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OIL REGULATOR FOR PNEUMATIC TOOLS

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Fig. 1.

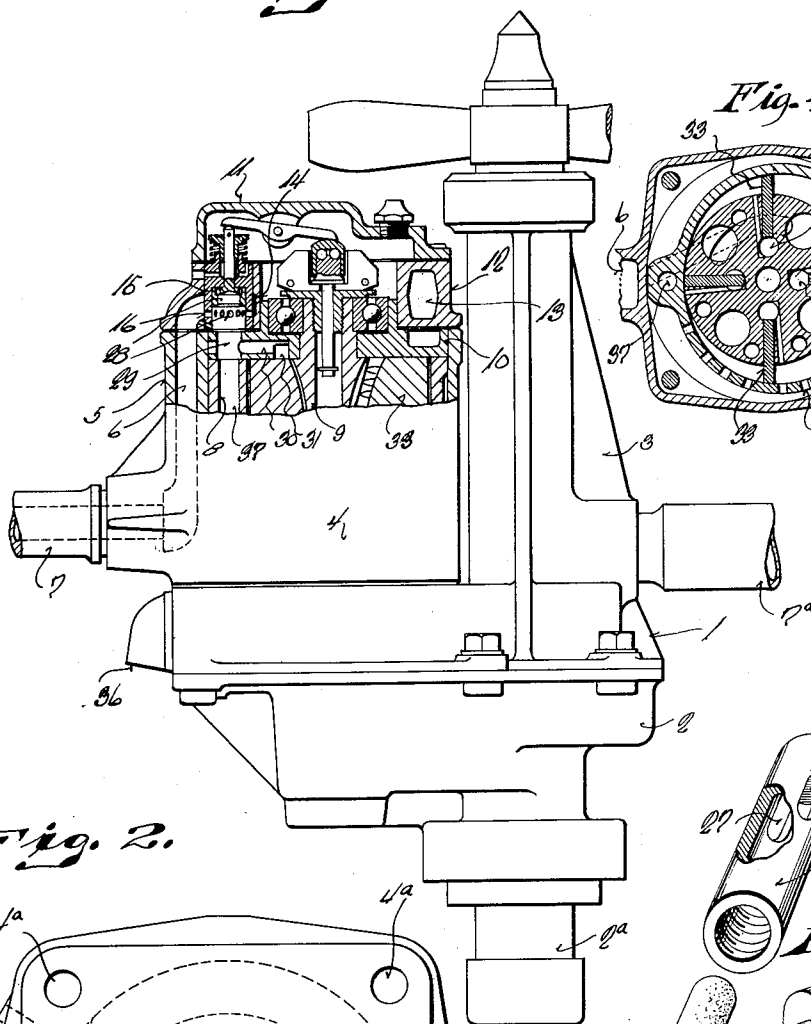


Fig. 4.

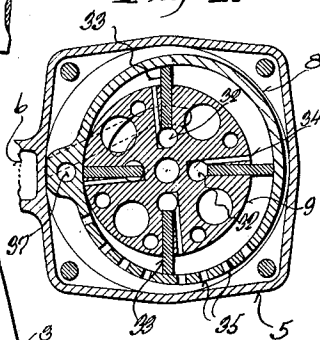


Fig. 2.

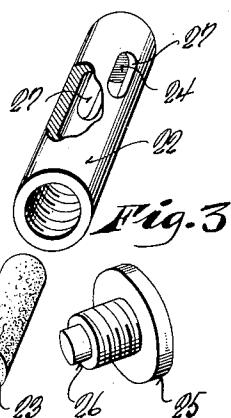
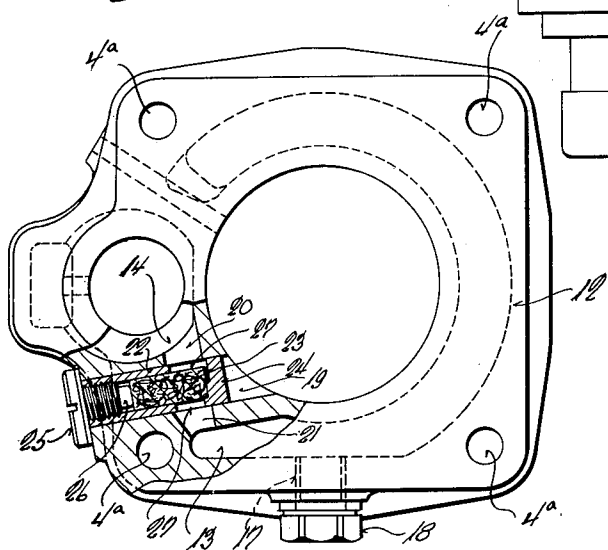


Fig. 3.

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UNITED STATES PATENT OFFICE

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OIL REGULATOR FOR PNEUMATIC TOOLS

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3 Claims. (Cl. 184—55)

This invention relates to an improved oil regulator for portable pneumatic and other tools.

