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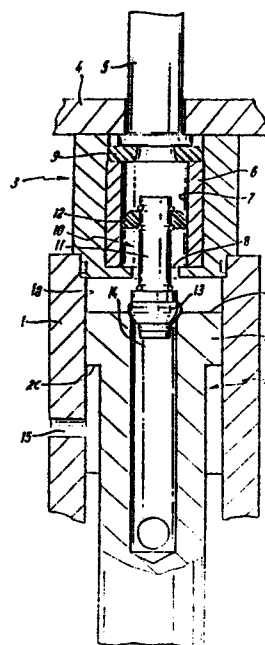
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Air tool with double acting valve.

An air tool comprises a casing (1) having an internal bore (1a) and a piston (2) slidably mounted for reciprocal movement therein. The piston (2) is driven in the bore (1a) by a fluid supply (5) controlled by valve means (3).

The valve means (3) is movable between a first position in which a drive portion (2b) of the piston (2) is in communication with the fluid supply (5) and is closed to the fluid exhaust means (14), and a second position, in which the drive portion (2b) of the piston (2) is closed to the fluid supply (5) and in communication with the fluid exhaust means (14).



Air Tool with Double Acting ValveFIELD OF THE INVENTION

5. This invention relates to an air tool having a double acting valve.

DESCRIPTION OF THE PRIOR ART

10. Conventional air tools generally comprise an outer casing or cylinder barrel with a reciprocating piston slidably mounted within it. The piston strikes an operating head or toolbit on each downstroke. Various types of toolbits can be used so that the tool can be used, for example, as a hammer, a pick or a scabbling tool. As the piston moves up and down in the bore it covers and uncovers various ports in the
15. cylinder bore which connect the bore to a compressed air source and to the atmosphere for the exhaust.

20. The piston is shaped and the ports are arranged such that when the piston is at the bottom of its stroke compressed air acts to force it upwards with the space above the piston being open to atmosphere. When the piston reaches the top of its stroke the situation is reversed and the compressed air acts to force the piston down to strike the toolbit with the space below the piston being open to atmosphere.

- Such tools suffer from a number of inefficiencies. Each time the piston reaches the end of a stroke the air used to drive it there is exhausted, thus losing some of the potential energy content of the compressed air. There is
5. also a degree of leakage of compressed air around the piston which increases in time as the tool wears. For these reasons the tools tend to make an inefficient use of a compressed air supply.
10. It is an object of the present invention to provide a pneumatic air tool having an increased compressed air consumption efficiency.

SUMMARY OF THE INVENTION

15. According to the present invention there is provided an air tool comprising a casing having an internal bore and piston means slidably mounted for reciprocal movement therein and valve means for controlling a fluid supply for driving said piston, the valve means being movable between a first
20. position in which a drive portion of said piston is in communication with said fluid supply and closed to fluid exhaust means, and a second position, in which said drive portion of said piston is closed to said fluid supply and in communication with said fluid exhaust means.
25. Preferably, said valve means is mounted for reciprocal movement in said casing.

- Preferably also, said fluid exhaust means is an opening in
30. the piston, the opening being closed by virtue of the opening in the piston engaging the valve means during part of the range of reciprocal movement of the piston

- Preferably also, the valve means has a first valve member
35. operable in the first position and a second valve member

operable in the second position, the first and second valve members being spaced apart on a valve stem.

5. Preferably also, the first and second valve members on the valve stem are adjustable so that the range of reciprocal movement of the piston may be varied.

10. Preferably also, second fluid supply means are provided or said tool for supplying fluid for driving said piston in a reverse direction.

15. Most preferably, said second fluid supply means comprises an inlet in the casing of said tool which supplies fluid to the bore of said tool to act on a drive flange of said piston.

BRIEF DESCRIPTION OF THE DRAWINGS

Embodiments of the present invention will now be described, by way of example, with reference to the accompanying drawings, in which:-

20. Fig. 1 is a sectional side view of an air tool in accordance with the present invention, with the piston near the top of its stroke;

25. Fig. 2 is a sectional side view of the air tool of Fig. 1 with the piston at a mid-point of its stroke; and

30. Fig. 3 is a sectional side view of the air tool of Fig. 1, with the piston near the bottom of its stroke.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

35. Referring to the drawings, an air tool comprises a cylinder liner in the form of a casing 1 having an internal bore 1a in which a piston 2 is fitted for reciprocal movement. A

valve assembly 3 is mounted on the upper end of the casing 1 and a top plate 4 having a high pressure fluid supply inlet 5 is mounted on the upper end of the valve assembly 3. The valve assembly 3 comprises an outer body 6 having an

5. internal bore 7 which communicates with the internal bore 1a of the casing 1 via an inlet port 8 and is sealably connected to the supply inlet 5 by a nylon washer 9. A control valve 10 is mounted in the valve assembly 3 and comprises a valve stem 11 which extends through the inlet

10. port 8, having an upper nylon valve member 12 and and a lower nylon valve member 13.

