magazine **35** are fed to, and are releasably held in, positions in which they may be properly presented to the work as the tool is moved to a position in which the rivet set is to be actuated. In other words the movement of the gun to a riveting position is utilized for insertion of the rivet to be acted upon at such position. As additional or special movements of the gun for the purpose of inserting the rivets are avoided, fatigue of the operator is minimized. Moreover, as the operator does not have to employ one hand in placing the rivets, he may hold the gun in both hands at all times, grasping the handle in one hand and directing the barrel with the other.

The magazine **35** may be loaded and reloaded in any desired manner. One way that this may be accomplished conveniently and rapidly is with the aid of the loading tube **53** illustrated in Figures 8 and 9. The said tube is closed at one end and open at the other and is adapted to accommodate a column of the rivets **36**. The rivets are held in the tube by a spring **54**. A number of closely spaced turns of the latter fit around the tube and support a loop **55** across the open end of the tube, a notch **56** in the side wall of the tube holding the loop **55** so that it will be positioned in the path of the rivets.

The gun may be loaded by inserting the open end of the loading tube in the sleeve-like body **57** of the cap-piece **41** as illustrated in Figure 9. As the loading tube enters the body **57**, the spring-loaded plug **42** is moved aside while the loop **55** of the spring **54** is moved out of the path of the rivets by the sleeve-like body of the cap-piece, thereby permitting the rivets in the loading tube to enter the magazine. As the loading tube is withdrawn after the loading operation, the spring-loaded plug **42** returns to its original position to close the outer end of the magazine while the loop **55** of the spring **54** reenters the slot in the wall of the loading tube.

I claim as my invention:

1. The combination with a tool having a pneumatically-operated rivet set and an element for controlling the operation of said rivet set, of a rivet magazine, means for transferring a rivet from said magazine to, and for temporarily holding it in, a predetermined relation with respect to said rivet set, whereby said tool may be manipulated to present said rivet to the work, means including a valve for introducing compressed air into said magazine to feed rivets from the latter to said transferring and holding means, and means including said element for withdrawing said transferring and holding means to release said rivet prior to the actuation of said rivet set, said element being operative to open said valve as it is actuated to operate said rivet set.

2. The combination with a tool having a pneumatically-operated rivet set, of a rivet magazine, a member for receiving a rivet from said magazine and for transferring it from the latter to, and for temporarily holding it in, a position in front of said rivet set, whereby the tool may be manipulated to present said rivet to the work,

a passage through which compressed air may be introduced into said magazine to feed rivets from the latter to said member, a valve for controlling the flow of air through said passage, and means including a control element for first withdrawing said member from in front of said rivet set to release said rivet and for thereafter actuating said rivet set and opening said valve, said member being thereby moved to a position to receive a second rivet from said magazine.

3. The combination with a tool having a pneumatically-operated rivet set, of a rivet magazine, a member for receiving a rivet from said magazine and for transferring it from the latter to, and for temporarily holding it in, a position in front of said rivet set, whereby said tool may be manipulated to present said rivet to the work, a passage through which compressed air may be introduced into said magazine to feed rivets from the latter to said member, a valve for controlling the flow of air through said passage, means including a manually-operable control element for first withdrawing said member from in front of said rivet set to release said rivet and for thereafter actuating said rivet set and opening said valve, said member being thereby moved to a position to receive a second rivet from said magazine, and means which is automatically operative upon the release of said control element to restore said member to its original position and in so doing to advance said second rivet to the position originally occupied by the first.

4. The combination with a tool having a barrel and a rivet set, of a magazine for accommodating rivets in end-to-end relation, said magazine having a nozzle through which said rivets may be discharged shank foremost, an arcuate member pivotally mounted on said barrel and formed with a slot, said member being movable to one position in which a rivet from said magazine may be caused to enter said slot and being movable to a second position to transfer said rivet to, and temporarily hold it in, a predetermined relation with respect to said rivet set, whereby said tool may be manipulated to present said rivet to the work, means including a control element for first actuating said member to release said rivet and for thereafter actuating said rivet set, said member being thereby moved to a position to receive a second rivet from said magazine, and means which is automatically operative upon the release of said control element to restore said member to its original position and in so doing to advance said second rivet to the position originally occupied by the first.

5. The combination with a tool having a barrel and a rivet set, of a magazine for accommodating rivets in end-to-end relation, said magazine having a nozzle through which said rivets may be discharged shank foremost, an arcuate member pivotally mounted on said barrel and formed with a slot, said member being movable to one position in which a rivet from said magazine may be caused to enter said slot and being movable to a second position to transfer said rivet to, and temporarily hold it in, a predetermined relation with respect to said rivet set, whereby said tool may be manipulated to present said rivet to the work, a passage through which compressed air may flow to said magazine to feed rivets from the latter to said member, a normally closed valve for controlling the flow of compressed air through said passage, means including a control element for first actuating said

member to release said rivet and for thereafter actuating said rivet set and opening said valve, said member being thereby moved to a position to receive a second rivet from said magazine, and means which is automatically operative upon the release of said control element to restore said member to its original position and in so doing to advance said second rivet to the position originally occupied by the first.

