Dec. 12, 1944. O. A. PETERS 2,364,750

CONTROL FOR RIVETING DEVICES

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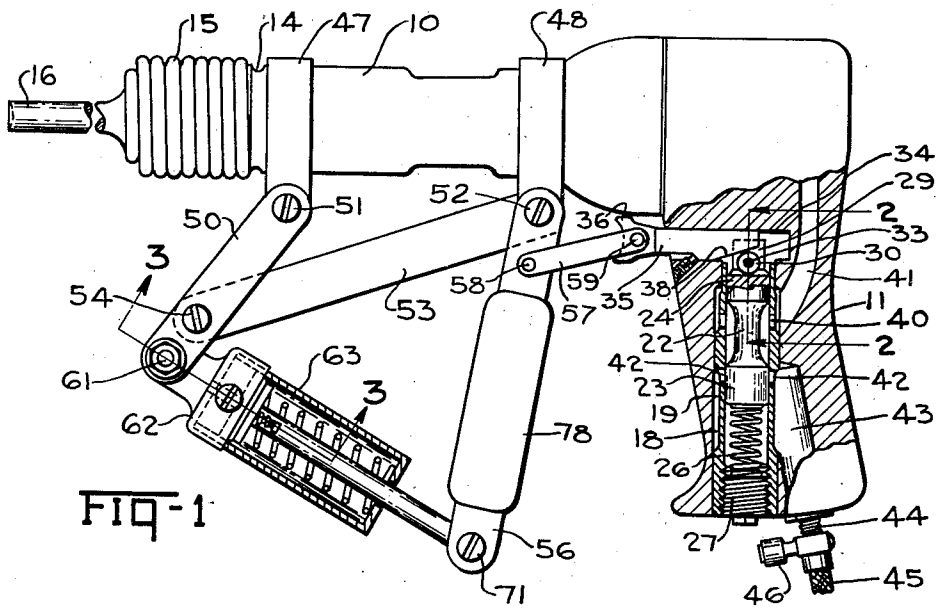


FIG-1

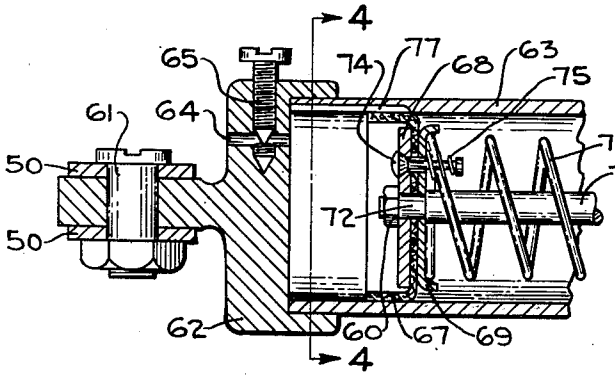


FIG-3

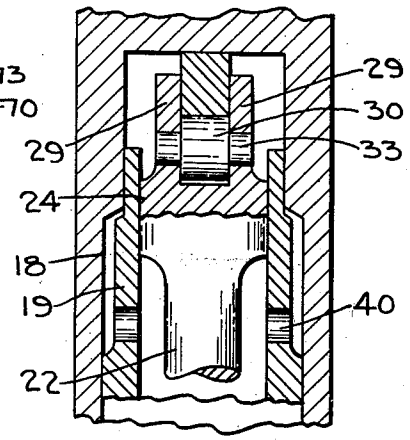


FIG-2

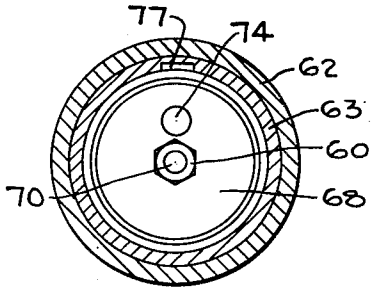


FIG-4

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CONTROL FOR RIVETING DEVICES

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10 Claims. (Cl. 78—48)

This invention relates to improvements in control mechanism for riveting apparatus and more especially to means for pre-determining or timing the duration of each riveting operation.

The invention comprehends the provision of means associated with the control valve mechanism of fluid actuated riveting apparatus whereby successive riveting operations may be of substantially uniform duration.

An object of the invention is the provision of means, set into action by the operator in moving the control valve to actuate the riveting apparatus whereby the valve is automatically closed after a pre-determined lapse of time thus securing uniformity in successive riveting operations.

Another object of the invention is the provision of a simple yet effective means which may be affixed to or associated with conventional riveting devices for controlling or determining the effective strokes of the riveting device occurring in each riveting operation.