In portable pneumatic tools, automatic lubrication of the working parts of the tools by carrying the oil into the tool with the incoming air has received considerable attention by the manufacturers of such tools.

In these tools and more particularly with respect to tools of the type in which rotor devices with piston blades are employed as the motor units, it has been proposed heretofore to provide a chamber within the casing of the tool to serve as a reservoir for the lubricating oil required, and to have this reservoir in communication with the main inlet air passage of the tool in advance of the motor through a relatively small opening which is controlled by a needle valve. The main objection to this construction is that the opening clogs if unclean oil is used by reason of the close adjustment required between the wall of the opening and the valve in order to feed the oil very slowly from the reservoir to the air duct or just enough to prevent the moving parts of the tool getting dry and starting to cut and wear.

The object of my invention is to provide an oil regulator so constructed and designed that it will not clog and thus keep open at all times the connection between the reservoir chamber and the air duct so that the required flow of oil to the tool may be maintained, and also strain or filter the oil as it passes out of the reservoir and thus supply only clean oil to the tool.

Specifically, I provide a cartridge type of device insertable in the connection between the reservoir and the inlet air passage of the tool, with a packing of felt or other oil cleaning and straining material in the cartridge through which the oil must flow. The cartridge is so constructed and arranged in the tool that it may be readily and easily removed from time to time for renewal of the felt or packing material employed in the device. The closing cap of the cartridge engages the packing to compress it to the extent required to control the flow of oil therethrough.

The invention consists further in the matters hereinafter described and claimed.

In the accompanying drawing:

Fig. 1 is a side view with parts in section of a portable pneumatic tool provided with the oil regulator of my invention;

Fig. 2 is a top plan view of the motor section of the tool with the cap member removed to show the oil regulator which is in section;

Fig. 3 is a perspective view of the several parts composing the regulator; and

Fig. 4 is a horizontal sectional view taken through the rotor and its shell.

The tool shown in the drawing is of the type having a supporting frame 1 with a gear case section 2 on its under side and feed screw and motor sections 3, 4, respectively, on its upper side. The several sections referred to are secured together in assembled relation in any suitable manner, as by screws and bolts, some of which are shown in Fig. 1.

The motor section 4 has an outside casing 5 provided with an inlet passage 6 to which is connected a hollow handle 7 through which the compressed air required to operate the tool is supplied. A manually operable throttle valve (not shown) is associated with the handle 7 whereby the operator may control the supply of motive fluid to the tool. The tool has a dead handle 7^a on its side opposite the live handle 7, and as these handles extend laterally outward from the tool they provide means whereby the tool may be conveniently held and carried.

Located within the casing 5 is a rotor housing or shell 8, in which is a revoluble rotor 9 having shaft extensions at its opposite ends. Said extensions are journaled in end plates at the opposite ends of the shell 8, which plates and shell are held against rotation as in tool structure of this kind. The motor section 4 is arranged on the frame 1 with the axis of the rotor 9 vertical and connected at its lower end with the spindle 2^a of the tool through gearing in the gear case section 2. The upper end plate 10, as shown in Fig. 1, is clamped between the upper end of the shell 8 and the cap structure at the top of the motor casing. This structure provides a support and housing for the governor and the valve operated thereby in the rotation of the rotor 9 to automatically control the amount of motive fluid supplied thereto in accordance with the load on the same. The cap structure includes an outer cap member 11 and an inner member 12, which is interposed between the cap member 11 and the top of the motor casing 5, as shown in Fig. 1. The bolts which secure the casing 5 to the frame 1 may be made long enough to take in the cap structure to clamp it and its parts together and to the casing of the motor. The holes for these bolts are shown at 4^a, 4^a in Fig. 2.

The member 12 is preferably in the form of a casting in the shape required to conform to the contour at the upper end of the motor section of the tool, and is cored out to provide an oil con-

taining chamber or reservoir 13, which as shown in Fig. 2 extends in a circumferential direction about the axis of said section from points on opposite sides of an annular space 14 about the exterior of a bushing 15 in which is slidably fitted a valve 16 operated by the governor mechanism of the tool. The reservoir 13 is provided with a filling opening 17 normally closed by plug 18, as shown in Fig. 2.

In accordance with my invention, the casting 12 is cored out to provide a bore 19, which extends through the casting at a point adjacent one end of the reservoir 13 and interposed between the same and the space 14, as shown in Fig. 2. The casting 12 is provided with ports 20, 21, on opposite sides of the bore 19. The port 20 connects the bore 19 with the space 14, while the port 21 connects the bore with the adjacent end of the chamber 13, as shown in Fig. 2.

The oil regulator of my invention is disposed in the bore 19, and is preferably made in the form of a cartridge comprising a tubular member or sleeve 22 of a diameter to fit within the bore 19, and containing a packing 23 of suitable flow controlling and oil filtering material, such as felt. The inner end of the sleeve 22 is closed by an end wall 24. The outer end of the sleeve is made open and is internally screw-threaded to receive a threaded closing plug 25, which is provided with an inward extension 26 to engage and compress the packing 23 to render it dense enough to serve as a flow regulator and an effective filter or screen for the oil passing therethrough. In order that the oil may pass through the packing from the reservoir 13 to the space 14 about the exterior of the bushing 15, I provide the sleeve 22 with diametrically arranged slots 27, 27, disposed to register respectively with the ports 20 and 21, as shown in Fig. 2.

