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(54) PRESSURE-FLUID DRIVEN TOOL HAVING A GUARD MEANS

(71) We, INGERSOLL-RAND COMPANY, a Company organised under the laws of the State of New Jersey, United States of America, of 200 Chestnut Ridge Road, Woodcliff Lake, New Jersey 07675, United States of America, do hereby declare the invention, for which we pray that a patent may be granted to us, and the method by which it is to be performed, to be particularly described in and by the following statement: —

Good safety practice has always dictated the use of a guard or protective device for personal safety on certain classes of tools having work engaging members which, because of their high speed of operation or exposed cutting edges, would allow serious injury to the operator should he accidentally contact the work engaging member. In particular, hand-held saws and grinders have long been known to constitute such a hazard, and for this reason saw and grinder manufacturers have provided numerous designs of guards for personal protection. However, a guard is effective only so long as it is used by the operator. In many instances, the inconvenience of the guard no matter how slight has prompted the operator to remove the guard while the tool is in service.

According to the invention there is provided a pressure fluid-driven tool comprising: a tool housing; a pressure fluid supply connected to the housing; a pressure-fluid driven motor means in the housing communicating with the pressure fluid supply and having its work output on a spindle; a work engaging means mounted on the spindle; a guard means attached to the housing for at least partially surrounding the work engaging means; and the attachment of the guard means being essential to the maintenance of the pressure fluid supply.

An embodiment of the invention will now be described by way of example with reference to the accompanying drawings in which: —

FIG. 1 is a sectional view of the side elevation of the pressure driven tool according to this invention;

FIG. 2 is a plan section taken through section 2–2 of FIG. 1.

Referring now to FIG. 1, a vertical hand-held grinder similar to the type commonly employed in industry for operation by compressed air or the like is shown. The grinder consists of a housing generally designated by numeral 1. The housing contains a pneumatic motor 2 of the typical vane type. The motor rotor 3 and vanes 4 are best seen on FIG. 2. Compressed air enters the housing via pressure fluid inlet 5 and proceeds to the motor by passing through a supply passage 6 in the handle 7 which is attached to the housing.

The pressure fluid first passes through a first screen 8 to where it encounters valve 9. The valve 9 is the primary shut off means for the grinder and may be of any convenient design. An axially displaced end faced spool valve has been chosen for the preferred embodiment. Operation of safety lever 10 will displace the spool to the left as shown in FIG. 1 allowing it to come off of valve seat 11 which then permits the pressure fluid to proceed along the supply passage 6. A second screen 12 has been optionally provided beyond the valve seat. Pressure fluid passing through screen 12 next enters the vertical housing passageway 13 in housing 1. The pressure fluid is here directed to the top of the housing wherein it enters a governor chamber 14. Mounted in the governor chamber for rotation with the motor rotor is centrifugal governor 15.

So long as the grinder is operating below its governed speed, pressure fluid will enter the governor casing 16 through orifice 17 and by means of governor passageway 18 enter the motor housing 19, wherein it will be expanded against the motor vanes 4 to produce the rotary driving force necessary to operate the tool. Whenever the motor exceeds the governed speed, centrifugal

force will force the orifice sealing means 21 of the centrifugal governor 15 to close off the orifice 17 thereby reducing the pressure fluid supply to the pneumatic motor 2. This, of course, results in the reduction of power output of the motor and hence its speed will decrease. The work output of the motor 2 is on spindle 22 which has mounted on it a cup grinding wheel 23. Cup grinding wheel 23 is held in place by means of backup washer 24, force washer 25, and machine screw 26 in a well-known manner.

Surrounding the cup wheel is a guard 27 which is provided with an outer adjustable flange 28 to compensate for wheel wear in a conventional manner. The adjustable guard is also provided with a retaining flange 29. Inspection of FIG. 1 will show the pneumatic motor 2 to be slidingly disposed in the housing 1 in bore 30. Rotation of the pneumatic motor within bore 30 is prevented by locating pin 31. However, the axial retention of the motor is accomplished by means of retaining flange 29. Differences in expansion and makeup tolerances are compensated for by means of dual Belleville springs 32.

