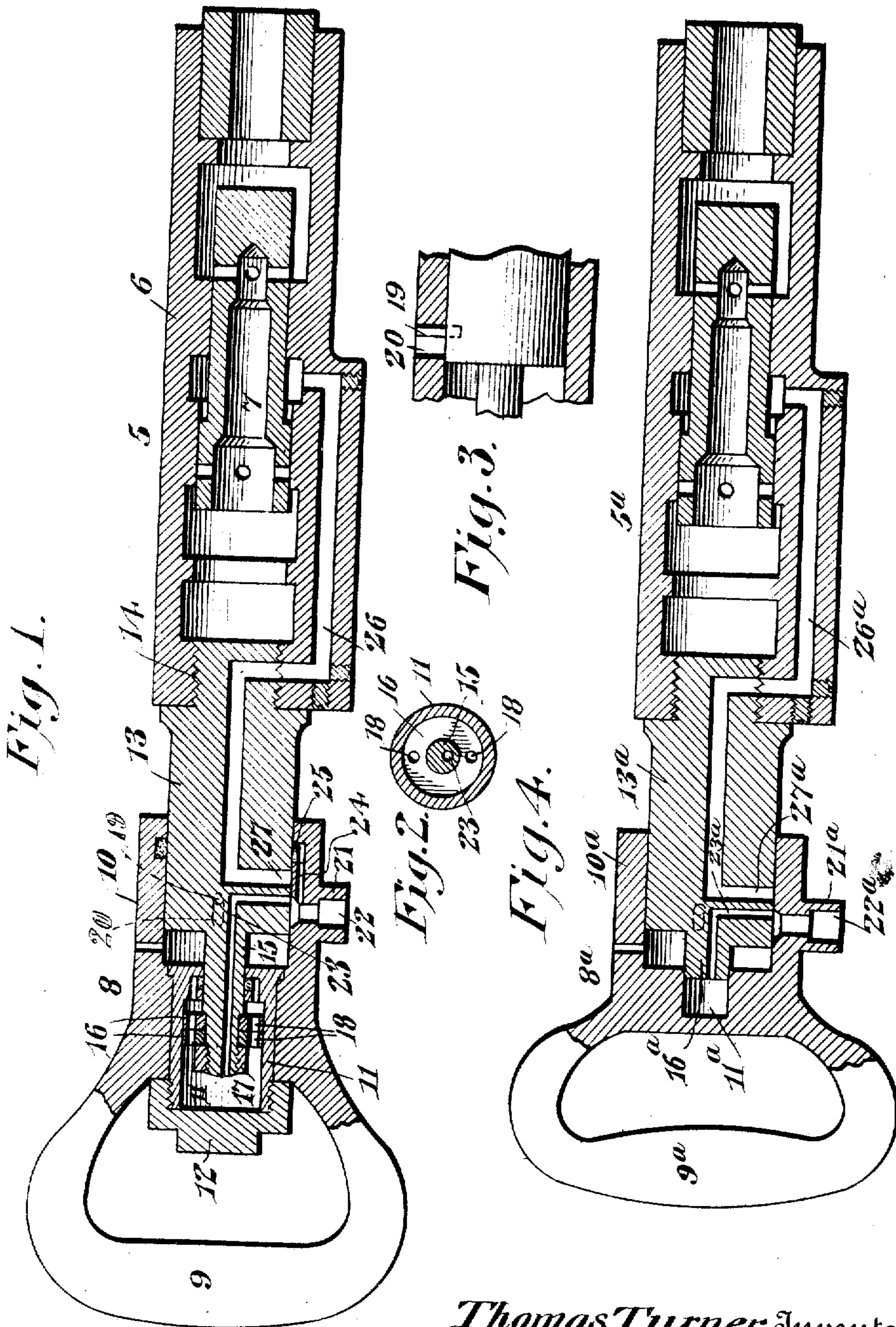


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PATENTED JAN. 29, 1907.

T. TURNER.
PNEUMATIC MOTOR.
APPLICATION FILED FEB. 27, 1906.



Witnesses
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THOMAS TURNER, OF OTTUMWA, IOWA.

PNEUMATIC MOTOR.

No. 842,359.

Specification of Letters Patent.

Patented Jan. 29, 1907.

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To all whom it may concern:

Be it known that I, THOMAS TURNER, a citizen of the United States, residing at Ottumwa, in the county of Wapello and State of Iowa, have invented a new and useful Pneumatic Motor, of which the following is a specification.

In hand-manipulated pneumatic motors as ordinarily constructed there are several serious objections present. In the first place, the operation of the motor imparts disagreeable vibrations, shocks, and jars, which are transmitted to the workman and have a deleterious effect upon him. Then, again, when outside valves and like-controlling devices are employed, unless the motor is held with sufficient force to its work, or if the motive fluid is turned on without offering some outside resistance to the operation of the hammer or piston, said hammer or piston will strike portions of the cylinder or casing and damage and derange the same, making the motor useless or inoperative.