Another object resides in a device of this character whereby the period of duration of riveting operations may be regulated.

Still another object of the invention is the provision of control valve damping or delaying means which, when initiated into operation by the operator, automatically determines the length of time that the riveting device is in operation without further act on the part of the operator.

Still a further object is the provision of control means for riveting devices whereby uniformity in successive riveting operations may be attained by unskilled operators and whereby riveting operations of uniform character may be had, thus substantially eliminating spoilage of work.

Further objects and advantages are within the scope of this invention such as relate to the arrangement, operation and function of the related elements of the structure, to various details of construction and to combinations of parts, elements per se, and to economies of manufacture and numerous other features as will be apparent from a consideration of the specification and drawing of a form of the invention, which may be preferred, in which:

Figure 1 is a side elevational view partly in section showing my invention associated with a riveting device;

Figure 2 is an enlarged fragmentary sectional view taken substantially on the line 2—2 of Figure 1;

Figure 3 is a fragmentary detail sectional view taken substantially on the line 3—3 of Figure 1;

Figure 4 is a sectional view taken substantially on the line 4—4 of Figure 3.

While I have shown the arrangement of my invention as used with a riveting device it is to be understood that I contemplate the incorporation of the invention in any arrangement where it may be found to have utility.

Referring to the drawing in detail, there is illustrated a riveting device or gun of the fluid actuated type which is inclusive of a barrel shaped body 10 having a hand grip portion 11. At the forward extremity of body 10 there is provided a peripheral thread or groove 14 upon which is threaded a coil-like member 15 fabricated of spring wire or similar material. The member 15 serves to position and secure at the extremity of the body 10 a riveting die 16, or other tool which may be utilized with the riveting device. The body 10 of the riveting device contains the riveting or actuating hammer and its associated mechanism (not shown) of conventional design which is arranged to be actuated by fluid means, as for example, compressed air.

The grip portion 11 contains valve mechanism for controlling or regulating the flow of compressed air to the mechanism contained in the body 10 of the riveting device. The grip portion 11 is formed with a bore 18 within which is contained a valve cage or sleeve 19. The sleeve is snugly fitted into the bore 18 and frictionally retained therein. Contained within the hollow interior of the sleeve 19 is a reciprocable valve or plunger 22 which is formed with portions 23 and 24 having only sufficient clearance as to be slidably reciprocable with the sleeve. The valve 22 is normally urged to its uppermost position by means of an expansive coil spring 26, the tension on the spring being controllable by adjustment of a plug or abutment 27 threaded into the lower portion of the bore 18.

Formed on the valve member 22 above portion 24 is a pair of projections 29 and arranged between the projections is a roller 30 rotatably mounted upon a suitable pin or stub shaft 33 the latter projecting into aligned openings in the projections 29. The bore 18 at its upper end registers with a transversely extended channel 34 in which is slidably positioned a valve actuating member 35 having a finger portion 36 extending exteriorly of the grip portion 11. The valve actuating member 35 is formed with an angularly inclined or cam surface 38 adapted when member 35 is moved inwardly of the grip portion to engage roller 30 and cause the valve member 22 to move downwardly and open the valve mechanism.

The sleeve 19 is formed with ports or openings 40 in communication with a channel or duct 41 through which the actuating medium, as for example, compressed air is conveyed to the riveting hammer (not shown) contained within the body 10. The sleeve 19 is provided with a second series of ports or openings 42 in communication with a channel or duct 43 in the lower end of which is embodied a fitting 44 to which an air conveying hose 45 is connected. Contained

within the fitting 44 is an air flow regulating means (not shown) which may be adjusted by means of a thumb piece 46.

Secured to the body 10 of the riveting device is a frame which in the embodiment disclosed comprises a pair of bands or clamps 47 and 48 surrounding the body of the riveting device. Connected to band 47 is a pair of links 50 forming a part of the frame structure and are secured to the band 47 by means of a bolt 51. Secured to the band 48 by means of a bolt 52 is one end of a link or strut 53 having its other end connected to the bars or links 50 by means of a bolt 54. A relatively movable link 56 is pivoted for movement about the axis of the bolt 52, the link 56 being connected by suitable means, as for example, a bar 57 to the valve actuating member 35 by means of members or bolts 58 and 59.

Pivotally articulated to the frame links 50 by means of a bolt 61 is a cylinder head or member 62 which is interiorly bored to receive a cylinder 63 which is pressed into the head. The head 62 is provided with an air vent or orifice 64 which is provided with a regulating needle or valve 65 threaded into an opening in the head 62 which may be adjusted to regulate the effective opening of the vent 64.