The piston 2 has a flange 2a at its upper end which forms an upper drive face 2b and a lower annular drive face 2c. A

15. fluid exhaust passage 14 extends through the piston 2.

A subsidiary high pressure fluid inlet 15 is provided in the casing 1 to allow high pressure fluid to communicate with the bore 1a and drive face 2c.

20.

In operation, a compressed air supply is connected to both the supply inlet 5 and the subsidiary inlet 15.

Referring to Fig. 1, the piston 2 is shown near to the top

25. of its stroke. In this position, compressed air enters the bore 1a through the inlet 15 to produce an upward force on the drive face 2c. At the same time the piston 2 is engaged with the control valve 10 such that the lower valve member 13 closes the exhaust passage 14 and the upper valve member

30. 12 opens the inlet port 8 so that compressed air from the inlet 5 enters the bore 1a. This compressed air produces a force on the drive face 2b of the piston 2 greater than that on the drive face 2c by virtue of the larger area of the face 2b. There is thus a net downward force acting on the

35. piston 2 so that it moves downwardly in the bore 1a.

Referring to Fig. 2, the piston 2 is shown at a mid-point of its stroke. As the piston 2 moves downwardly it allows the upper valve member 12 of the control valve 10 to close the inlet port 8 under the influence of the compressed air supply.

5.

The momentum of the piston is such that it continues downwardly to disengage from the lower valve member 13 and open the exhaust passage 14, as shown in Fig. 3. This allows the compressed air held in the bore 1a above the piston 2 to dissipate.

10.

The compressed air from inlet 15 acting on drive face 2c thus produces a net upward force on the piston 2 causing it to move upwardly in the bore 1a. As the piston 2 moves upwardly it engages the lower valve member 13 to close the exhaust passage 14 and to cause the upper valve member 12 to open the inlet port 8. The compressed air supply can thus enter the bore 1a to act on the drive force 2b of the piston once again. This force causes the piston to slow down as it reaches the top of its stroke and then causes it to begin its downward stroke again so that the cycle is repeated.

15.

20.

The operation of the control valve 10 ensures that only the minimum amount of compressed air is exhausted during each cycle thus ensuring an economical level of air consumption.

25.

The reciprocal movement of the piston 2 may be used to drive any type of conventional toolbit apparatus as required.

30.

The distance between the upper valve member 12 and lower valve member 13 on the control valve 10 may be adjusted thus altering the effective stroke, and hence the power, of the tool.

Modifications and improvements may be incorporated without departing from the scope of the invention

