Nov. 14, 1944. R. O. ALLEN 2,362,608

ADJUSTING DEVICE FOR THROTTLE VALVES

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FIG.-1.

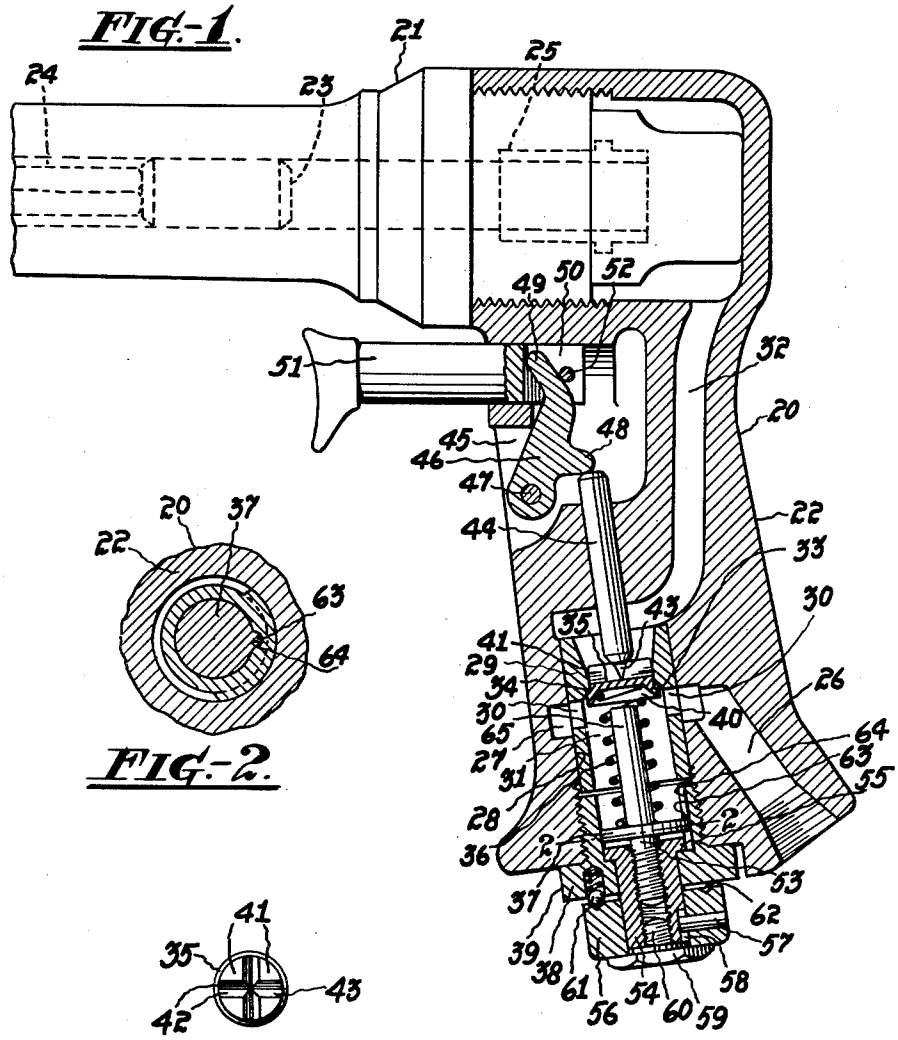


FIG.-2.

FIG.-3.

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ADJUSTING DEVICE FOR THROTTLE VALVES

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1 Claim. (Cl. 251—137)

This invention relates to pressure fluid controlling devices, and more particularly to an adjusting device for throttle valves serving to control the power supply for a pneumatically actuated tool.

One object of the invention is to selectively vary the range of movement of the throttle valve.

Another object is to enable the adjustments required to so vary the range of movement of the throttle valve to be made without danger of marring the cooperating sealing surfaces of the throttle valve and its seat.

Other objects will be in part obvious and in part pointed out hereinafter.

In the drawing accompanying this specification and in which similar reference numerals refer to similar parts,

Figure 1 is a side elevation, partly broken away, of a fluid actuated tool having the invention applied thereto,

Figure 2 is a transverse view taken through Figure 1 on the line 2—2, and

Figure 3 is a plan view of a detail.

Referring more particularly to the drawing, 20 designates a pneumatically actuated tool comprising a casing 21 having a laterally extending grip portion 22 adjacent its rearward end whereby the tool may be conveniently grasped for holding it in the correct relationship with the work.

The casing 21 is suitably bored to accommodate a reciprocatory hammer piston 23 that drives a working implement 24 and may be actuated by pressure fluid distributed to the opposite ends of the hammer piston 23 by a suitable automatic valve 25.

The pressure fluid serving to operate the piston 23 passes through the grip member 22 to the distributing valve 25. The grip member is accordingly provided with a supply passage 26 having its outer end threaded for connection with a supply conduit (not shown). The supply passage 26 opens at its inner end into an annular groove 27 in the wall of a bore 28 in the grip member 22, and in the bore 28 is a sleeve 29 having ports 30 to afford communication between the annular groove and the chamber 31 in the sleeve.

The sleeve 29 is hollow throughout its length and its innermost end is in constant communication with a passage 32 that extends through the grip member 22 and opens into the rearward end of the casing for supplying pressure fluid to the distributing valve 25.

Within the sleeve 29, between the ports 30 and the passage 32, is a beveled annular surface 33 to provide a seat for a correspondingly shaped surface 34 of a reciprocatory throttle valve 35 that serves to control the flow of pressure fluid from the chamber 31 to the passage 32 and is normally held against the surface 33 by a spring 36 within the chamber 31. One end of the spring 36 seats against the throttle valve and the other end seats against a plate 37 in a plug 38 threaded into the outer end of the bore 28 to form a closure therefor. The plug 38 is arranged coaxially with the sleeve 29 so that its interior forms a continuation of the chamber 31 and has a head 39 that seats against the end of the grip member 22.