The principal object in the present invention is to provide a novel and simple structure that will overcome or eliminate both of the above objections by providing an air or fluid cushion between the handle and the motor and by providing novel valve mechanism requiring resistance to the hammer before the same may be operated. Another object is to provide means whereby the strength or resistance of the cushion may be readily varied to suit the different conditions of use.

In the drawings, Figure 1 is a longitudinal sectional view through one embodiment of the invention. Fig. 2 is a cross-sectional view through the cylinder element and piston-rod. Fig. 3 is a detail sectional view at right angles to Fig. 2, showing the means for limiting the relative movement of the members. Fig. 4 is a horizontal sectional view of a slightly-modified form of structure.

Similar reference-numerals designate corresponding parts in all the figures of the drawings.

Referring to the embodiment disclosed in the first three figures, a motor member 5 is employed, which may be of any suitable structure comprising, broadly, a cylinder or casing 6, within which operates a reciprocating piston or hammer 7. The operation of this motor member is well known to those skilled in the art, and it is also a well-known fact that unless a drill-stem or other tool-

shank is opposed to the blows of the hammer or piston 7 said hammer or piston will strike the inwardly-projecting portions of the casing or cylinder 6 and batter the same out of shape, thereby ruining the structure.

Associated with the motor member 5 is a pressure member 8, which in a more restricted sense is a handle member. It comprises a suitable handle-grip 9, having at one end a cylinder element which includes a guide-sleeve 10. Within the inner portion of the guide-sleeve is located a cylinder 11, having a removable head or cap 12 threaded thereon and constituting the means for retaining the cylinder in place. Carried by the motor member 5 is a piston element comprising a shank 13, threaded into the rear end of the casing 6 of the motor member, as shown at 14, and having a reduced piston-rod portion 15 projecting from its rear end, said piston-rod being slidable in the cylinder 11. Mounted on the inner end portion of the piston-rod 15 is a piston that operates in the cylinder 11 and comprises relatively rotatable disks 16, held in place by a nut 17, threaded on the inner end of the piston-rod. The disks 16 have openings 18 therethrough, which are arranged to be placed in or out of alinement by the relative rotation of the disks. The motor and handle members are thus connected, but are relatively movable, this movement being limited, however, by a pin 19, carried by the piston element and operating in a slot 20, formed in the sleeve 10 of the handle element.

Motive fluid from any suitable source is supplied through a nipple 21, carried by the sleeve 10, and having a supply-port 22 therethrough. The piston element is provided with a channel 23, having an inlet end or port always in communication with the port 22, said channel extending longitudinally through the piston-rod 15 and having an outlet communicating with the interior of the cylinder in rear of the piston. Another port 24, formed in the sleeve 10, has communication with suitable air-actuating packing 25, surrounding the shank 13. The motive fluid for operating the motor 5 is conducted to said motor through a channel 26, formed partially in one wall of the casing 6 and partially in the shank 13 of the piston element, said channel 26 having an inlet-port 27, that is movable into and out of alinement with the supply-port 22.

The operation of this embodiment of the

invention may be briefly described as follows: Assuming that air under pressure is supplied to the port 22, it will be evident that the same will pass through the channel 23 and enter the cylinder 11, thus acting on the piston element and moving the handle and motor members away from each other. As a result, the inlet-port 27 of the motive-fluid-supply channel 26 will be moved out of alinement with the port 22, and no motive fluid will thus pass through said channel. Consequently it will be noted that the handle member also constitutes a valve member. It will be evident from the above that air or other motive fluid cannot enter the motor until a tool has been placed therein and the handle has been forced downwardly against the pressure in the cylinder 11 to bring the ports 22 and 27 into communication. When this has been done, there is sufficient force applied by the workmen to the structure to properly hold the motor to its work, and consequently all danger of jamming or battering the casing is eliminated, for as soon as the operator releases his pressure against the machine sufficiently to permit the air or motive-fluid pressure to operate on the piston in the cylinder 11 the motor and handle members will be relatively moved so as to carry the ports 22 and 27 out of alinement. The pressure required to thus throw the motor into operation can be varied, for the effective pressure area of the piston 11 can be varied. For instance, if the openings 18 are disposed out of alinement the air-pressure is against the entire rear surface of the piston and piston-rod; but if the openings are placed in alinement, the pressure on the disks is balanced, and consequently the effective pressure area is practically the diameter of the piston-rod. At the same time these cylinder and piston elements are performing another function, for they form an air-cushion between the handle member and the motor member, so that the vibrations, shocks, and jars of the latter are taken up in this cushion, are not transmitted to the handle member, and consequently not to the hand of the operator. A structure of this character is therefore peculiarly effective in that class of pneumatic or other fluid-operated motors in which the pressure action is manually controlled.