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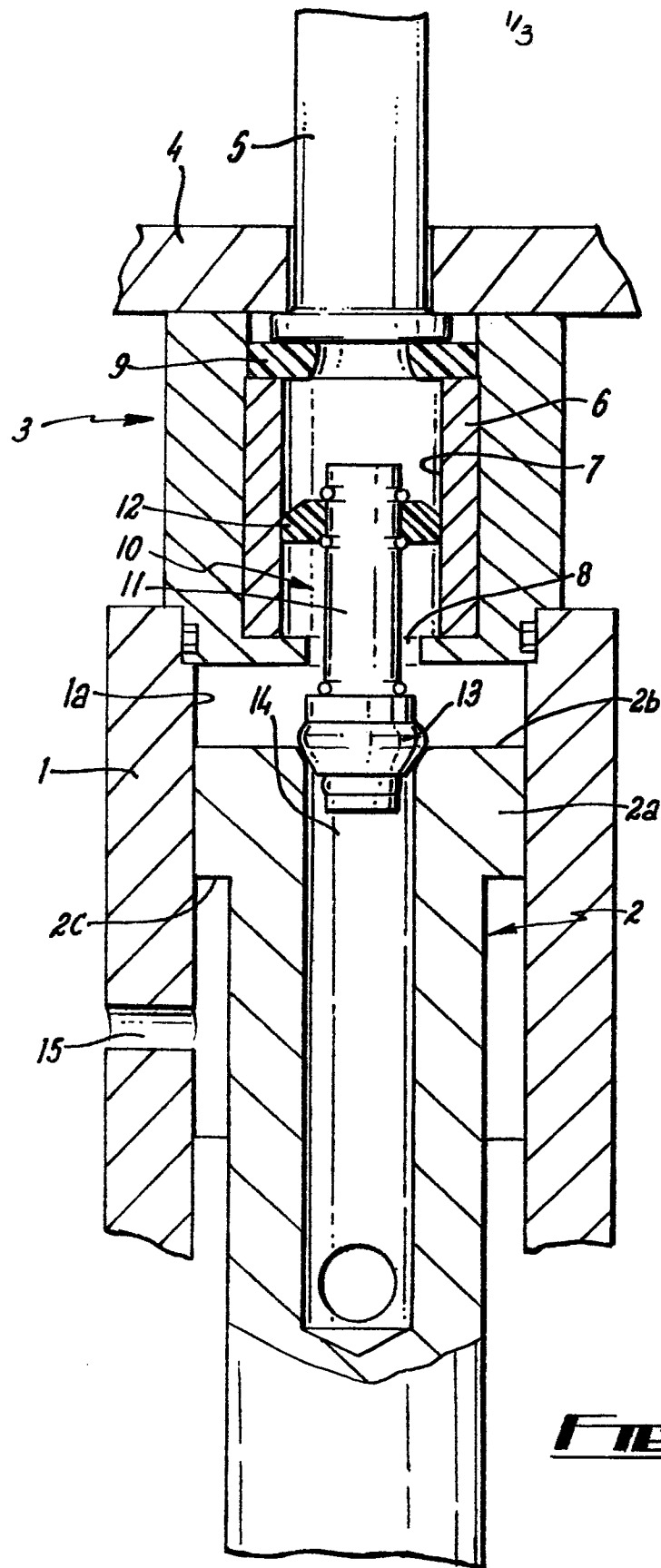
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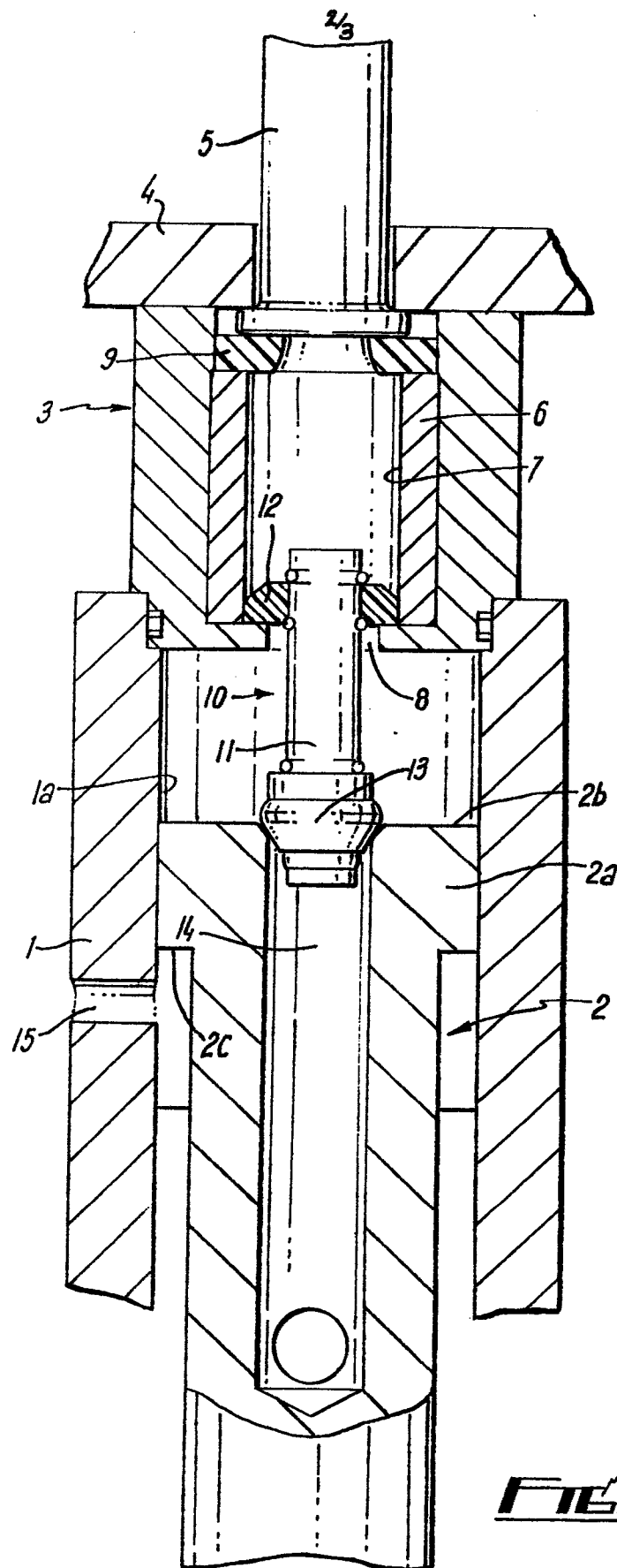
1. Air tool comprising a casing (1), a bore (1a), formed in the casing (1), piston means slidably mounted in the bore (1a) for reciprocal movement therein, a drive portion (2b) formed on the piston (2), a fluid supply (5) for driving the piston (2) in the casing (1), means (14) for the exhaust of fluid from the casing (1), and valve means (3) for controlling the fluid supply (5), characterised in that the valve means (3) is movable between a first position in which the drive portion (2b) of the piston (2) is in communication with the fluid supply (5) and closed to the fluid exhaust means (14), and a second position in which the drive portion (2b) of the piston (2) is closed to the fluid supply (5) and in communication with the fluid exhaust means (14).
2. An air tool according to Claim 1, wherein the valve means (3) is mounted for reciprocal movement in the casing (1).
3. An air tool according to Claims 1 or 2 wherein the fluid exhaust means is in the form of an opening (14) in the piston (2).
4. An air tool according to Claim 3, wherein the opening (14) in the piston (2) is closed by virtue of the valve means (3) engaging the opening (14) during part of the range of reciprocal movement of the piston (2).
5. An air tool according to any one of the preceding Claims wherein the valve means (3) has a first valve member (12) operable in the first position, and a second valve member (13) operable in the second position, the first and second valve members (12 and 13) being spaced apart on a valve stem (11).