The body portion of the throttle valve 35 is shown as being of substantially disc shape. It has a depression 40 in one side to receive the end of the spring 36, and on the opposite side of said valve are guide ribs 41 that cooperate slidably with the inner surface of the sleeve 29, adjacent the beveled surface 33, to maintain the throttle valve coaxial with the surface 33.

The radial edges or surfaces 42 of the ribs 41 are inclined to define V-shaped notches 43 through which pressure fluid flows from the chamber 31 into the passage 32. The apices of the notches 43 are pointed toward the chamber 31 so that they will be the first portions of the notches to come into communication with the chamber 31 when the throttle valve is unseated. Owing to this arrangement the flow area through the throttle valve may be nicely controlled to permit only a small volume of pressure fluid to pass to the percussive element of the tool for operating it to deliver light blows against the working implement or, as when the throttle valve is opened to wide limits, a large volume of pressure fluid may be delivered to the tool for operating it at a high rate of speed and with maximum force.

The means serving to unseat the throttle valve is actuated by manual pressure and comprises a push rod 44 that is slidable in the grip member 22 and seats at one end upon the inner ends of the ribs 41 of the throttle valve. The opposite end of the push rod 44 lies within a recess 45 in the grip member containing a rocker 46 that is pivoted at its lower end upon a pin 47 and has a laterally extending arm 48 intermediate its ends to engage the upper end of the push rod 44.

The opposite or free end 49 of the rocker arm 48 extends into a slot 50 in the inner end of a plunger 51 slidable transversely of the grip member 22 for imparting movement to the rocker 46 to unseat the valve 35. A pin 52 extends transversely through the innermost end of the plunger

and through the slot 60 to prevent disconnection of the plunger 51 from the rocker 46.

To the end that the plate 37 may be conveniently shifted endwise of the chamber 31 for varying the pressure of the spring 36 against the throttle valve 35 said plate is provided on its outer surface with an externally threaded stem 53 that engages a nut 54 in the head 39 of the plug 38. The nut 54 is freely rotatable in the head 39 and when rotated in one direction or the other will cause the plate 37 to move toward or away from the throttle valve for selectively increasing or decreasing the force of the spring against said throttle valve.

The nut 54 is capable of only such endwise movement as will permit it to rotate freely within the head 38 and carries on its inner end a flange 55 that seats against the bottom of the chamber 31. On a portion of the nut 54 lying exteriorly of the plug 38 is a collar 56 that is slidable endwise within a limited degree upon the nut 54 and carries a pin 57 to extend slidably into a slot 58 in the periphery of the nut 54 to prevent rotation of the collar upon the nut.

The collar 56 is retained upon the nut 54 by the head 59 of a screw 60 threaded into the end of the nut, and a suitable locking element shown as being in the form of a spring pressed ball 61 in the head 39 and engaging depressions 62 in the adjacent surface of the collar 56 holds the nut 54 normally stationary.

In order to hold the plate 37 against rotary movement during the rotation of the nut 54 for shifting the plate 37 axially of the chamber 31 said plate is provided on its edge with a lug 63 to extend slidably into a key slot 64 in the inner surface of the plug 38, and on the inner surface of the plate 37 is a stem 65 that extends through the spring 36 to a point near the throttle valve 35 to serve as a stop for limiting the unseating movement of the throttle valve.

In the operation of the device, whenever it is intended to cause the pneumatic tool to deliver light blows to the work, and in which case it is essential that a relatively small volume of power medium be delivered to the percussive element of the tool, the nut 54 is manipulated to shift the plate 37 and thereby bring the stem 65 to a position near the throttle valve 35. Thus, when the throttle valve is pressed against the end of the stem 65 only so much of the V-shaped grooves 54 will be in communication with the chamber 31 as will define the required flow area through the throttle valve to assure the required action of the hammer piston 23.

If, on the other hand, the work requires the delivery of forceful blows thereagainst by the percussive element of the tool, the nut 54 is rotated in an opposite hand direction to withdraw the stem 65 from the throttle valve 35. The latter may then be opened to wider limits to assure delivery of the required volume of pressure fluid to the tool.

Thus, as will be readily appreciated, the degree in which the throttle valve may be opened in order to assure a desired action of the tool may be readily and conveniently controlled by merely manipulating the nut 54 and, owing to this fact, a uniform speed of the tool may be maintained without necessitating the constant manipulation of the throttle valve to assure that result. Moreover, by slidably interlocking the plate 37 with the casing portion of the tool so that the plate 37, the spring 36 and the throttle valve are prevented from rotating during the turning of the nut 54 the throttle valve and its seat will be protected against damage other than that which may result from normal use.

I claim:

An adjusting device for a throttle valve, comprising a casing having a passage for pressure fluid, an annular beveled seating surface in the passage, a reciprocatory throttle valve having a surface corresponding with the seating surface and cooperating therewith to control the passage, there being a recess in the throttle valve opposite the last mentioned surface, manually operable means for unseating the throttle valve, a hollow plug threaded into the casing in axial alignment with the seating surface, a spring extending into the recess to resist unseating movement of the throttle valve, a seat member for the spring within the plug and slidably interlocked with the plug, a nut rotatable in the plug and threadedly connected with the seat member for effecting sliding movement of the seat member to vary the resistance of the spring, and a stem on the seat member extending through the spring into the path of the throttle valve for limiting the unseating movement of the throttle valve.

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