A slightly-different and more simple form of the invention is disclosed in Fig. 4. In this embodiment the motor member 5^a is of any desired or well-known form, and the handle member 8^a consists of a grip 9^a and a cylinder element comprising a sleeve 10^a and a counterbored portion 11^a, forming a cylinder. The piston element consists of a shank 13^a, carried by the motor member and having a reduced piston portion 16^a, that operates in the cylinder 11^a. Motive fluid is supplied through a port 22^a in a nipple 21^a, and

this port is in communication with the inlet of a channel 23^a, extending through the piston element and communicating with the cylinder 11^a. The supply-channel 26^a to the motor has an inlet-port 27^a, that is movable into and out of alinement with the port 22^a. It will be clear that the operation of this structure is substantially the same as that already described, and it has the same advantages excepting the means for securing the variable air-pressure. A further description of the same is therefore believed to be unnecessary.

From the foregoing it is thought that the construction, operation, and many advantages of the herein-described invention will be apparent to those skilled in the art without further description, and it will be understood that various changes in the size, shape, proportion, and minor details of construction may be resorted to without departing from the spirit or sacrificing any of the advantages of the invention.

Having thus fully described my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. In a pneumatic tool, the combination with a motor member, of a cylinder element, a piston element operating in the cylinder element, one of said elements being connected to the motor member, and a supply-conduit opening through the cylinder element, said piston element having a channel provided with an inlet end communicating with the conduit, and an outlet communicating with the interior of the cylinder on one side of the piston to admit motive fluid to said cylinder element for effecting the relative movement of the cylinder and piston elements.

2. In a pneumatic tool, the combination with a motor member, of a cylinder element, a piston element operating in the cylinder element, one of said elements being connected to the motor member, said piston element also having a port that permits the passage of the motive fluid into the cylinder on the opposite side of the piston, and means for closing the port.

3. In a pneumatic tool, the combination with a motor member, of a cylinder element, a piston element operating in the cylinder element, one of said elements being connected to the motor member, and a supply-conduit having a supply-port opening through the cylinder element, said piston element having channels, both of which communicate with the supply-port, one of said channels communicating with the interior of the cylinder on one side of the piston to admit motive fluid to said cylinder element for effecting the relative movement of the cylinder and piston elements, the other communicating with the motor member.

4. In a pneumatic tool, the combination

with a motor member, of a piston element connected thereto, a cylinder element in which the piston element operates, and a supply-conduit connected to the cylinder and having a port opening therethrough, said piston element having independent channels provided with independent inlet ends that communicate with the port of the supply-conduit, said channels leading in opposite directions, and one communicating with the interior of the cylinder, the other communicating with the motor member, said latter channel having its inlet end movable into and out of communication with the port.

5. In a pneumatic tool, the combination with a motor member, of a cylinder element, a piston element operating therein, one of said elements being connected to the motor member, a supply-conduit connected to one element, the other element having channels, both communicating with the conduit, one of said channels communicating with the cylinder on one side of the piston, the other communicating with the motor member and having its inlet end movable into and out of communication with the supply-conduit.

6. In a pneumatic tool, the combination with a motor member, of a cylinder element, a piston element snugly fitted therein and connected to the motor member, said piston element having a channel communicating with the motor member at one end and having an offset inlet end, and a supply-conduit having a port opening through the cylinder element and disposed in line with the path of movement of the inlet.

7. In a pneumatic tool, the combination with a motor member, of a cylinder element, a piston element operating in the cylinder element, one of said elements being connected to the motor member, and means for introducing motive fluid into the cylinder on one side of the piston, said means including ports carried by the piston and cylinder and arranged in alinement.

8. In a pneumatic tool, the combination with a motor member, of a cylinder element, a piston element operating in the cylinder element, one of said elements being connected to the motor member, and means for introducing motive fluid into the cylinder on one

side of the piston, said means including a supply-nipple connected to the cylinder element, and a channel formed in the piston element and communicating with the nipple and with the cylinder element at one side of the piston.

9. In a pneumatic tool, the combination with a motor member, of a cylinder element and piston element operating in the cylinder element, one of said elements being connected to the motor member, means for introducing motive fluid to the cylinder element on one side of the piston element, said piston element having an opening therethrough, and means carried by the piston element for closing said opening.

10. In a pneumatic tool, the combination with a motor member, of a cylinder element and piston element operating in the cylinder element, one of said elements being connected to the motor member, and means for introducing motive fluid to the cylinder member on one side of the piston element, said piston element comprising relatively rotatable parts having openings that are movable into and out of alinement.

11. In a pneumatic tool, the combination with a handle member having a cylinder, of a motor member having a piston element operating in the cylinder, and a supply-nipple connected to the cylinder, said piston having a channel that communicates with the nipple and with the cylinder in rear of the piston.

12. In a pneumatic tool, the combination with a handle member having a cylinder element, of a motor member having a piston element operating in the cylinder element, and a motive-fluid supply having a port through one of the cylinder-walls, said piston element having a channel communicating with the port and with the cylinder on one side of the piston, said piston element also having a supply-channel that communicates with the motor member and is movable into and out of communication with the port of the cylinder element.

In testimony that I claim the foregoing as my own I have hereto affixed my signature in the presence of two witnesses.

THOMAS TURNER.

Witnesses:

C. F. HYATT,
E. G. ALLEN.