

- [54] **PNEUMATIC SCREWDRIVER OR LIKE
ROTARY TOOL**
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- [22] Filed: **Oct. 13, 1972**
- [21] Appl. No.: **297,369**
- [30] **Foreign Application Priority Data**
Nov. 5, 1971 Great Britain 51578/71
- [52] **U.S. Cl.**..... **144/32, 81/55, 29/211**
- [51] **Int. Cl.**..... **B25b 23/08**
- [58] **Field of Search** **144/32; 29/211, 240, 208;
81/55**
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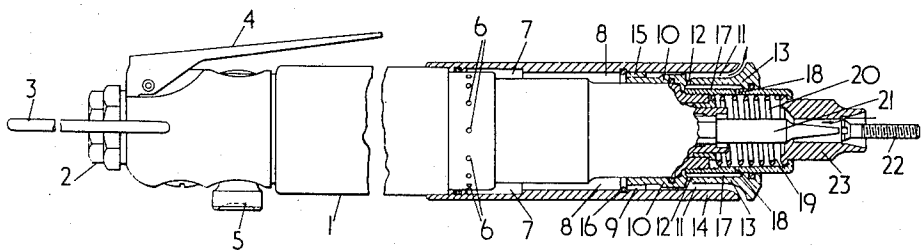
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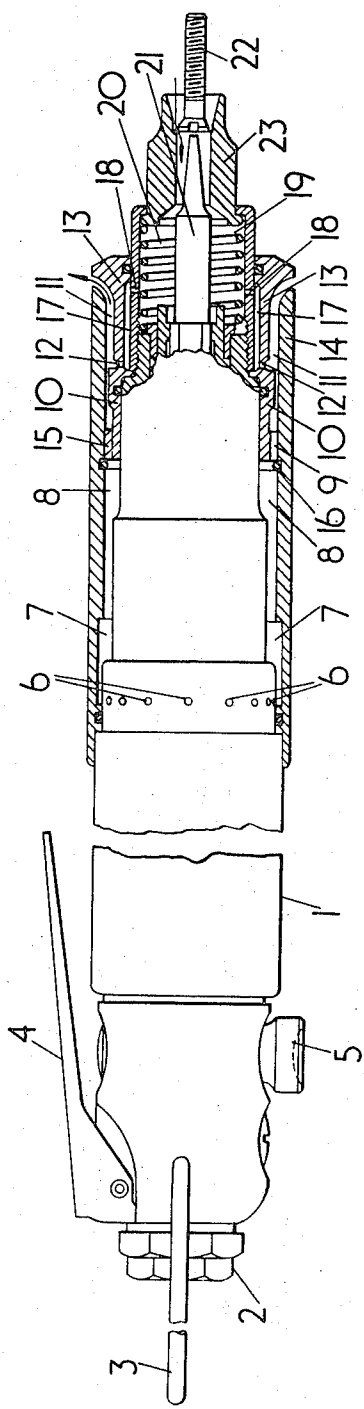
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[57] **ABSTRACT**

A pneumatic screwdriver having a hollow fastener finder around a rotary bit, in which finder a sub-atmospheric pressure of air is provided to pick up and hold a fastener in the finder by the passage of air through an annular passage way adjacent the head of the tool formed by a stepped sleeve in a bore in the casing, the air first passing through the narrow part of the passage way before emerging into the wider part of the passage way, and having radial bores opening into the wider part of the passage way adjacent the step in the sleeve to induce flow of air radially outwards through the bores and thereby induce a sub-atmospheric pressure in the hollow of the fastener.

6 Claims, 1 Drawing Figure





PNEUMATIC SCREWDRIVER OR LIKE ROTARY TOOL

The invention relates to pneumatic screwdrivers or like rotary tools which may be used for rotating fasteners such as nuts, bolts, screws and the like, while the object of the invention is to provide such a tool having improved means of presenting and holding the fastener means by the fastener finder or socket before its application to its cooperating bolt or screw threaded hole.

