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PNEUMATIC RIVET SQUEEZER

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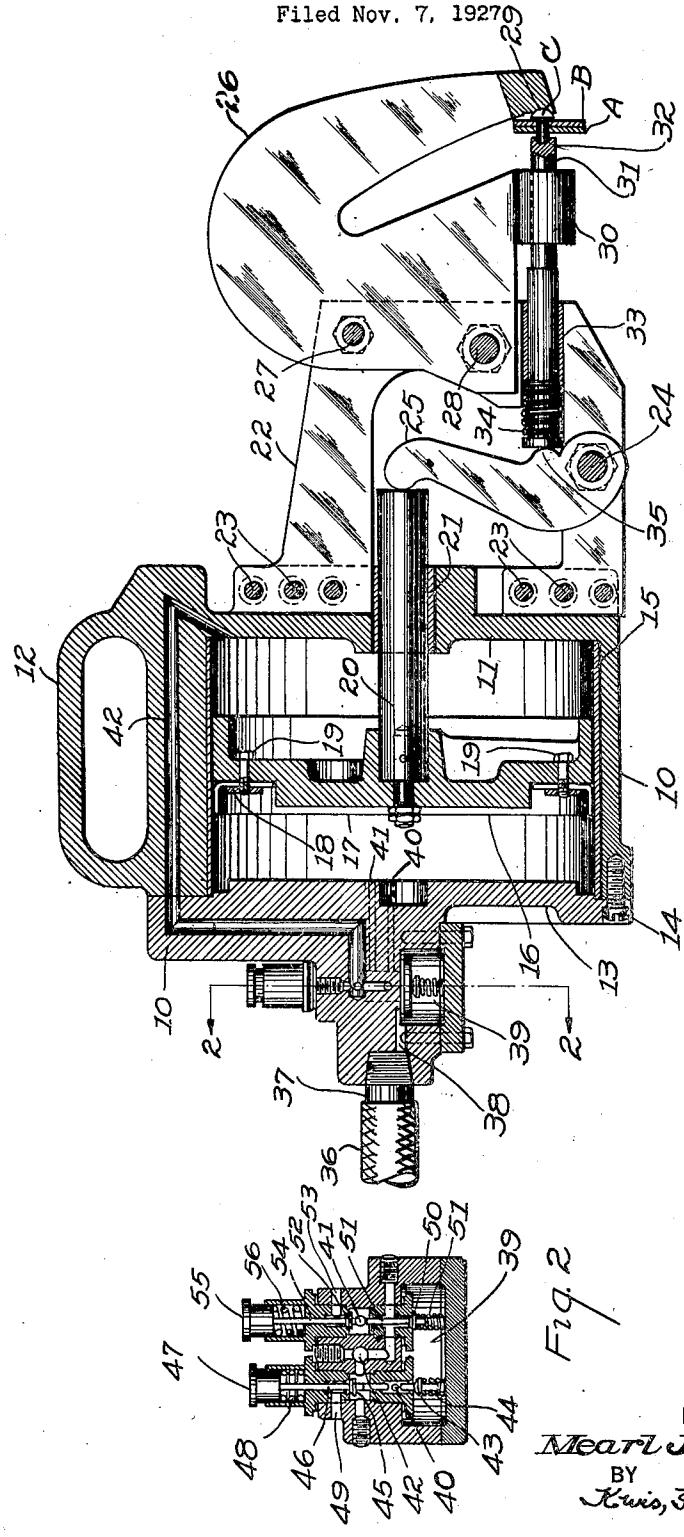

Fig. 1

Fig. 2

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PNEUMATIC RIVET SQUEEZER

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This invention relates to improvements in pneumatic rivet squeezers, that is pneumatically operated tools for setting rivets by steady pressure as distinguished from a series of hammer blows.

One of the objects of the invention is the provision of means for exerting a heavy pressure, continuously for a short time, in a comparatively small hand tool, particularly a riveting tool.

Another object is the provision of pneumatic means for positively moving the piston of the tool in either direction.

Another object is the provision of control means bringing about the exhaust of power fluid from either side of the piston in advance of the admission of power fluid to the other side thereof.

Still another object is a particular arrangement of valves and valve-operating means for accomplishing the control just mentioned.

Other objects and features of novelty will appear as I proceed with the description of that embodiment of the invention which, for the purposes of the present application, I have illustrated in the accompanying drawing, in which

Fig. 1 is a central longitudinal sectional view of a riveting tool embodying the invention; and

Fig. 2 is a cross sectional view taken substantially on line 2—2 Fig. 1.

In the drawing, the body of the tool is shown at 10 with an integral end wall 11 and a handle 12. The opposite end wall 13 is removably held in position by screws 14 or the like. The cylindrical wall of the body member may have a metal liner 15, within which is mounted to slide a piston 16. The latter is preferably provided with a leather or washer 17 which is retained in position by means of a metal ring 18 and a series of cap screws 19. At the center, the piston 16 is attached to a plunger 20 which slides in a bushing 21 in the forward wall of the tool body.

