Dec. 26, 1922.

1,440,082

H. C. INSLEE.
FLUID ACTUATED HAMMER.
FILED OCT. 5, 1918.

2 SHEETS-SHEET 1

Fig. 1.

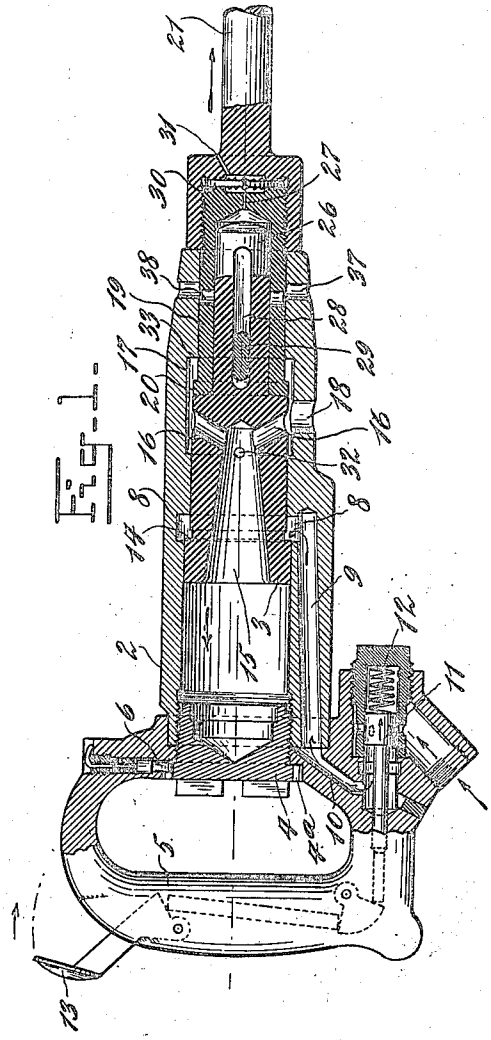
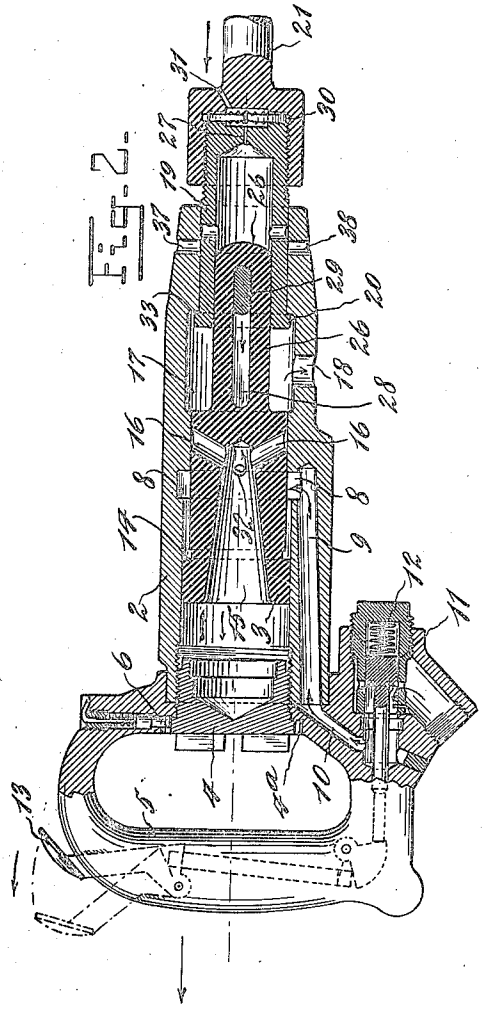


Fig. 2.



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2 SHEETS-SHEET 2

Fig. 4.

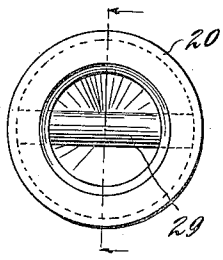


Fig. 3.

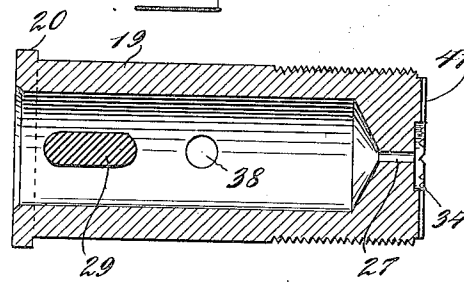


Fig. 5.

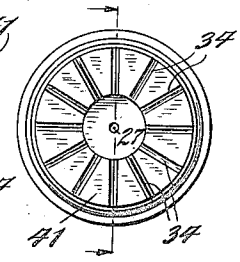


Fig. 8.

