

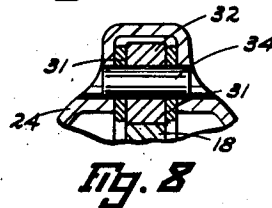
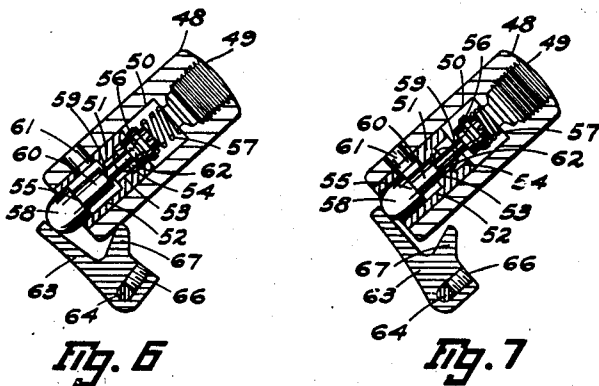
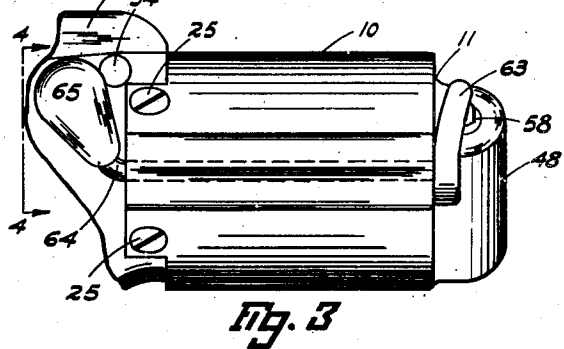
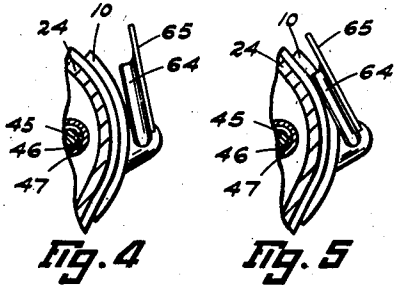
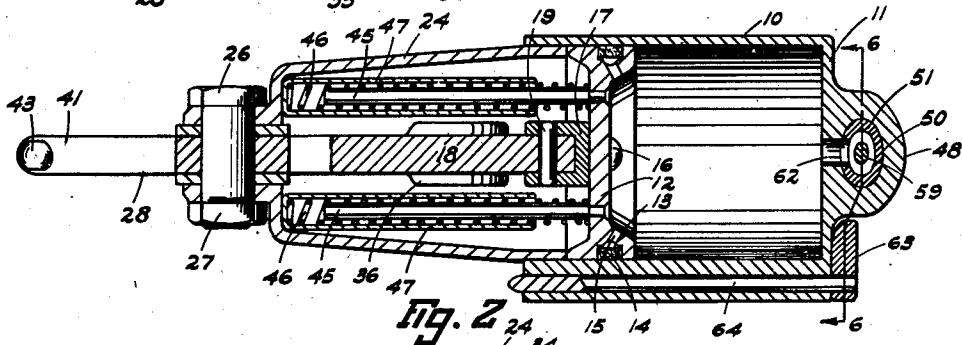
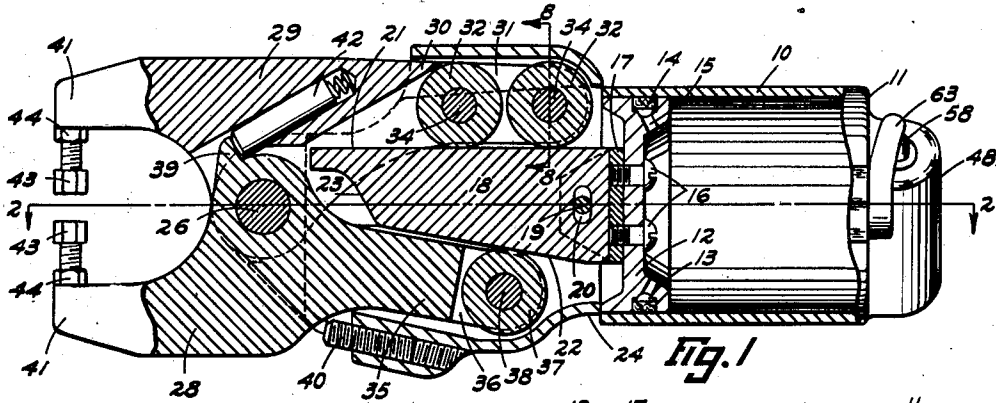
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PORTABLE TOOL

