

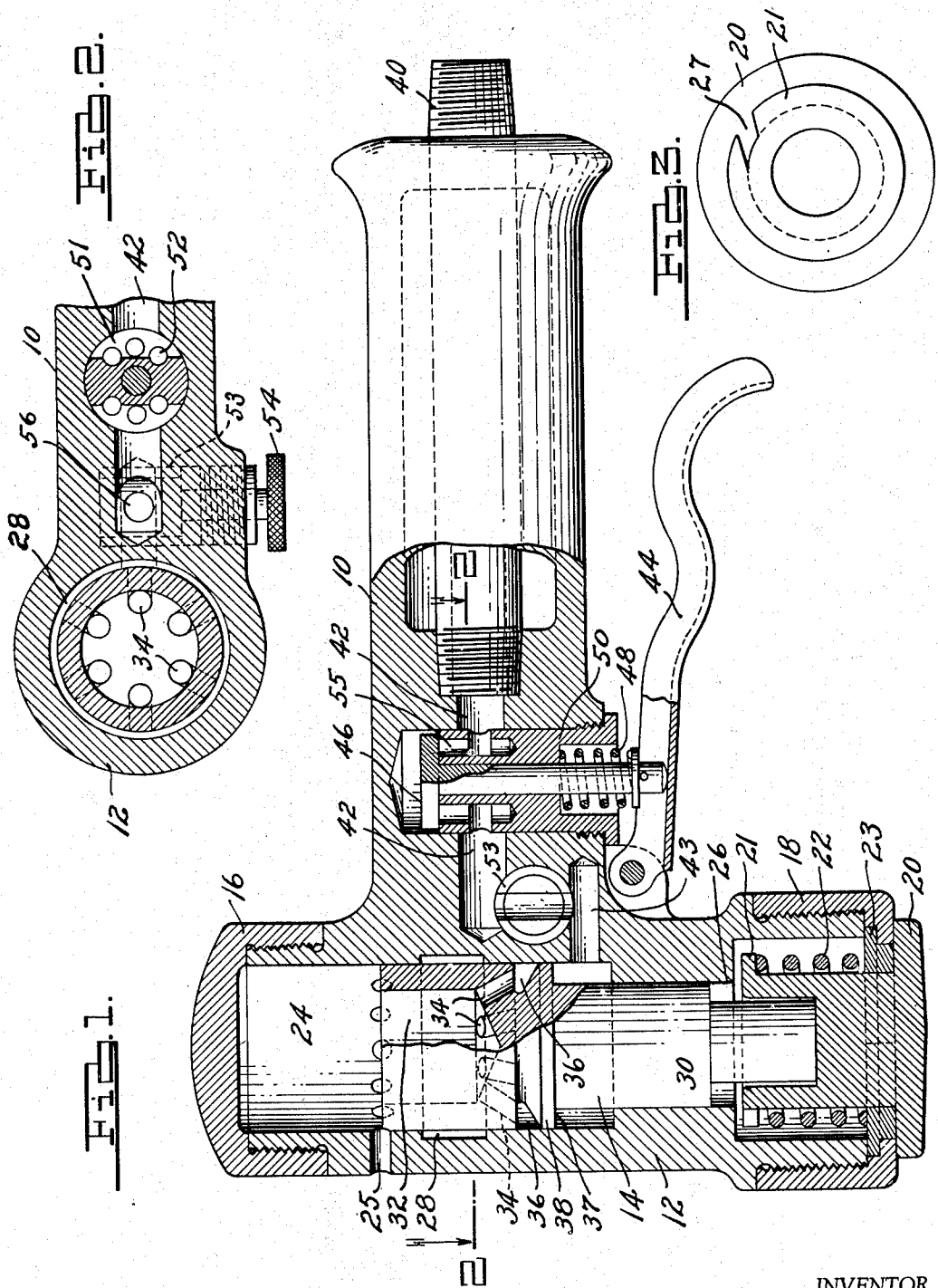
Jan. 4, 1938.

