This invention relates to fluid actuated machines, and more particularly to throttle valve mechanism for controlling the flow of pressure fluid to such machines.

One object of the invention is to construct a rugged and simplified throttle valve mechanism that may be conveniently operated and will remain fluid tight for prolonged periods of time without requiring repeated dismantling for purposes of inspection and replacement of parts.

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

In the drawings accompanying this specification,

Figures 1 and 2 are longitudinal views, partly in section, of a throttle valve mechanism constructed in accordance with the practice of the invention applied to a pneumatic tool and respectively showing the valve element in the closed and open positions, and

Figure 3 is a transverse view taken through Figure 1 on the line 3—3.

Referring more particularly to the drawings, the throttle valve mechanism, designated in its entirety by 20, is shown applied to the rearward end of the housing 21 of a pneumatic tool of the reciprocatory hammer type which accordingly has a piston chamber 22 and a piston 23 reciprocable therein.

The pressure fluid serving to actuate the piston is conveyed to the front and rear ends of the piston chamber 22 by inlet passages 24 and 25, respectively, that lead from a valve chamber 26 at the rearward end of the piston chamber containing an oscillating plate valve 27 for controlling the passages 24 and 25. The pressure fluid thus distributed by the valve 27 enters the valve chamber 26 through passages 28 in a plate 29 at the rearward end of the valve chamber that also serves as a seat for an end of the casing 30 of the throttle valve mechanism 22 which is threaded part way into the housing 21 in coaxial relation therewith.

The housing 21 is recessed interiorly to provide a chamber 31 for pressure fluid adjacent the plate 25. It is also bored to provide a long guideway 32 from the chamber 31 to the rearward end of the casing 30 for a correspondingly long member 33 slidable axially therein and itself having a bore 34 the outer portion of which is in communication with pressure fluid supply (not shown) through a conduit 35 threadedly connected to the member 33.

The bore 34 contains a sleeve 36 which is preferably press-fitted into the member 33 and has a flange 37 that lies across the inner end of the member 33 and partly overlaps the adjacent portion of the end wall 38 of the chamber 31 to cooperate therewith for limiting movement of the member 33 in an outwardly direction. The interior of the sleeve 36 constitutes a guideway 39 for the stem 40 of a poppet valve 41 which seats upon a bevelled surface 42 at the end of the sleeve 36 lying within the bore 34.

In order to permit the free flow of pressure fluid from the bore 34 through the guideway 39, the portion 43 of the stem 40 immediately adjacent the valve 41 is of reduced diameter and the remaining portion of the stem has flutes 44 to convey pressure fluid from the space encircling the reduced portion 43 of the valve stem to the chamber 31. The stem 40 is, moreover, of such length that when the valve 41 rests upon the surface 42 the free end of said stem will project beyond the sleeve 36 into the chamber 31 to engage the plate 29 for unseating the valve when the member 33 is thrust inwardly in the guideway 32.

Such movement of the member 33 is effected by manual pressure applied to a grip member 45 which is attached to the outer end of the member 33, as by a press-fit, and has a skirt portion 46 that loosely encircles the rearward portion of the casing 30. Movement of the member 33 in an inwardly direction is limited by the outer end surface 47 of the casing which serves as an abutment for a surface 48 within the grip member 46.

The movement required for moving the member 33 in the opposite direction to again place the surface 42 into engagement with the valve 41 is effected by pressure fluid acting against the opposed surfaces 49 and 50 of the plate 29 and the flange 37, respectively, and by the pressure fluid in the bore 34 acting against the free end surface 51 of the valve 41 and a surface 52 of an internal flange 53 in the member 33 serving to limit the degree of opening movement of the valve 41.

In the operation of the device, whenever it is intended to supply pressure fluid to the distributing valve of the pneumatic tool the member 33 is moved inwardly in the direction of the pneumatic tool by manual pressure applied to the grip member 45. During the initial portion of such movement the valve 41 will move with the member 33 until the free end of the stem 40 engages the plate 29. Thereafter the valve 41 will remain stationary, and continued movement of the member 33 in the direction described.
will move the surface 42 away from the valve. Pressure fluid will then flow from the bore 34 through the guideway 38 into the chamber 31, thence through the passages 28 into the valve chamber 26 for distribution, by the valve 27, to the ends of the piston chamber 22.

Whenever it is intended to discontinue the operation of the tool, the grip member 45 is released. The pressure fluid within the bore 34, and acting against the surfaces 51—52, and the pressure existing in the chamber 31 and acting against the surfaces 49—50 will then immediately retract the member 33 and move it into a position wherein the surface 42 again engages the valve 41 to cut off the flow of pressure fluid into the chamber 31.

I claim:

1. A throttle valve mechanism, comprising a casing having a bore, a member slidable axially in the bore projecting from said bore and having a passage extending endwise therethrough for conveying pressure fluid through the member, a grip portion on the projecting portion of the member for manually imparting sliding movement to said member, a valve seat in the passage, a valve in the passage to cooperate with the valve seat for controlling the flow of pressure fluid through the passage and being movable axially with the member, a stem on the valve projecting from an end of the passage, an abutment on the casing for the stem to hold said valve stationary during movement of the member in one direction for enabling the seat to move out of engagement with the valve and thereby permit the flow of pressure fluid through the passage, and opposed pressure surfaces on the valve and the member subjected to pressure fluid for moving the member in the opposite direction to place the valve seat into engagement with the valve.

2. A throttle valve mechanism, comprising a casing having a bore and an enlarged chamber at one end of the bore, sleeve means slidable axially in the bore and projecting from the opposite end of said bore, a grip member on the projecting portion of the sleeve means encircling the casing and having a surface to engage the casing for limiting movement of the sleeve means in the direction of the chamber, a valve seat in the sleeve means, a valve in the sleeve means to cooperate with the valve seat for controlling the flow of pressure fluid through the passage into the chamber and having a stem to project into the chamber, a closure for the chamber to serve as an abutment for the valve for holding the valve stationary during movement of the sleeve means in the direction of the chamber and thereby enable the seat to move out of engagement with the valve, and opposed pressure surfaces on the closure and the sleeve means and on the valve and the sleeve means subjected to pressure fluid for moving the sleeve means in the opposite direction to place the valve seat into engagement with the valve.

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