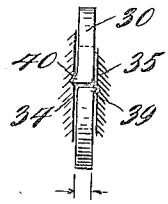


Fig. 6.

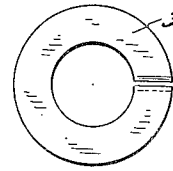


Fig. 7.

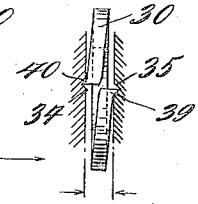


Fig. 10.

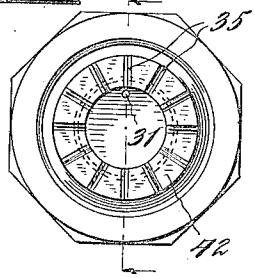
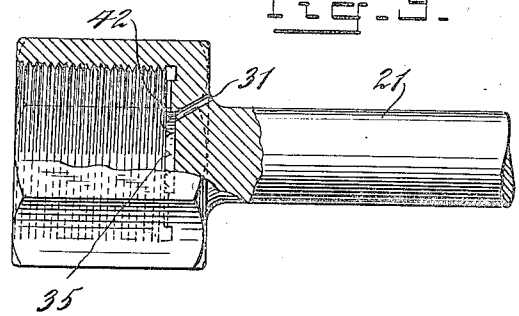


Fig. 9.



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Patented Dec. 26, 1922. 1,440,082

UNITED STATES PATENT OFFICE.

HEBER C. INSLEE, OF ROSELLE, NEW JERSEY, ASSIGNOR TO THE BABCOCK & WILCOX COMPANY, OF BAYONNE, NEW JERSEY, A CORPORATION OF NEW JERSEY.

FLUID-ACTUATED HAMMER.

Application filed October 5, 1918. Serial No. 256,982.

To all whom it may concern:

Be it known that I, HEBER C. INSLEE, a citizen of the United States, residing at Roselle, in the county of Union and State of New Jersey, have invented a new and useful Improvement in Fluid-Actuated Hammers, of which the following is a full, clear, and exact description, reference being had to the accompanying drawings, forming parts of this specification, in which Figure 1 is a longitudinal section, partially in side elevation of one form of hammer embodying my invention, and in which the piston or hammer is at the end of its outward stroke, when the blow of the hammer is being delivered toward its work; Fig. 2 is a similar view showing the parts in the reversing position, in which the piston or hammer is moved to its inward limit while the hammer is delivering its blows away from the work; Fig. 3 is a longitudinal section of one of the parts of my device, and termed a thimble and having a key therein; Fig. 4 is an end view of the flanged end of the thimble; Fig. 5 is a view of the opposite end of the thimble showing grooves thereon; Fig. 6 is a plan view of a spring locking-washer; Fig. 7 is a side view of washer in its extended position; Fig. 8 is a view similar to Fig. 7 but showing the washer compressed between the thimble and a tool shank; Fig. 9 shows the attaching end of a tool, partly in section to more clearly illustrate a socket thereon; Fig. 10 is an end view of the shank showing grooves upon the bottom surface of the socket.

This invention relates to an improvement in fluid-actuated hammers of the pneumatic or elastic fluid type, in which the hammer or piston is adapted to be used to strike a blow in both directions thus giving a hammer blow for driving a tool into or against and out of or from the work.

I accomplish this by mounting any desired tool to a thimble in the cylinder, in such a manner that when the tool and thimble are in one position, with relation to cylinder, one end of the piston will act as a hammer to drive the tool forward to the work, and when said tool is in another position with relation to the cylinder, the piston or hammer will act in the reverse manner on the tool.

The precise nature of my invention will be best understood by reference to the accompanying drawings, which will now be described, it being premised, however, that various changes may be made in the details of construction of the various parts without departing from the spirit and scope of my invention as defined in the appended claims.

Referring to the accompanying drawings, the reference character 2 designates the shell or body of the structure which is bored out for the reception of a piston or hammer 3. 4 designates a cylinder head for closing the end of the bore, and which is provided with a flange 4^a for securing a handhold 5 in position on the cylinder. The numeral 6 designates a spring-actuated locking device for preventing the plug from backing out of the cylinder. A pin (not shown) in end of cylinder engages in a hole in handhold to prevent its rotation with respect to the cylinder. The bore of the cylinder is provided with an annular recess 8 intermediate its ends, which is in direct communication with an inlet port 9 which extends longitudinally of the cylinder. This inlet port is in communication with a port 10 in the handhold, and which port 10 is in direct communication with a supply pipe through the medium of the throttle valve 11. This throttle valve is held in its closed position by means of a spring 12 as shown in Figure 1, and is arranged to be opened as in Figure 2 by a lever 13. The piston 3 is provided with a head 14, the lower side of which is always under the supply pressure from the supply pipe, which acts to move the piston toward the cylinder head or handhold. This piston is provided with a port 15, extending through the head and a portion of the reduced part, there being a plurality of ports 16, leading therefrom through the wall of the reduced portion. 17 is an exhaust chamber in the lower end of the cylinder 2, which is always open to the atmosphere through the port 18.