Various means have been previously proposed for picking up and holding fastening means, including magnetic means for ferro-magnetic fasteners, and spring sleeves for non-ferro-magnetic fastenings, and also suction devices.

The disadvantage of known suction devices is that seeing that the connection to a supply of compressed air is normally at the end of the tool and remote from the head of the tool, a pipe external to the tool is provided to carry live air or suction to the head of the tool. This pipe extends the length of the tool and can in consequence be vulnerable to damage, can interfere with the use of the tool and can also be detrimental to the appearance of the tool.

The invention consists in a pneumatic screwdriver or like rotary tool comprising a casing, a pneumatic motor in the casing, a rotary bit at the head of the tool, a connector for connection of the tool to a source of air under pressure on the casing remote from the head of the tool, and a hollow fastener finder within which the bit is positioned, characterised in being provided with a cylindrical bore in the casing adjacent the head of the tool, a stepped cylindrical sleeve coaxial with and spaced from the cylindrical bore in the casing and providing an annular passage way for air on its way to the exhaust port means in the casing at the head of the tool, the part of the passage way through which the air first passes on its way to the exhaust port means being narrower than the part through which it subsequently passes, circumferentially spaced radial bores in the sleeve opening into the wider part of the passageway and adjacent the said step in the sleeve, thereby, with flow of air through the passage way, to induce a flow of air radially outwards through the radial bores, and channel means by which the radial bores communicate with the hollow in the fastener finder, whereby a sub-atmospheric pressure is provided in the fastener to induce it to pick up and hold a fastener.

The invention further consists in a pneumatic rotary tool as set forth in the preceding paragraph in which the air which passes through the annular passage way travels from the connector through the casing of the tool.

The invention still further consists in a pneumatic rotary tool as set forth in the preceding paragraph in which the air which passes through the annular passage way is the air exhausted by the motor.

The accompanying drawing shows, by way of example only, one embodiment of the invention comprising a pneumatically operated screwdriver having a part cylindrical casing 1 which in known manner houses a pneumatic motor and gear box, not shown. The connector 2 is provided by which the tool is fastened to a flexible air supply tube. If desired the tool may be hung up by a ring 3. The supply of air to the tool is controlled by a manually operated lever 4. The direction of rotation of the motor is controlled by a knob 5 operating a valve not shown.

The exhaust air passes from the motor by way of circumferential bores 6 into the annular cavities 7 and 8 and thence by circumferentially spaced slots 9 into an annular passage way around a cylindrical step to sleeve 10 mounted coaxially with and spaced from a cylindrical bore in the casing, thus providing an annular passage having a narrower part and a wider part 11. The forward end of the sleeve 13 and the end of the casing 14 are shaped as shown so that the air passing through the passage way emerges by an exhaust port means in a radial direction as shown by the arrow. The sleeve 10 is positioned coaxially with the bore by means of the ribs 15 and is held in position by the circlip 16. A clutch mechanism is housed within the end of the sleeve 10, and is referred to later.

The sleeve 10 is provided with radial bores 12 opening into the wider passage 11 and close to the step in the sleeve 10 so that as air emerges from the narrow part of the passage way into the wider part of the passage way air is induced to flow radially outwards through the bores 12, thereby producing a sub-atmospheric pressure in the cavity 17, which is connected at its inner end by radial bores 18 with the central cavity 19 containing the spring 20 and the bit 21, and thus providing a sub-atmospheric pressure in the cavity 19. This induces air to flow into the hollow of the fastener finder 23, as shown by the arrow, thus picking up a fastener 22 and holding it in position as shown in the drawing.

The purpose of the clutch mentioned, but not shown, is to interrupt the drive from the gear box to the bit 21 until pressure is applied by the bit upon the fastener 22 during the process of screwing it into its cooperating bore. Under such pressure the bit moves longitudinally the tool and causes the clutch to be engaged. Consequently, when the motor is started by the lever 4 and the fastener finder 23 is empty, a subatmospheric pressure is established in the cavity 19, and air flows into the cavity by the way of the bore in the fastener finder.