Slidably positioned with the cylinder 63 is a plunger or piston 67 formed of leather or other suitable material and which normally snugly contacts the walls of the cylinder. Positioned on either side of the leather plunger or piston 67 are washers 68 and 69 preferably of metal. A rod 70 is formed with a threaded tenon portion 72 which extends through registering openings in washers 68, 69, and piston 67 and is adapted to receive a securing nut 60 to hold the washers and piston in assembled relation upon the piston rod 70. The other end of piston rod 70 is pivotally connected to the lower extremity of link 56 by means of a bolt 71. The one end of the cylinder 63 is provided with an inwardly turned flange 66 having a central opening to receive and guide the piston rod 70. Interposed between the washer 69 and the flange 66 is an expansive coil spring 73 for normally urging the piston 67 toward the end of the cylinder as illustrated in Figure 1.

The washer 68 adjacent to the piston 67 is provided with a frusto-conical opening which is normally closed by a complementary shaped valve member 74. Valve member 74 has a stem 80 encircled by a spring 75 normally the valve 74 toward closed position. The wall of the cylinder adjacent to head 62 is provided with longitudinally extending groove or by-pass 77 for permitting the by-pass of air around the piston when it has reached a predetermined position in the cylinder 63 during its return movement.

The link 56 is preferably provided with a handle or trigger portion 78 formed of plastic or other suitable material which may be conveniently gripped by the operator in using the riveting gun.

The operation of the arrangement of my invention is as follows: The operator in using the riveting device places the latter in a position wherein the riveting die 16 engages a rivet to be driven. With the device in this position the operator grips the trigger 78 and exerts a counterclockwise movement to the link 56 about the axis of the bolt 52 which movement actuates the link 57 and in turn the valve actuating member 35, moving the latter inwardly whereby the cam surface 38 of member 35 causes a downward movement upon the roller 30 and the valve 22, bringing the enlarged valve portion 23 beneath the ports 42. With the valve in this open position, compressed air flows through the duct 43, ports 42, ports 40, and conduit 41 to actuate the riveting mechanism (not shown) contained within the body 10. This movement of link 56 actuates the piston rod 70 to move the piston 67 in a right hand direction as viewed in Figure 1, the valve 74 and the flexible walls of the leather piston 67 permitting air to flow through the valve opening and peripherally of the piston into the cylinder. At the same time the spring 73 is compressed in the lower end of the cylinder 63 thus storing up energy for returning the piston to normal position when the operator releases the trigger or finger grip 78.

The screw 65 is adjusted to permit a rate of air flow through orifice 64 sufficient to delay the closing of the valve 22 under the influence of spring 73, thus permitting operation of the riveting device during the movement of the piston from the right-hand end of the cylinder (as viewed in Figure 1) to the opposite end of the cylinder. By this means the valve 22 remains open for a period of time dependent upon the adjustment of the screw 65 which regulates the effective area of the air vent or orifice 64. It has been found extremely desirable to cause a substantially instantaneous closing of the air control valve 22 at the completion of a riveting operation. In the embodiment of my invention this is accomplished by means of the relief port or by-pass 77. When the piston in its retrograde movement moves past the by-pass or port 77, the latter provides a channel permitting air to flow from the left hand side of the piston (as viewed in Figure 3) to the right hand side thereof. This quickly equalizes the pressure, whereby the piston rapidly completes its return movement under the influence of spring 73, which results in a rapid closing of the valve member 22.

By the means of my invention herein before described, I am enabled to regulate accurately the period of time during which the riveting device is in operation. This means enables the setting of a number of rivets of identical size uniformly as each rivet received substantially the same number of blows in a given period of time. Moreover, by adjusting the air vent regulating screw 65 a wide range of variation in delaying action of the valve mechanism is attainable for accomplishing either momentary or prolonged riveting as is desired.

It is apparent that, within the scope of the invention, modifications and different arrangements may be made other than is herein disclosed, and the present disclosure is illustrative merely, the invention comprehending all variations thereof.

What I claim is:

1. In combination with an air operated riveting device having an air control valve, a valve actuating member associated with the riveting device and adapted to control said valve; a frame carried by said riveting device; means for predetermining the length of time that said air valve is open including a cylinder articulated with said frame; a piston reciprocable in said cylinder; linkage connecting said piston to said valve actuating member, and resilient means for normally urging said piston toward one position.

2. A mechanism for predetermining the period of operation of a portable fluid actuated riveting device having a housing, in combination, a frame

carried by the riveting device: a valve actuating member associated with the riveting device for controlling the flow of actuating medium to the riveting device; a link connected to said valve actuating member; means including a cylinder and piston associated with said link for controlling the duration of opening of said valve; spring means for normally urging said piston toward valve closing position; an air vent in said cylinder; and means for adjusting the effective opening in said vent for regulating the rate of air flow therethrough.