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2,104,468

PNEUMATIC HAMMER

Filed Aug. 5, 1936



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## UNITED STATES PATENT OFFICE

2,104,468

## PNEUMATIC HAMMER

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Application August 5, 1936, Serial No. 94,377

7 Claims. (Cl. 121—35)

My invention relates to an improved pneumatic hammer or fluid pressure operated vibratory impact device of a similar character.

An object is to provide a simple, compact device of the character described which is of a strong and durable construction, easily operable and inexpensive to build and which comprises a minimum number of rugged readily assembled rugged parts.

A meritorious feature resides in improved fluid pressure actuated mechanism of the vibratory type and particularly to an improved type of piston structure adapted in its reciprocation to control the admission of fluid to operate the piston and the associated parts.

A further meritorious feature resides in the provision of an improved fluid pressure control valve by which the flow of fluid under pressure to the fluid actuated part within the cylinder is regulated and controlled and a tight seal is maintained at such valve against leakage of fluid at such point.

A further meritorious feature is the provision in a structure of the character described of improved manually operable control valve mechanism to regulate the admission of fluid to the cylinder in conjunction with a metering or measuring valve which determines the amount of fluid admitted into the cylinder by the control valve.

Other objects, advantages, and meritorious features of my invention will more fully appear from the following description, appended claims, and accompanying drawing, wherein:

Figure 1 is a side elevation of a pneumatic hammer structure embodying my invention and being partly broken away to show the interior thereof,

Fig. 2 is a horizontal sectional view taken on line 2—2 of Fig. 1, and

Fig. 3 is a plan of the upper end of the plunger.

My improved pneumatic tool has a T-shaped casing which includes a handle portion 10 and a head portion 12. The head is cored out to provide a cylinder within which piston element 14 is mounted to reciprocate. One end of the cored out casing or cylinder is closed with a screw cap 16. The opposite end of the head is exteriorly threaded to receive a cooperatively internally threaded retainer ring 18. Plunger 20 is slidably supported within the retainer ring upon a spring 22 which in turn is supported upon a stepped split washer 23. This plunger 20 has a flange 21 which rests upon the spring. The end of the plunger is recessed as shown to receive the re-

duced end of the piston 14. Flange 21 is cut away at 27 as shown in Fig. 3 to permit threaded insertion of the spring through the cut out into place upon the plunger.

The cored out interior of the casing head forms the cylinder 24 within which the piston 14 is slidably disposed. This cylinder 24 is provided with a wall recess in the form of a circumferential channel or groove 28 of greater diameter than the diameter of the cylinder. The upper end of the piston constitutes a portion of maximum diameter and forms a tight slidable fit within the cylinder. Such upper end is hollowed out as at 32 and a plurality of fluid communicating ports 34 lead from such hollowed out interior to a channel or groove 36 extending about such maximum diameter portion of the piston as shown in Fig. 1. The opposite end 30 of the piston is of less diameter. The juncture of such lower end portion 30 of the piston with the maximum diameter portion thereof forms a shoulder 37 which, with the channel or groove 36, makes up a ledge or skirt 38. The reduced end portion 30 of the piston is slidable within an extension 26 of the cylinder 24.

A handle 10 is provided with a fluid inlet 40 which leads into a cored out passageway 42. The flow of fluid through this passageway 42 is controlled by a valve assembly including valve 46 held snugly seated by a spring 48, which spring may be overcome by a manually operable lever 44 to lift the valve 46 to permit air to flow through the cored out passageways in valve plug 50, which carries the valve 46. Plug 50 is provided on opposite sides with grooves or channels 51. A plurality of angular passageways 52, three being here shown, lead from each of these channels 51 through the valve plug 50 so as to establish communication between the valve chamber above said plug and the fluid passageway 42 through the handle of the casing.