When the mouth of the fastener finder is brought close to the head of a fastener 22, such as the bolt shown, it is lifted by the motion of the air and enters the finder and assumes the position shown in the drawing. Upon positioning the bolt at the threaded bore into which the bolt is to be screwed, pressure is applied to the tool and the bolt slides the finder 23 back into the tool so that the bit engages the bolt head, following which the bit slides back into the tool and the clutch is engaged and the bolt is rotated and driven home.

One method of presenting the bolts of the kind illustrated for picking up by the tool, is to provide a tray having parallel slots in the bottom thereof, wider than the stems and narrow than the heads of the bolts. When the tray is shaken, the stems of the bolts fall through the slots and the heads of the bolts are presented upwards. With the tool constructed in accordance with the invention there is sufficient flow of air into the finder not only to hold the bolt in the position shown, but to cause the bolts to jump up from the tray into the finder when it is held a short distance from the head of the bolt while the motor is turned on. The result is that the fastener is held positively in the finder by atmospheric pressure under the fastener head.

In an alternative form of construction live air is allowed to by-pass the inlet side of the motor and escape by the exhaust passages by way of a passage or passage way within the casing 1, thus providing the necessary

amount of air to create the same conditions for suction without running the motor. This can be arranged to be done with a reversible motor by positioning the direction control 5 in an intermediate position.

The advantages of the present invention over known constructions are in its simplicity and non-vulnerability. It also has added benefits in providing improved silencing of the tool and improved appearance of the tool.

It is to be understood that the above description is by way of example only, and that details for carrying the invention into effect may be varied without departing from the scope of the invention claimed.

I claim:

1. A pneumatic screwdriver or like rotary tool comprising a casing, a pneumatic motor in the casing, a rotary bit at the head of the tool, a connector for connection of the tool to a source of air under pressure on the casing remote from the head of the tool, and a hollow fastener finder within which the bit is positioned, characterised in being provided with a cylindrical bore in the casing adjacent the head of the tool, a stepped cylindrical sleeve coaxial with and spaced from the cylindrical bore in the casing and providing an annular passageway for air on its way to the exhaust port means in the casing at the head of the tool, the part of the passageway through which the air first passes on its way to the exhaust port means being narrower than the part through which it subsequently passes, circumferentially spaced radial bores in the sleeve opening into the wider part of the passageway and adjacent the said step in the sleeve, thereby, with flow of air through the passageway, to induce a flow of air radially outwards through

the radial bores, and channel means by which the radial bores communicate with the hollow in the fastener finder, whereby a sub-atmospheric pressure is provided in the fastener to induce it to pick up and hold a fastener.

2. A pneumatic rotary tool as claimed in claim 1 in which the air which passes through the annular passage way travels from the connector through the casing of the tool.

3. A pneumatic rotary tool as claimed in claim 1 in which the air which passes through the annular passage way is the air exhausted by the motor.

4. A pneumatic rotary tool as claimed in claim 1 in which the motor is a reversible motor and there is provided a control valve for controlling the direction of rotation of the motor and which valve has a third position in which the air from the connector by-passes the motor on its way to the annular passage way.

5. A pneumatic rotary tool as claimed in claim 1 in which the fastener finder is slidable against the action of the spring in a cylindrical sleeve mounted within the stepped cylindrical sleeve, in such position that a fastener held in the finder is movable towards and to engage the bit by pressure upon the fastener.

6. A pneumatic rotary tool as claimed in claims 1 in which the tool is provided with a clutch in the drive between the motor and the bit, which clutch is engaged by longitudinal movement of the bit towards the clutch, and which by continued movement of the fastener held in the finder after engagement with the bit moves the bit longitudinally and thus engages the clutch.

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