Slidably mounted in one end of the cylinder 2 is a thimble 19, which is provided with a flange 20 at the inner end thereof and has connected to its outer end any desirable working tool 21.

The tool to be used is formed at one end with a specially formed socket which is tapped to fit a threaded portion of the thimble

to which it is screwed. To prevent the vibration of the hammer loosening the tool I provide a spring lock-washer 30 having its ends turned outwardly to form projections 39 and 40 and interpose the said washer between the end 41 of the thimble and the bottom surface 42 of the socket of the tool. Upon the end of the socket and upon the end surface of the thimble I provide radial grooves or channels 35 and 34 to receive the projections of the lock-washer. When the tool is screwed in position upon the thimble the elasticity or compression force of the washer serves to keep one projection in a groove of the thimble and the other in a groove of the tool, thus preventing any loosening of the tool by the hammer vibrations. The edges of the grooves are beveled and when it is desired to remove a tool, sufficient power may be applied in turning the tool to force the projections out from the grooves. By the above means the tool is locked to the thimble against loosening from vibration but may be readily removed at any time.

The thimble is slidably fitted upon an extension 26 of the hammer or piston. 27 and 31 are ports in the thimble and tool respectively, making communications to the outside of the hammer to permit air to pass into and from the bore in the thimble during the reciprocation of the hammer. The extension 26 is provided with a slot 28, and 29 is a key member which is driven through openings in the walls of the thimble and which passes through the said slot and is arranged to be engaged by the end of the slot 28 nearest the work to receive blows away from the work.

The operation of the device is as follows: Assuming any desired working tool is to be used for forward action into or against any material, the cylinder is then moved to bring the tool in contact with the work, thus also moving the thimble toward the handhold, as shown in Fig. 1, and thereby compelling the hammer 3 to strike the flange 20 provided at one end of the thimble and cause the tool connected to the thimble to receive and transmit a rapid succession of blows into or upon the work. The pressure of the air in the chamber 8 will first cause the piston to move in the direction of the cylinder head until the small pressure port 32 has been advanced sufficiently into comunication with the chamber 8 slightly further than shown in Fig. 2 to have pressure admitted to the cylinder above the piston head, to force the piston away from the cylinder head to a position slightly in advance of that shown in Fig. 1, giving an outward blow to the thimble, as clearly shown in Fig. 1. At this forward position of the piston the small pressure port 32 and larger ports 16 have been moved into the exhaust chamber 17, as shown in Fig. 1, to discharge the fluid acting upon the large area of the piston head, thereby permitting the high pressure fluid to expand and exhaust to the atmosphere through port 18 to reduce the pressure acting on the larger area of the piston and causing the constant pressure to act on the annular differential area 14 on the opposite side of the piston head to effect the return movement of the head. When the inlet port 32 has reached the constant pressure chamber 8 as shown in Fig. 2, it permits the large area of the piston to again receive high pressure while the ports 16 are closed, and the hammer will be driven in the opposite direction, this reciprocating action of the piston 3 with its extension 26 and slot 28 being continued until the throttle valve is closed.

In the thimble 19 holes 38 are provided to come in line with holes 37 of same size in the cylinder at its forward end, for the purpose of inserting a pin through cylinder into the thimble to hold the thimble against rotation, when attaching or replacing any desired form of working tool.

It will be understood from the following explanation that in my device the direction of the hammer blows may be reversed, as for instance, if a caulking tool is being used and the tool becomes wedged in a seam, the reversible action of the hammer will disengage the tool. To reverse the action it is simply necessary to grip the device by the handhold and move it away from the work in which the tool has become wedged.

The working parts of the device then take the position as shown in Fig. 2, namely, the cylinder or shell is pulled back along the thimble until flange upon the thimble engages with stop 33 within the cylinder. The fluid pressure then causes one end of the slot (provided in the extension of the piston) to strike against the key 29 secured to the thimble which is connected to the tool, thereby driving the thimble and the tool connected therewith in the reverse direction, toward the handhold.

When the hammer is held in the hand by the handhold, the thumb is placed upon the lever 13 which, when pressed more or less from the stopped position, as shown in Fig. 1, will give more or less air pressure to the reciprocating piston, thereby the strength and rapidity of the blows may be readily varied as desired.

It will be understood by those familiar with the art that any tools to perform various work can be used in connection with this device, and that other types of pneumatic hammers might be used in connection with applicant's reversing device.