The density and length of the packing 23 selected is such that the packing when compressed by the closing plug 25 will allow only the proper amount of oil to pass therethrough and thus avoid wasting of the oil. The packing being in contact on one side with the oil in the reservoir 13 through the port 21 will absorb the oil and furnish it to the compressed air on the other side of the packing which is in contact therewith through the port 20. Compressed air entering the chamber 14 each time the tool is started passes through the packing 23 into the oil reservoir 13 creating a pressure on the oil therein, and at the same time removing any dirt or other foreign matter collected on the packing. When the air is turned off from the chamber 14, as by closing the throttle valve in the handle 7, the air travels in the opposite direction from the reservoir carrying oil with it through the packing 23 and into the motor section of the tool to lubricate its parts. This oiling system does not clog and feeds oil even if considerable dirt gets on the felt. It does not prevent the felt from absorbing the oil and the compressed air in the chamber 14 also being in contact with the packing 23 will carry oil from the packing along with the air to the working parts of the tool.

The sleeve 22 has a pressed fit in the bore 19, and therefore prevents any oil from passing from the reservoir into the chamber 14 except through the felt. This effectively regulates the amount of oil fed into the air line of the tool, and also prevents grit and dirt which might be in the oil from passing into the tool to injure or score its working parts. Moreover, the dirt does not pre-

vent the oil from coming in contact with the felt.

In order that the compressed air admitted into the inlet passage 6 may enter the shell or housing 8 to operate the rotor 9 therein, I provide the bushing 15 with a plurality of ports 28 arranged to permit the air to flow from the passage 6 into the interior of the bushing when the valve member 16 uncovers said ports. The end plate 10 is provided with a passage 29 which registers with the lower open end of the bushing 15. The passage 29 connects with a radial passage 30 in the end plate 10, which passage leads to a groove 31 which feeds live air to the bottoms of the slots 32 in which the piston blades 33 of the rotor have sliding movement. The motor is so constructed that the live air may pass from the bottoms of the slots to the rear or pressure sides of the blades beyond the periphery of the tool through passages 34 to effect rotation of the rotor as in motors of this design. The motor is also constructed to permit the air to exhaust from the shell 8 through exhaust ports 35 to the exhaust nozzle or deflector 36 on the exterior of the tool. The end plate (not shown) at the lower end of the rotor is similar to the plate 10 and has the radial passage and the groove so that both ends of the rotor will be supplied with motive fluid at the same time. For connecting the passages 29 whereby both ends of the rotor may be supplied with motive fluid, the housing or shell 8 is provided with a longitudinal passage 37, as shown in Fig. 1.

It is to be of course understood that the oil regulator of my invention as herein shown and described is not restricted in its use to the particular type of tool herein referred to. The particular type of tool shown has merely been selected as an illustration of the application of my improved oil regulator for pneumatic tools. Regardless of the type of tool, the oil regulator is disposed in the passage which connects the oil reservoir with that portion of the live air duct of the tool in advance of the motor thereof.

I claim as my invention:

1. In a pneumatic tool having a motor and a live air duct thereto and a chamber adapted to contain lubricating oil, passage providing means connecting the chamber with the live air duct in advance of the motor, and an oil regulator disposed in said passage, said regulator consisting of a tubular member with a packing material therein and having slots in register with the portions of the passage on opposite sides of the tubular member, and a non-yielding plug adjustably mounted in said member and directly engageable with the packing for compressing the same and holding it compressed to control the flow of oil therethrough.

2. An oil regulator in the form of a cartridge or self-contained unit and insertable as such in a pneumatic tool, comprising a tubular holder open at one end and closed at the opposite end and having slots in the sides thereof, a packing fitting in said holder and underlying said slots, and a screw plug fitting in and closing the open end of the holder, said plug having its outer end exterior of the holder and its inner end directly engaging the packing for compressing the packing in the holder against its closed end on screwing the plug into the holder.

3. In a pneumatic tool having a motor and a live air inlet duct therefor, a member incorporated in the structure of the tool and having a chamber to contain a supply of lubricating oil for the

working parts of the motor, a pair of intersecting passages in said member between said chamber and said duct, one of said passages connecting the chamber with the duct in advance of the mo-	a tubular holder tightly fitting in the bore to close the same against leakage of oil from the chamber, said holder having slots in register with the passage which intersects the bore, a packing in said holder, and a screw plug fitting in the hold-	80
5 tor and the other passage being in the form of a bore opening to the outside of the member, and an oil regulator in the form of a cartridge or self-contained unit insertable into said bore from the exterior of the member, said regulator comprising	FRANK B. HAMERLY.	85
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