

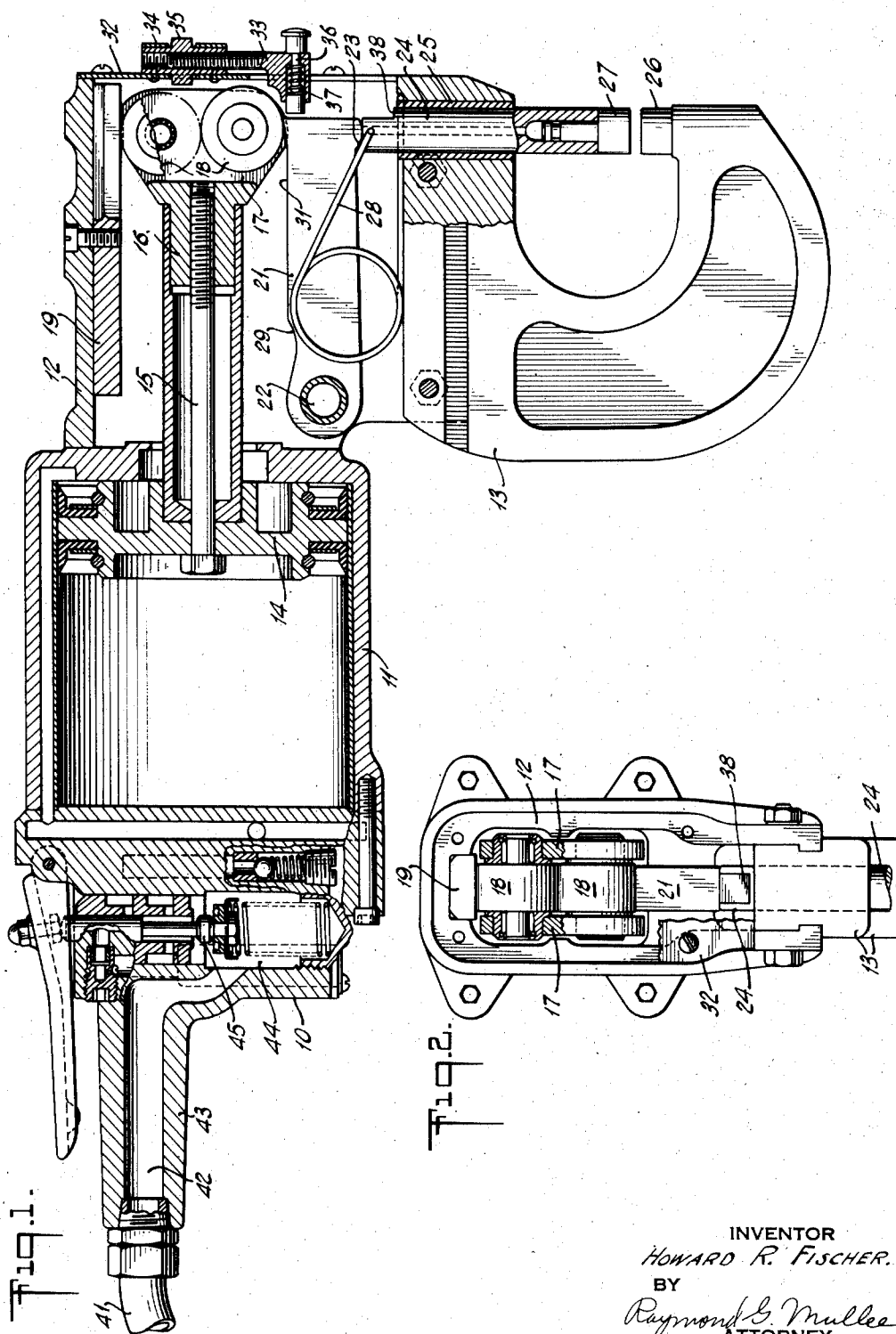
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COMPRESSION RIVETER ADJUSTABLE STOP MEANS

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COMPRESSION RIVETER ADJUSTABLE
STOP MEANSHoward R. Fischer, Detroit, Mich., assignor to
Chicago Pneumatic Tool Company, New York,
N. Y., a corporation of New JerseyOriginal application August 2, 1940, Serial No.
349,820. Divided and this application January
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1 Claim. (Cl. 74-526)

1

This invention relates generally to fluid operated presses for performing riveting and similar operations and more particularly to a return stroke adjuster for controlling the extent of separation between the complementary dies on the working jaws during the interval between successive power strokes. This application is a division of parent application Serial No. 349,820, filed August 2, 1940, which is now Patent No. 2,389,661, granted November 27, 1945.