The advantages of my invention result from the provision of means for causing the tool to act in either of two directions, by simply holding it to or from the work.

What I claim and desire to secure by Letters Patent of the United States is:—

1. A fluid-actuated hammer having a cylinder, a piston arranged to be reciprocated therein, and a tool arranged in permanent operative alinement with said piston arranged to be driven forward by the piston when the cylinder is in one position with relation to the tool and to drive the tool backward when the cylinder is in another position with relation thereto.

2. A pneumatic tool having a shell with a piston mounted therein, means for supplying fluid pressure to the cylinder for reciprocating the piston, a tool mounted to be actuated by the piston and arranged in permanent operative alinement therewith, said tool being so mounted that it will be advanced by the piston when the cylinder is in one position with relation thereto and retracted when in another position with relation thereto.

3. A pneumatic tool, comprising a shell having a piston mounted therein, means for supplying fluid pressure for reciprocating the piston, a tool slidably mounted with relation to the shell, means on said tool arranged to be struck by the piston when moved in one direction to advance the tool, and other means connected to the piston and the tool for withdrawing the tool when the tool is in a different position with relation to the shell.

4. A pneumatic tool, having a shell with a piston therein, means for supplying pressure to the shell to reciprocate the piston, a tool slidably mounted in the shell arranged to be struck by the piston to advance the tool when the tool is in one position with relation to the shell, and connections between the piston and the tool arranged to withdraw the tool when the tool is in another position with relation to the shell.

5. A pneumatic tool, having a shell with a piston therein, means for supplying pressure to the cylinder to reciprocate the piston, a thimble having an opening therethrough slidably mounted in the said cylinder, a tool connected to the end of said thimble, stops on said thimble arranged to engage a stop within the cylinder, an extension on the piston having a slot therethrough, and a key extending through said slot and the walls of the thimble.

6. A pneumatic device having a shell with a cylindrical bore therein, a piston mounted within said bore, a stop within the said bore, means for supplying pressure to the cylinder to reciprocate the piston, a thimble slidably mounted in said bore, a tool connected to the end of said thimble, a stop on said thimble arranged to engage with the stop within the bore, an extension on the piston having a slot therethrough, and a key extending through said slot and the walls of the thimble.

7. A pneumatic device having a cylinder, a piston mounted within the cylinder, a movable thimble arranged to be operated upon by the piston, a tool secured to the thimble and means for reciprocating the piston to deliver a succession of blows upon the thimble in either of two directions.

8. A pneumatic device having a cylinder, a piston mounted within the cylinder, a movable thimble arranged to be operated upon by the piston, a tool secured to the thimble, a spring lock-washer arranged between the thimble and tool to keep them in locked relation to one another and means for reciprocating the piston to deliver a succession of reversible blows upon the thimble and tool.

9. A pneumatic device having a cylinder, a piston mounted within the cylinder, a movable thimble having a tool integral therewith and arranged to be operated upon by the piston, means for reciprocating the piston to deliver a succession of blows upon the tool in either direction.

10. In combination, a tool, a reciprocating member, means independent of said member whereby a pressure may be applied to said tool in either of two directions, and means for delivering a blow from said member to said tool in the same direction as that in which the pressure is applied.

11. In combination, a tool, a reciprocating member, means independent of said member whereby a pressure may be applied to said tool in either of two directions, and means for delivering a succession of blows from said member to said tool in the same direction as that in which the pressure is applied.

12. In combination, a tool, a reciprocable member under the control of the operator, and means independent of said member for delivering a succession of blows from said member to said tool in either direction in accordance with the direction in which said reciprocable member has been moved by the operator and while the tool and member are maintained in substantial alinement.

13. In combination, a reciprocating member, a tool having an extension attached thereto and forming a telescopic engagement with said member, and connections for delivering a blow from said member to said tool in either of two directions.

14. In combination, a reciprocating member, a thimble forming a telesoopic engagement with said member, a tool secured to said thimble, and connections for delivering a blow from said member to said thimble in either of two directions.

15. In a device of the character described, a cylinder, a tool associated therewith, means whereby the operator may apply pressure from the cylinder to the tool in either of two directions, and means comprising a piston

within the cylinder for delivering a blow from the piston to the tool in the direction in which said pressure is applied by the operator.

16. In a device of the character described, a cylinder, a tool associated therewith, means whereby the operator may apply pressure from the cylinder to the tool in either of two directions, and means comprising a piston within the cylinder for delivering a succession of blows from the piston to the tool in the direction in which said pressure is applied by the operator.

In testimony whereof I have hereunto signed my name in the presence of two subscribing witnesses.

HEBER C. INSLEE.

Witnesses:

F. A. CLEARY,

WILLIAM WATSON.