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PORTABLE TOOL

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2 Claims. (Cl. 78—48)

This invention relates broadly to air actuated riveters or squeezers, but more particularly to an improved manual control of the throttle valve thereof.

One object of this invention is to provide a pneumatic rivet squeezer with a main housing forming a convenient hand grip by which the tool can be grasped and held to the work with a minimum of effort and fatigue to the operator.

Another object of this invention is to produce such tool with manually valve controlling means located at a place readily accessible to the operator when normally grasping and holding the tool to the work.

Another object of this invention is to produce an improved fluid actuated tool of a size and shape adapted to fit comfortably in the hand of the operator and provided with a fluid connection and throttle valve located in a manner calculated not to interfere with the comfortable and natural holding of the tool by the operator.

Other objects and advantages more or less ancillary to the foregoing reside in the specific construction and aggroupment of the elements peculiar to this structure, as will become apparent from a more complete examination of this specification.

In the drawing:

Fig. 1 is a longitudinal view mostly in section of a fluid actuated rivet squeezer embodying the invention.

Fig. 2 is a longitudinal sectional view taken in a plane indicated by line 2—2 in Fig. 1.

Fig. 3 is a side elevational view of the body portion of the tool illustrating the hand operated trigger associated with the throttle valve for controlling inlet of motive fluid to the tool.

Figs. 4 and 5 are views looking in the direction of the arrows 4—4 in Fig. 3 and illustrating the throttle valve trigger in different positions.

Figs. 6 and 7 are cross sectional views taken on a plane indicated by line 6—6 in Fig. 2 and illustrating parts in different positions.

Fig. 8 is a cross sectional view taken in a plane indicated by line 8—8 in Fig. 1.

Referring to the drawing which illustrates a preferred form of the invention, 10 represents a cylinder or power housing having a closed end 11. Within the housing is reciprocally mounted a piston 12 formed with a peripheral groove 13 accommodating a packing ring 14. The groove 13 is in constant communication with the interior of the cylinder 10 through a plurality of piston-ports 15. Centrally mounted on the side of the piston 12 remote from the closed end 11 of the

housing 10, there is a forked block 17 secured in position by cap screws 16, within which block is mounted the large end of a wedge 18 extending longitudinally from the piston 12. This wedge is secured to the block 17 against axial movement relative thereto by a cross pin 19 carried by the block 17 and extending through a laterally elongated slot 20 provided within the large end of the wedge 18. The wedge has one side 21 substantially parallel to the center axis of the cylinder 10, while the opposite side 22 of the wedge tapers toward the free end thereof where it is terminated by a sharp incline 23.