The passageway 42 that leads axially through the handle 10 communicates adjacent to the head of the casing with the fluid inlet 43 into the cylinder. This fluid inlet is spaced below the passageway 42 through the handle and communication therebetween is controlled by a rotatable valve 53 having a knurled end 54 whereby it may be rotated to bring the valve passageway 56 into position to permit a controlled amount of air to flow therethrough as shown in Figs. 1 and 2 or to shut off such flow as is obvious from the construction illustrated. It is apparent that the valve 53 may be manipulated to varying positions to regulate the size of the

communicating passageway between the air inlet 42 through the handle and the air inlet 43 into the cylinder.

The operation is apparent from the above description. Air enters through intake 40 into passageway 42 through the handle. With the valve 46 positioned as shown in Fig. 1 the flow of air is blocked at this point. Upon depression of the lever 44 compressing spring 48 the control valve 46 is lifted from the top of the plug 50 into the valve chamber above said plug. This uncovers the angular air passageways 52 through the plug which establishes communication between the two portions of the air passageway 42 through the handle on opposite sides of the plug 50.

Air flows through the angular passageways 52 on the pressure side of the plug upwardly and over the valve face of the plug and downwardly through the angular passageways 52 on the opposite sides of the plug into that end of the passageway 42 of the handle adjacent to the head of the casing. From here, with the valve 53 positioned as illustrated (fully opened) air flows through the passageway 56 through such valve into inlet 43 which leads into the cylinder 24 in the head.

Air pressure within the cylinder acts upon the lower shoulder 37 of the skirt 38 of the piston raising the piston toward the upper end of the cylinder. When the piston is elevated sufficiently to bring shoulder 38 into the circumferential wall recess 28 of the cylinder or to place the reduced end 39 of the piston in registration with such wall recess 28 of the cylinder the plurality of air pressure escape passageways 34 through the piston will open through the groove 35 to the recess 28 within the cylinder. In this position air under pressure flows from the lower end of the cylinder through the wall recess 28 through piston groove 36 and ports 34 into the cored out upper end 32 of the piston to the upper end of the cylinder. Air continues to flow into the upper end of the cylinder above the piston until the pressure is raised sufficiently to drive the piston downwardly so that the lower end of the reduced diameter portion 30 strikes against the upper end of the plunger 30 urging the same downwardly against the tension of the spring 22.

Downward movement of the piston uncovers the apertures 25 in the cylinder and the air escapes from the cylinder 24 above the piston to the atmosphere. This downward movement of the piston also moves air escape openings 34 in the piston below the wall recess 28 in the cylinder wall to the position shown in Fig. 1 so as to prevent any flow of air from the air inlet end of the piston to the upper end of the piston. It will be noted that when the groove 36 in the piston is in registration with wall recess 28 in the cylinder that the air outlet openings 25 of the cylinder are closed by the piston.

What I claim:

1. In a fluid pressure device of the character described, a casing having a handle and a head portion, said head portion hollowed out to form a fluid cylinder having a fluid outlet, said fluid cylinder having a fluid inlet extending through said handle, a piston within the cylinder, a valve casing plug extending transversely across the fluid inlet through the handle, said plug having a valve chamber at one end and having a valve stem passageway therethrough, a valve having a head adapted to seat against the end of the plug within the valve chamber and having a stem extending through said valve stem passageway, a spring holding said valve to its seat against the

end of the plug, mechanism for unseating said valve against the tension of said spring, said plug having two fluid passageways leading from the valve chamber to the fluid passageway through the handle on opposite sides of the plug and adapted to be normally closed by the valve seated against the end of the plug within the chamber.