In a device of the class to which the present invention relates a working plunger is moved toward and away from a stationary die, or through a single cycle of operation. The plunger is forced toward the stationary die by a power piston, acting either directly on the plunger or through intermediate pressure multiplying and transmitting elements, while any yielding means may be used to return the plunger. The power piston reciprocates within a cylinder, constructed as an integral part of the tool assembly or located remotely therefrom, and movement of the piston is effected by pressure fluid directed to alternate ends of the cylinder at opposite sides of the piston head. The means for controlling the flow of pressure fluid to the power cylinder is not described in detail in this case as it is covered by the parent application aforesaid.

An object of the present invention is to limit the separation of the working dies to such space as may be necessary for insertion and removal of the work pieces, and thereby enable the operator more quickly and accurately to apply the tool to the rivets.

Another object is to permit the clearance space between the dies or jaws to be regulated by a simple adjustment. Accordingly, a feature of the invention is a return stroke regulator comprising a stop element adjustably positioned for intercepting movement of the working plunger away from the stationary jaw, and adapted to be disabled at will to permit the plunger to complete a return stroke when desired.

Other objects and structural details of the invention will be more apparent from the following description when read in conjunction with the accompanying drawing, wherein:

Fig. 1 is a view, partly in longitudinal section and partly in side elevation of a riveting tool embodying the structure and mechanism of the present invention and including an adjustable mechanism for limiting the movement of the working plunger away from the stationary die; and

2

Fig. 2 is a front end view of the tool shown in Fig. 1, with a cover plate removed and the lower end of the stationary yoke broken away.

The invention is shown embodied in a small riveting tool of the type adapted either to be mounted upon a pedestal, for use as a fixed machine, or held in the hands of the operator, for use as a portable tool. The tool is, further, of the class embodying rivet set mechanism, power mechanism and operating controls in a single unitary structure, connected by a pressure fluid conducting hose line to a source of power.

Referring to Fig. 1, the tool comprises several cooperating sections or sub-units including a head 10 and a cylinder 11, intermediate the head 10 and an end portion, or casing, 12 to which is secured a yoke 13. Within the head 10 are pressure fluid passages and control valves, while within the cylinder 11 is a piston 14 having a rod 15 secured thereto and extending through one end of the cylinder into the end portion 12. Fixed to the outer end of the rod 15 is a plate 16 bifurcated to form a pair of arms 17 (see also Fig. 2) between which are supported a pair of rollers 18. The rollers 18 are arranged one above the other and the upper one engages the lower surface of a guide block 19, fixed within the casing 12, while the lower one engages the upper edge of a lever 21 pivoted on a stud 22 supported between the side walls of casing 12. The lower edge of the lever 21 is formed at its outer end with a projection 23 which overlies the upper end of a downwardly extending plunger or movable jaw 24 movable within a bushing 25 positioned in the upper end of the yoke 13. The lower end of the plunger 24 lies above a die 26 set in the lower jaw of the yoke 13 and the plunger reciprocates vertically in a movement toward and away from the die 26 to complete a single riveting operation. The adjacent ends of the lower die 26 and an upper die 27, within the lower end of the plunger 24, are concave in shape in order that the ends of the rivet may have an even rounded form when headed. A spring 28 mounted within the casing 12, in a manner not herein shown, is connected to the movable jaw or plunger 24 and urges it upward into engagement with the projection 23 on lever 21. Through the plunger 24, the spring 28 acts also to maintain the upper edge of the lever 21 in contact with the lower one of the pair of rollers 18. The upper edge of the lever 21 is formed with a depression 29 near the pivot point 22 and with an inclined surface 31 extending from a point near the depression 29 to the outer end of the lever.