3. A mechanism for predetermining the period of operation of a riveting device having a housing and a control valve including, in combination, a support carried by the housing; a member for actuating the control valve to regulate the flow of actuating medium to the riveting device, motion retarding means including a cylinder and piston connecting said frame and said member for controlling the duration of the opening of said valve; and resilient means for normally urging said piston toward valve closing position.

4. In combination with a portable air riveting device having a barrel-shaped housing and an air controlling valve, a valve actuating member; a frame carried by said housing, linkage connected to said valve actuating member, a valve actuating member movement retarding means including a cylinder connected to said frame, a piston reciprocable in said cylinder and connected to said linkage, a valve in said piston for permitting the flow of air through said valve when the piston is moved in one direction, spring means for normally urging the piston to one position in said cylinder; and a by-pass arranged in the wall of said cylinder for establishing communication from one side of said piston to the other when the latter has been moved to a predetermined position in said cylinder.

5. In combination with an air actuated riveting device having a housing and an air controlling valve; a valve actuating member, a support associated with the housing of the riveting device, linkage connected to said valve actuating member, a motion retarding means including a cylinder connected to said support, a piston reciprocable in said cylinder and connected to said linkage, an adjustable vent in said cylinder, a valve in said piston for permitting the flow of air through said valve when the piston is moved in one direction, spring means in said cylinder in engagement with said piston for normally urging the latter to one position, and a channel arranged in the wall of said cylinder for by-passing air from one side of said piston to the other when the latter has been moved to a predetermined position in said cylinder.

6. In combination with a portable air actuated riveting device having a housing and an air controlling valve, a valve actuating member; a frame carried by the housing of the riveting device; linkage connected to said valve actuating member; a motion retarding means for said member including a cylinder connected to said frame, a piston reciprocable in said cylinder and connected to said linkage, an adjustable vent in one end of said cylinder, a valve in said piston for permitting the flow of air through said valve when the piston is moved in one direction, spring means in said cylinder and adapted for engagement with said piston for normally urging the latter to one position, and a relief passage arranged in the wall of said cylinder for by-passing air from one side of said piston to the other when the latter has been moved to a predetermined position in said cylinder.

7. In combination with a riveting device of the fluid actuated type having a barrel-shaped housing and hand grip portion; a fluid control valve in said hand grip portion; a valve actuating member; a frame structure carried by said housing; means for manually moving said valve actuating member to open the fluid control valve to initiate the operation of said riveting device; means connecting said frame structure and said valve actuating member for retarding the return movement of said valve actuating member toward valve closing position; and means for regulating the effective action of said retarding means.

8. In combination with a portable riveting device of the fluid actuated type having a barrel-shaped housing and hand grip portion, a valve in said hand grip portion, a valve actuating member, a frame structure carried by said housing, manually actuated means for moving said valve actuating member for opening the fluid control valve to initiate the operation of said device, means connecting said frame structure and said valve actuating member for retarding the return movement of said valve actuating member toward valve closing position including a cylinder, a piston in said cylinder, resilient means in said cylinder for urging said piston toward one end of said cylinder, and means for regulating the rate of movement of said piston under the influence of said resilient means.

9. In combination with a portable air actuated riveting device having a housing and an air controlling valve; a valve actuating member; a frame structure carried by said housing, a cylinder connected to said frame structure; a link pivotally connected to said frame structure; a piston reciprocable in said cylinder and having a piston rod extending exteriorly thereof; said piston rod being connected to said link, resilient means within said cylinder and engageable with the piston for urging the latter in one direction, adjustable means for venting air from said cylinder for determining the rate of movement of the piston, a second link connecting said first mentioned link and said valve actuating member whereby movement of said piston causes proportionately reduced movement of the valve actuating member.

10. In combination with a portable air actuated riveting device having a housing and an air controlling valve; a valve actuating member; a frame structure carried by said housing; a cylinder articulately connected to said frame structure; a link pivotally connected to said frame structure; a piston reciprocable in said cylinder and having a piston rod extending exteriorly thereof; said piston rod being pivotally connected to said link, resilient means within said cylinder and engageable with the piston for urging the latter in one direction, adjustable means for venting air from said cylinder for determining the rate of movement of the piston; a second link pivotally connecting said valve actuating member to said first mentioned link and intermediate the ends of the latter whereby movement of said piston in said cylinder causes a corresponding but greatly reduced movement of said valve actuating member.

OTTO A. PETERS.