Extending longitudinally from the open end of the cylindrical housing 10, there is a housing extension 24 secured to the cylinder housing by cap screws 25. The free outer end of this extension is properly shaped to form a clevis through which extends a bolt 26 secured in position by a nut 27, on which bolt is pivotally mounted a lower jaw 28 and upper jaw 29, the latter being shaped to straddle the former on the bolt 26. The upper jaw 29 is provided with a tail end portion 30 extending into the housing projection 24 above the wedge 18 where it is slotted as at 31 to accommodate two rollers 32 operatively mounted on cross pins 34 extending through the housing extension 24 and the tail portion 30 of the jaw 29 as clearly shown in Fig. 8. Like the jaw 29, the lower jaw 28 is provided with a tail portion 35 also extending in the housing projection 24 and having the extreme end thereof slotted as at 36, within which slot is disposed a roller 37 operatively mounted on a cross pin 38 carried by the tail portion 35. Slidably carried by the upper jaw 29, there is a spring pressed plunger 42 active on a lug 39 formed on the lower jaw 28 adjacent the cross shaft 26, through which plunger pressure is exerted on the inclined side 22 of the wedge 18 by the roller 37. Due to the laterally elongated slot 20 through which passes the cross pin 19, the wedge 18 is free to move laterally relative to the piston 12. Upon the pressure exerted on its side 22 by the roller 37, the wedge 18 will be moved and maintained in operative engagement of its side 21 with the rollers 32. An adjustable stop in the form of a set screw 40 carried by the housing extension 24 below the jaw 28 and engageable with the latter, limits the opening movement of the jaw or more particularly the inward movement of its roller 37. The jaws 28 and 29 are each provided with a terminal portion 41 diametrically opposed to each other and carrying an adjustable die 43 extending toward each other and securable in position by a lock nut 44.

Carried by the piston 12 and extending longitudinally therefrom one on each side of the wedge 18, there are two rods 45 each acting as a guide for a compression spring 46 which has one end seated on the piston 12, while the other end rests on the bottom of a guide tube 47 carried by the housing extension 24 adjacent the shaft 26.

Formed integral with the closed end 11 of the cylinder housing 10, there is a boss 48 extending transversally thereof and having its lower end in Figs. 1 and 3 formed with a screw threaded bore 49 adapted to receive one end of a fluid conveying conduit, not shown. The boss 48, although preferably an integral part of the housing 10, is so designed that its upper end terminates below the periphery of said housing so as to enable convenient gripping thereof when holding the tool to the work. The bore 49 opens into a flat bottom bore 50 extending axially therefrom through the boss 48 and within the front portion of which is pressed a bushing 51 formed with three differential inner diameters 52, 53 and 54, the diameter 54 being adjacent to the inner end of the bore 50. Slidable within the bushing 51 there is a throttle valve generally designated by 55 having a head 56 adapted to seat on the inner end of the bushing 51 for closing the bushing from the threaded bore 49. This throttle valve is constantly urged into closed position of its head relative to the bushing 51 by a compression spring 57 interposed between the head 56 and the flat bottom of the bore 50. The other end of the valve 55 is provided with a knob 58 protruding from the boss 48 and slidably mounted within the bore 52 of the bushing 51. The knob 58 is united to the head 56 by a reduced stem 59 having adjacent the knob 58 an enlarged portion 60 fitting within the bore 53 of the bushing 51. Leading from the inner end of the bore 52 below the knob 58 of the valve 55, there is an exhaust port 61 opening to the atmosphere. A port 62 opens from the interior of the cylinder 10 through the closed end 11 into the bushing 51 below the enlarged portion 60 of the stem 59 and always opened relative to the head 56 of the valve 55.

Active on the knob 58 of the throttle valve 55, there is a latch 63 carried by a rod 64 which extends longitudinally therefrom through the side wall of the housing cylinder 10 and is terminated outside of the cylinder 10 and above the cylinder extension 24 with a trigger or thumb plate 65, located in a manner calculated to receive the thumb of the operator when normally holding the tool to the work. In practice the thumb plate or trigger 65 is preferably made an integral part of the rod 64, while the latch 63 is detachably secured on the rod 64 by any suitable means such as a set screw 66. The latch 63 also has depending therefrom a lug 67 engageable with the boss 48 for limiting pivotal movement of the latch away from the valve 55.