With the piston in retracted position, or in

3

the lefthand end of the cylinder 11 as viewed in Fig. 1, the lower roller 18 takes a position above the depression 29 allowing the lever 21 and plunger 24 to rise from the fully operated position of Fig. 1 to a normal position wherein the dies 26 and 27 are spaced apart a sufficient distance to permit the application of the tool to the next rivet. As the piston 14 moves forwardly, or to the right as viewed in Fig. 1, the rollers 18 pass between the lever 21 and guide block 19 and act as a wedge, moving the lever 21 in a clockwise direction and thereby forcing the plunger 24 downward toward the die 26. At the start of the forward or compression stroke the lower roller 18 rides out of the depression 29 and, in so doing, moves the lever 21 and plunger 24 quickly through the major portion of their travel toward fully operated position. This initial movement of the plunger brings the die 27 into contact with the work and is usually termed the rivet setting portion of the stroke. As the piston 14 continues to move forwardly the lower roller 18 advances along the slightly inclined surface 31 and the plunger 24 is pressed down slowly to the position shown in Fig. 1, completing the rivet heading operation.

The upper edge 31 of the lever 21 is substantially a straight line for the major portion of its length. Toward the front end, however, it has a slight curve, upwardly and forwardly. The shape of the edge 31, which may be determined either empirically or mathematically, is preferably such as to prevent substantial variation in the mechanical advantage, or instantaneous speed ratio, between the primary power piston 14 and the working plunger 24 during the final travel, say, the last one-eighth inch, of plunger 24. As a result, the maximum, or final, riveting pressure will be proportional to the maximum or ultimate cylinder air pressure, notwithstanding variations of, say, one-eighth inch, in the thickness of the plates being riveted together.

The front of the end portion, or casing, 12 is closed by a plate 32, which supports an adjustment means whereby the distance which the dies 26 and 27 are spaced apart in the normal position of the plunger 24 may be varied to compensate for differences in the length of the rivets or the thickness of the sheets being joined. This adjustment means comprises a settable element or member 33 having a stem extending into a bracket 34 secured to the outside surface of the plate 32. A thumb nut 35, supported by the bracket 34 and plate 32, has a threaded engagement with the stem of the element 33 and by manipulation of the thumb nut the settable element may be raised or lowered relatively to the bracket 34. The lower end of the element 33 extends inwardly through a slot in the plate 32 and has mounted therein a plunger 36 pressed, by means of a spring 37, toward the outer end of the lever 21. If it is desired at times to temporarily relieve the settable element 33 from engagement with the plunger 24 without affecting its original setting, the stop plunger 36 contained in the element 33 is withdrawn against the action of its spring 37, whereby the main plunger 24 can pass upwardly beyond the stop plunger 36. The end of the plunger 36 is positioned above a cut-out portion 38 in the upper end of the plunger 24 and is adapted to engage this cut-out portion to

4

limit the movement of the plunger 24 toward normal position. By adjustment of the thumb nut 35 the plunger 36 may be variably set with respect to the cut-out portion 38 to vary the extent of upward movement permitted the plunger 24.

Reciprocation of the piston 14 is effected by introducing pressure fluid into the cylinder 11 at alternate points to the rear and the front of the piston. The pressure fluid, in the present instance compressed air, is directed, by means of a hose line 41, from a source (not shown) to an inlet passage 42 formed in an extension 43 of the head 10, which extension serves as a handle for the tool. The passage 42 opens into a bore 44 in the head 10 and the air flowing into the bore 44 is admitted, under the control of a throttle valve 45, to a compressed air distributing system whereby it is caused, upon actuation of the valve 45, to drive the piston 14 forwardly and, when a predetermined peak pressure is reached within the cylinder 11 in back of the piston 14, to return the piston to normal position. In Fig. 1, the throttle valve 45 is shown in open position and the piston 14 at the end of its compression stroke.

What is claimed is:

In a mechanical movement having a movable member a return stroke adjuster adapted for controlling the extent of movement of the member in successive forward and return strokes, said stroke adjuster comprising a plunger resiliently maintained in a first position to engage the movable member to restrict full return stroke movement thereof and manually operable to a second position which will allow the movable member unrestricted and full return stroke movement, and an axially adjustable means for the mounting of said plunger, said axially adjustable means having a first part, one end of which houses said plunger, the other end of which has an external screw-threaded surface, and a second part comprising a thumb nut which operatively engages said screw-threaded surface and is positionally maintained for rotational movement whereby said first part may be moved in either direction along an axis parallel to the direction of movement of said movable member.

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