6. The combination with a tool having a barrel and a rivet set, of a magazine for accommodating rivets in end-to-end relation, said magazine having a nozzle through which said rivets may be discharged shank foremost, an arcuate member pivotally mounted on said barrel and formed with an open slot, said member being movable to one position in which a rivet from said magazine may be caused to enter said slot and being movable to a second position to transfer said rivet to, and temporarily hold it in, a predetermined relation with respect to said rivet set, whereby said tool may be manipulated to present said rivet to the work, a resilient finger for releasably holding said rivet in said slot, means for moving said finger aside as said member moves to said first mentioned position and for permitting said finger to engage said rivet as said member begins its movement toward said second mentioned position, means including a control element for first actuating said member to release said rivet and for thereafter actuating said rivet set, said member being thereby moved to a position to receive a second rivet from said magazine, and means which is automatically operative upon the release of said control element to restore said member to its original position and in so doing to advance said second rivet to the position originally occupied by the first.

7. The combination with a tool having a barrel and a rivet set, of a magazine for accommodating rivets in end-to-end relation, said magazine having a nozzle through which said rivets may be discharged shank foremost, an arcuate member pivotally mounted on said barrel and formed with an open slot, said member being movable to one position in which a rivet from said magazine may be caused to enter said slot and being movable to a second position to transfer said rivet to, and temporarily hold it in, a predetermined relation with respect to said rivet set, whereby said tool may be manipulated to present said rivet to the work, a resilient finger for releasably holding said rivet in said slot, means for moving said finger aside as said member moves to said first mentioned position and for permitting said finger to engage said rivet as said member begins its movement toward said second mentioned position, a passage through which compressed air may flow to said magazine to feed rivets from the latter to said member, a normally closed valve for controlling the flow of compressed air through said passage, means including a control element for first actuating said member to release said rivet and for thereafter actuating said rivet set and opening said valve, said member being thereby moved to a position to receive a second rivet from said magazine, and means which is automatically operative upon the release of said control element to restore said member to its original position and in so doing to advance said second rivet to the position originally occupied by the first.

8. The combination with a tool having a barrel and a rivet set, of a magazine for accommodating rivets in end-to-end relation, said magazine having a nozzle through which said rivets may be discharged shank foremost, an arcuate member pivotally mounted on said barrel and formed with an open slot, said member being movable to one position in which a rivet from said magazine may be caused to enter said slot and being movable to a second position to transfer said rivet to, and temporarily hold it in, a predetermined relation with respect to said rivet set, whereby said tool may be manipulated to present said rivet to the work, a resilient finger which is engageable with the head of said rivet releasably to hold the latter in said slot, said nozzle being operative to move said finger aside as said member moves to said first mentioned position and permitting said finger to engage said rivet as said member begins its movement toward said second mentioned position, means including a control element for first actuating said member to release said rivet and for thereafter actuating said rivet set, said member being thereby moved to a position to receive a second rivet from said magazine, and means which is automatically operative upon the release of said control element to restore said member to its original position and in so doing to advance said second rivet to the position originally occupied by the first.

9. The combination of a rivet gun having a pneumatically operated reciprocable hammer, an air-control trigger movable between "off" and "on" positions for operating said hammer, a rivet magazine, a rivet carrier mounted on said gun and movable between rivet-receiving and rivet-inserting positions, means for supplying air to said magazine whereby to urge rivets contained therein towards said rivet carrier, and means connected to said carrier and operated by said trigger for moving said carrier to its rivet-receiving position when said trigger is moved to its "on" position and to its rivet-inserting position when said trigger is moved to its "off" position.

10. The combination of a rivet gun having a pneumatically operated reciprocable hammer, an air-control trigger movable between "off" and "on" positions for operating said hammer, a rivet magazine, a rivet carrier mounted on said gun and movable between rivet-receiving and rivet-inserting positions, a shield connected to said carrier and arranged to prevent ejection of rivets from said magazine in all positions of said carrier except the rivet-receiving position, means for supplying air to said magazine whereby to urge rivets contained therein towards said rivet carrier, and means connected to said carrier and operated by said trigger for moving said carrier to its rivet-receiving position when said trigger is moved to its "on" position and to its rivet-inserting position when said trigger is moved to its "off" position.

11. In a tool having a pneumatically operated rivet set, an element for controlling the operation of said rivet set, a rivet magazine, means for transferring a rivet from said magazine to, and for temporarily holding it in, a predetermined relation with respect to said rivet set, whereby said tool may be manipulated to present said rivet to the work, means operated by said control element for introducing compressed air into said magazine to feed rivets from the latter to said transferring and holding means, and means operated by said control element for withdrawing said transferring and holding means to release said rivet prior to the actuation of said rivet set.

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