The operation of the tool is as follows: Assuming that the piston 12 is located at the inner end of the cylinder housing 10, that is, in the position shown in Figs. 1 and 2, and that motive fluid is admitted into the threaded bore 49 from any source of supply to normally cooperate with the spring 57 for holding the throttle valve 55 in closed position as shown in Fig. 6. In this instance, the cylinder 10 is in communication with the atmosphere through the port 62, the bore 53 of the bushing 51 and the exhaust port 61, thereby venting the cylinder and enabling the return of the piston 12 toward the closed end 11 by means of the compression

springs 46 active on the piston 12. During this return stroke of the piston, the wedge 18 will slide between the rollers 32 and 37 to afford opening movement of the jaws 28 and 29 through the action of the spring pressed plunger 42 on the lug 39 of the jaw 28.

When it is desired to effect the closing movement of the jaws 28 and 29 or more particularly the movement of the dies 43 toward each other to perform the work, the throttle valve 55 may be pressed inwardly into open position by the operator exerting pressure on the trigger 65, thus causing pivotal movement of the rod 65 and of the latch 63 in a clockwise direction in Figs. 6 and 7 and the consequential inward movement of the valve 55 against the action of the compression spring 57. In this instance, the exhaust port 61 is cut off from the port 62 by the enlarged portion 60 of the valve stem 59 which fits closely within the bore 53 of the bushing 61. Concurrently, the port 62 is brought in communication with the inner end of the bore 50 by the valve head 56 now spaced from the bushing 51, thereby enabling the flow of motive fluid from the bore 49 into the port 62 and therefrom into the cylinder 10 to act on the piston 12. Under the action of the motive fluid the piston will be driven forwardly or away from the closed end 11 of the cylinder 10 causing corresponding motion to the wedge 18 for effecting closing movement of the jaws through the engagement of the roller 37 with the inclined side 22 of the wedge 18. During this working stroke of the piston the motive fluid will also be admitted in the groove 13 through the ports 15 for acting on the packing ring 14 to assure a fluid tight joint between the piston and the inner wall of the cylinder housing 10. The working stroke of the piston is limited by its engagement with the inner end of the housing extension 24 located within the corresponding end of the cylinder 10, as clearly shown in Fig. 2.

From the foregoing, it will be understood that the cylinder housing 10 located at the rear of the operating jaws 28 and 29 forms a handle grip adapted to fit comfortably in the hand of the operator and that the throttle valve operating trigger 65 is conveniently located to receive the thumb of the operator without necessitating his relinquishing the grip of the tool. The throttle valve 55 within the boss 48 which forms an integral part of the closed end 11, is located away from the operator's hand, thereby preventing the fluid conveying conduit connected to the housing by means of the threaded bore 49 to interfere with the operator's hand. The improved rivet squeezer above described forms a compact and efficient tool adapted to be held and operated by one hand, leaving the other one free to perform related tasks.

Although the foregoing description is necessarily of a detailed character, in order to be understood that the specific terminology is not intended to be restrictive or confining and it is to be further understood that various rearrangements of parts and modifications of structural detail may be resorted to without departing from the scope or spirit of the invention as herein claimed.

I claim:

1. A portable fluid actuated tool including an elongated power housing forming a handle grip for the operator to hold the tool to the work.

fluid pressure responsive means within said power housing, jaws extending longitudinally from the front end of said housing operable by said fluid pressure responsive means, a throttle valve slidable within the rear end wall of said housing, 5 a manually operable trigger near the front end of said housing positioned to be operated comfortably by the thumb of the hand of the operator while normally holding the tool to the work, and means including a rod leading from said 10 trigger along said housing to said throttle valve and rotatable by depressing said trigger for operating the throttle valve to actuate said fluid pressure responsive means.

2. In a portable fluid actuated tool including 15 an elongated housing forming a handle adapted

to be gripped by one hand of the operator, a boss at the rear of said housing, a spring pressed throttle valve in said boss, a manually operable trigger near the front end of said housing positioned to be operated comfortably by the thumb of the operator's said hand, an oscillatable rod leading from said trigger to the rear of the housing, and an operating member on the rear end of said rod having two angularly related 10 surfaces, one for engagement with said valve to shift the latter against the action of its spring and the other for engagement with said boss to limit the movement of said rod and trigger away from operating position.

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