6. An air tool according to Claim 5, wherein the first and second valve members, (12 and 13) are adjustable on the valve stem (11) such that the range of reciprocal movement of the piston (2) may be varied.

7. An air tool according to any one of the preceding Claims wherein second fluid supply means (15) are provided on the tool for supplying fluid for driving the piston (2) in an opposite direction to the fluid supply (5).

8. An air tool according to Claim 7, wherein the second fluid supply means comprises an inlet (15) in the casing (1) of the tool which supplies fluid to the bore (1a) of the tool to act on a drive flange (2c) provided on the piston (2).



**FIG. 2**

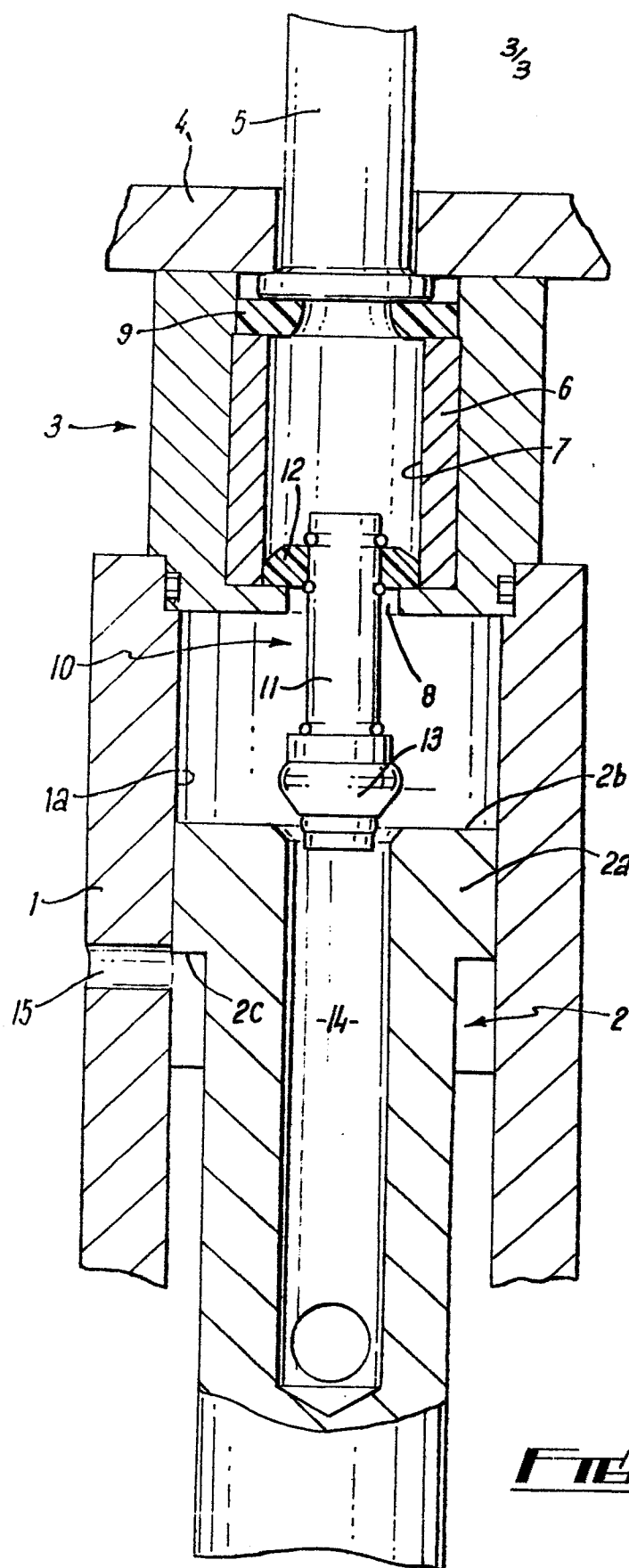


FIG. 3