2. In a fluid pressure device of the character described, a casing having a handle and a head portion, said head portion hollowed out to form a fluid cylinder having a fluid outlet, said fluid cylinder having a fluid inlet extending through said handle, a piston within the cylinder, a valve carrying plug and a valve normally closing said fluid passageway through the handle, said valve adapted to seat against the end face of the plug within a valve chamber at such end of the plug, said plug provided with two fluid passageways which lead from the valve face thereof to the fluid passageway through the handle but on opposite sides of the plug, means normally holding the valve seated against the valve seat of the plug to close said passageway, means operable to lift the valve from said valve face to establish communication through said passageways with the fluid passageway through the handle on opposite sides of the plug.

3. In a fluid pressure device of the character described, a casing having a handle and a head portion, said head portion hollowed out to form a fluid cylinder having a fluid outlet, said cylinder having a fluid inlet extending through said handle, a piston within the cylinder, a valve adapted to control the fluid passageway through the handle, means for operating said valve to open said passageway, and a second valve regulating the flow through said passageway from the first valve to the cylinder, said second valve adjustable to vary the extent of valve opening and adapted to maintain any position to which it may be adjusted.

4. In a fluid pressure device of the character described a casing having a handle portion provided with a fluid passageway extending there-through, said casing having a head portion hollowed out forming a fluid cylinder provided adjacent to one end with a fluid outlet, such cylinder also provided with a fluid inlet communicating with the fluid passageway through the handle, a piston slidable within the cylinder, manually operable valve mechanism controlling the fluid passageway through the handle, spring means normally holding said valve to close said passageway, and a second valve manually adjustable to vary the flow of fluid through said passageway.

5. In a fluid pressure device of the character described a casing having a handle portion provided with a fluid passageway extending there-through, said casing having a head portion hollowed out forming a fluid cylinder provided adjacent to one end with a fluid outlet, such cylinder also provided with a fluid inlet communicating with the fluid passageway through the handle, a piston slidable within the cylinder, a valve casing plug extending transversely across the fluid passageway through the handle and having one end adapted to serve as a valve seat, a valve chamber adjacent to said end of the plug communicating with the fluid passageway through the handle, a valve having its head disposed within the valve chamber and adapted to seat against the adjacent end of the plug and having its stem slidable through said plug, said plug provided with a valve passageway controlled by said valve and

adapted to place the valve chamber in communication with the cylinder intake.

5 6. In a fluid pressure device of the character described a casing having a handle portion provided with a fluid passageway extending there-  
10 through, said casing having a head portion hollowed out forming a fluid cylinder provided adjacent to one end with a fluid outlet, such cylinder  
15 also provided with a fluid inlet communicating with the fluid passageway through the handle, a piston slidable within the cylinder, a valve casing  
20 plug extending transversely across the fluid passageway through the handle and having one end adapted to serve as a valve seat, a valve  
25 chamber adjacent to said end of the plug having communication with the fluid passageway through the handle on opposite sides of the plug, a valve  
having its head disposed within said chamber and having a stem slidable through said plug, said  
valve controlling the fluid communication through the handle passageway between opposite sides of the plug, said valve being manually operable  
and provided with a spring adapted to maintain the valve normally closed.

7. In a fluid pressure device of the character

described a casing having a handle portion provided with a fluid passageway extending there-  
through, said casing having a head portion hollowed out forming a fluid cylinder provided adjacent to one end with a fluid outlet, such cylinder  
5 also provided with a fluid inlet communicating with the fluid passageway through the handle, a piston slidable within the cylinder, a valve casing  
10 plug extending transversely across the fluid passageway through the handle and having one end adapted to serve as a valve seat, a valve chamber  
15 adjacent to said end of the plug having communication with the fluid passageway through the handle on opposite sides of the plug, a valve having  
its head disposed within said chamber and  
20 having a stem slidable through said plug, said valve adapted when seated against the end of the plug to prevent flow of fluid through the handle  
passageway into the cylinder and adapted when  
25 spaced from the end of the plug to permit such flow of fluid, a spring normally holding said valve seated against the end of the plug and  
manual means for actuating said valve against the resistance of said spring.

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