FIG. 2 is a plan view of the grinder through section 2–2 of FIG. 1. The section shows the motor rotor 3, the vanes 4, and the motor housing 19 of the pneumatic motor 2. Pressure fluid enters the motor via inlet port 36 and is exhausted to atmosphere through exhaust port 37 around the outside of the motor housing 19, and finally through muffler 38. At the level of section 2–2 taken through an oiler 34, the cross-section of the vertical housing passageway 13 has been elongated to the kidney-shape shown to provide for additional oil capacity. The section of the passageway is circular above and at least to the "O" ring seal 39. Threaded plug 40 permits filling of the oil cavity.

The guard 27 and retaining flange 29 are permanently secured together by any well-known bonding process, or alternatively, as shown, retaining flange 29 may be one piece construction with the guard 27. The guard is held in place by means of several mounting screws 33 which are distributed on the face of the housing and are sufficiently sized and located to restrain the pressure force developed on the motor housing which tends to force it out of the bore 30.

In addition to the placement of the guard being required for motor retention within the grinder housing, vertical housing passageway 13 also communicates with the retaining flange 29. In the case of the preferred embodiment shown, an oiler 34 has been slidingly disposed in the vertical housing passageway 13. The oil retaining cavity 35 surrounding the oiler is utilized for oil storage to lubricate the grinder during operation. The placement of the retaining flange is required to retain the oiler in the vertical housing passageway 13. The oiler is, of course, an optional item and where it is omitted, the vertical housing passageway 13 would communicate directly to atmosphere were the grinder guard to be omitted.

It thus may be appreciated by one skilled in the art that positioning of the grinder guard is required for the operation of the grinder, or one of the three things will prevent the grinder from functioning. Either the motor will be expelled from bore 30 along with the governor, or the oiler will be expelled from the vertical housing passageway 13, or in the event that the oiler is not utilized, the passageway 13 will be directly open to amtosphere. In all events, the grinder will not operate, and the pressure fluid will be vented to the atmosphere. It can thus be appreciated that the unique design of the grinder of our invention will render the grinder inoperable by venting pressure fluid to the atmosphere whenever the safety guard is omitted for any reason.

Numerous other modifications of this invention will occur to one skilled in the art, and we do not wish to be limited in the scope of our invention except by the scope of the following claims:

WHAT WE CLAIM IS:—

1. A pressure-fluid driven tool comprising:
a tool housing;
a pressure fluid supply connected to said housing;
a pressure-fluid driven motor means in said housing communicating with said pressure fluid supply and having its work output on a spindle;
a work engaging means mounted on said spindle;
a guard means attached to said housing for at least partially surrounding said work engaging means; and
the attachment of said guard means is essential to the maintenance of said pressure fluid supply.

2. An apparatus as claimed in Claim 1 wherein:
removal of said guard vents said pressure fluid supply to atmosphere.

3. An apparatus as claimed in Claim 2 wherein:
a plurality of vents are provided.

4. An apparatus as claimed in Claim 1 wherein:
removal of said guard permits said motor means to freely disassociate itself with said housing and thereby vent said pressure fluid supply to atmosphere.

5. An apparatus as claimed in Claim 1 wherein:

removal of said guard permits a pressure fluid retaining member in said pressure fluid supply to freely disassociate itself with said pressure fluid supply and thereby vent said pressure fluid supply to atmosphere.

6. An apparatus as claimed in Claim 5 wherein:

said pressure retaining member is an oiler.

7. An apparatus as claimed in any preceding claim wherein:

said pressure-fluid driven tool is a rotary grinder.

8. An apparatus as claimed in any preceding claim wherein:

said guard means is provided with a pressure retaining means.

9. An apparatus as claimed in Claim 8 wherein:

said pressure retaining means is a flange abutted to said tool housing.

10. An apparatus as claimed in Claim 9 wherein:

said flange is a non-removable part of said guards means.

11. A pressure-fluid driven tool substantially as herein described with reference to and as shown in the accompanying drawings.