A U-shaped extension 22 is secured to the body of the tool by means of bolts or rivets 23 and projects forwardly, parallel to the plunger 20. This extension carries a trunnion 24 upon which is fulcrumed a lever 25, the free end of which is rounded and engaged by the plunger 20. A yoke 26 is removably supported upon the extension 22, being held in place by bolts 27 and 28, thus permitting interchange with yokes of different sizes and shapes. The forward jaw of the yoke has formed therein a concavity 29 adapted to fit the head of a rivet.

The rear jaw includes an integral sleeve 30 constituting a slide bearing for a riveting tool 31, the working end of which has a second concavity 32 for forming a second head upon the rivet. The shank of the tool 31 slides in a bushing 33 that is also mounted in the extension 22, the bushing 33 and the sleeve 30 being in alignment with each other and parallel with the bushing 21. The rear end of the tool 31 is provided with a head against which bears a coil spring 34 that surrounds the tool and abuts at its forward end against the bushing 33, thereby tending to retract the tool. On the lever 25 near the trunnion 24 there is a projecting portion 35 with a curved face which engages the rear end of tool 31.

Motive fluid for the operation of the tool is conducted thereto by a flexible hose 36, which is attached by means of a connector 37 to a valve housing formed in a rearwardly extending enlargement of the end wall 13. This housing contains a passage 38 through which motive fluid is admitted to a pressure chamber 39 at the bottom of the housing. From the valve housing an intake passage 40 leads to the rear end of the power cylinder and an exhaust passage 41 extends therefrom back to the valve housing. Between the latter and the forward end of the cylinder there is a passage 42 which serves for both intake and exhaust, as will presently appear.

The passage 40 is normally closed by a valve 43 which is urged upwardly towards its seat by a coil spring 44. Above the valve 43 and in alignment therewith is a valve 45 having a stem 46 to the upper end of which is attached a control button 47. This valve is urged upwardly towards its seat by a coil spring 48 beneath the control button 47. Opening the valve 45 connects passage 42

with the atmosphere through a port 49. Further pressure on the button 47 causes an extension on the valve 45 to engage the stem of valve 43 and depress the same, whereby these two valves may be opened consecutively by a single operation. A valve 50 urged to its seat by a coil spring 51, when opened, permits motive fluid to flow from chamber 39 into passage 42. Valve 50 has a relatively long stem 51. In alignment with stem 51 there is an upper valve 52 which may be opened to connect passage 41 with the atmosphere through a port 53. The valve 52 has a stem 54 to the upper end of which is attached a button 55, the latter being urged upwardly by a coil spring 56.

Operation.—In connection with the device as illustrated in Fig. 1, I have shown fragments of two sheets of metal or other material A and B to be joined, and a rivet C inserted into aligned holes in the sheets A and B. The device is placed in position with the concavity 29 over the original head of the rivet, the tool 31 being in a retracted position due to the action of spring 34. The operator then presses upon button 47, opening valve 45, whereby motive fluid is permitted to exhaust from the forward end of the cylinder through passage 42, valve 45 and port 49. Pressing the button 47 further down causes the extension of valve 45 to engage the stem of valve 43, opening the same and thereby setting up communication between the pressure chamber 39 and the passage 40 to the rear end of the cylinder. The piston 16 then moves forward carrying with it the plunger 20 and rocking lever 25 on its fulcrum 24. The projection 35 is thus caused to exert relatively high pressure upon the rear end of tool 31, and the concavity 32 therein upsets the metal of the rear end of the rivet, forming a second head and clamping the sheets A and B closely together. The operator then takes his finger off the button 47, and the springs 44 and 48 immediately close the valves 43 and 45, respectively. Now in order to retract the plunger 20 and permit the spring 34 to return the tool 31 to inoperative position, the operator presses upon button 55, the first result of his action being to permit the motive fluid behind the piston 16 to exhaust through passage 41, valve 52 and port 53. Further pressure on the button 55 causes a short extension on valve 52 to engage stem 51 of valve 50 and open the latter, whereupon motive fluid passes from pressure chamber 39 through valve 50 and passage 42 into the forward end of the cylinder to slide the piston 16 rearwardly. Lever 25 and tool 31 follow the rearward movement of plunger 20, and the device is then ready to be moved along for the next riveting operation.

Having thus described my invention, I claim:

In a rivet squeezer, a body forming a motor and having a plunger projecting therefrom adapted to reciprocate in a straight line, an extension on said body substantially in line with said plunger, a riveting tool slidably suported by said extension, a lever pivotally mounted on said extension for transmitting movement of said plunger to said tool, a spring connected to a portion of said tool and arranged to maintain the latter in engagement with said lever and said lever in engagement with said plunger, and a yoke member secured to said extension and supporting an abutment in line with said tool.

In testimony whereof, I hereunto affix my signature.

MEARL J. CHAPMAN.