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2 SHEETS *This drawing is a reproduction of the Original on a reduced scale*
Sheet 1

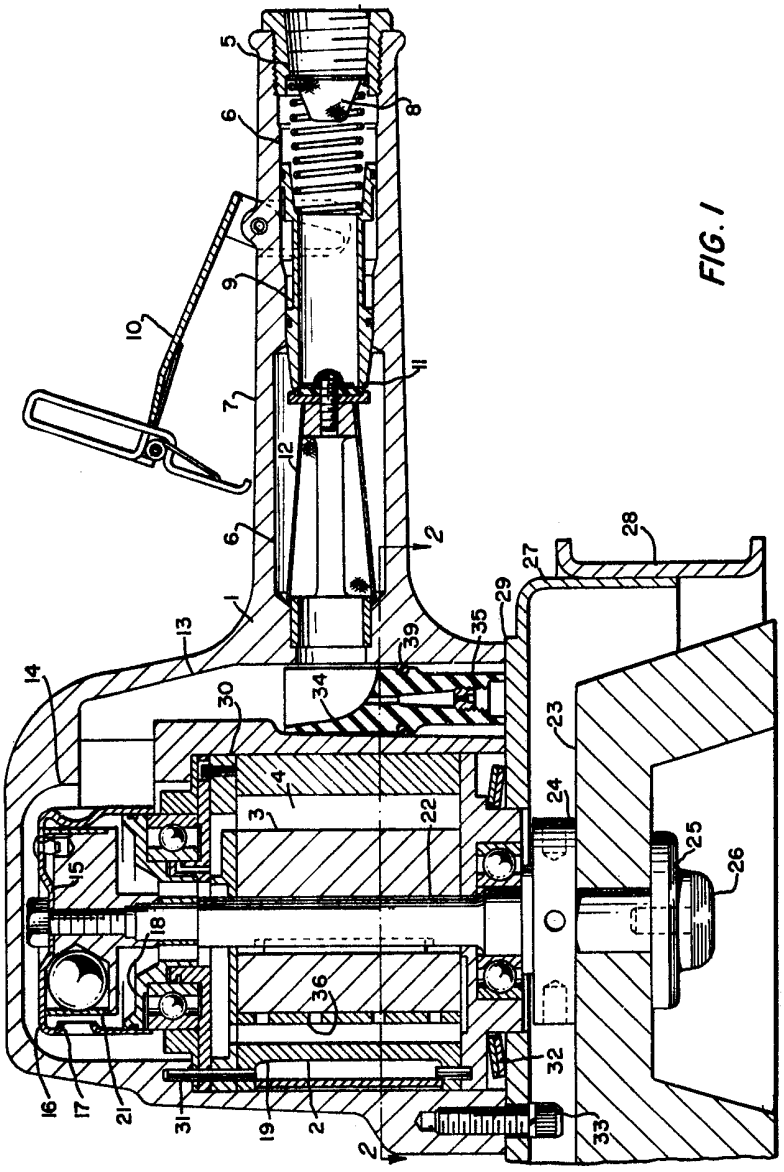

FIG. 1

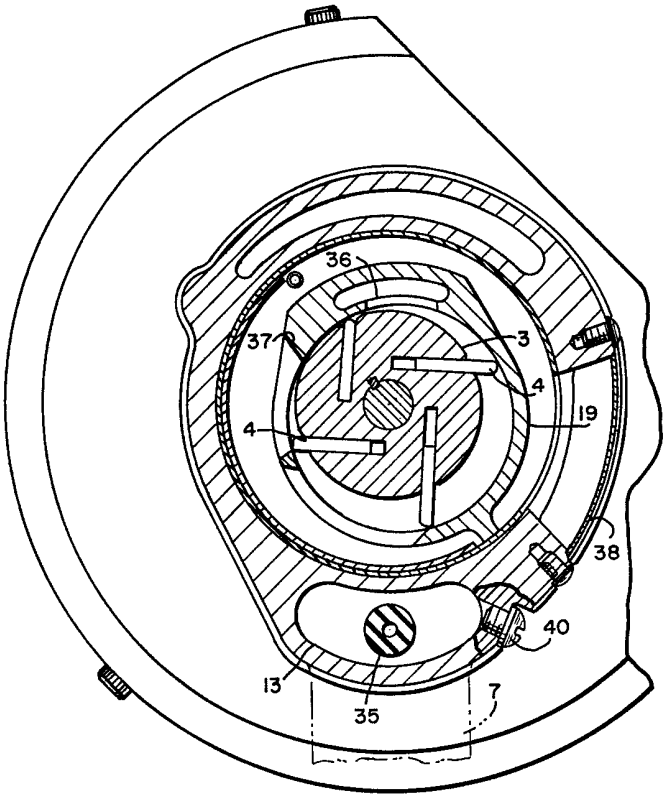

FIG. 2