July 18, 1939. F. P. FORSS 2,166,757

GRINDER AND CONTROL VALVE THEREFOR

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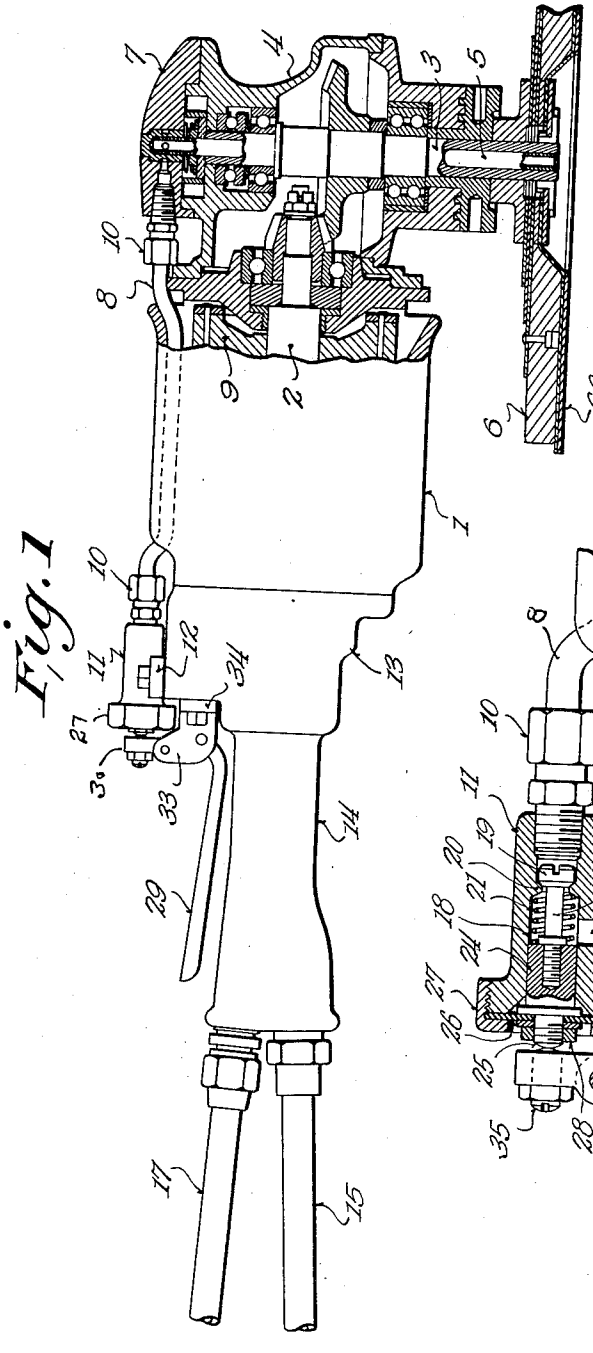


Fig. 1

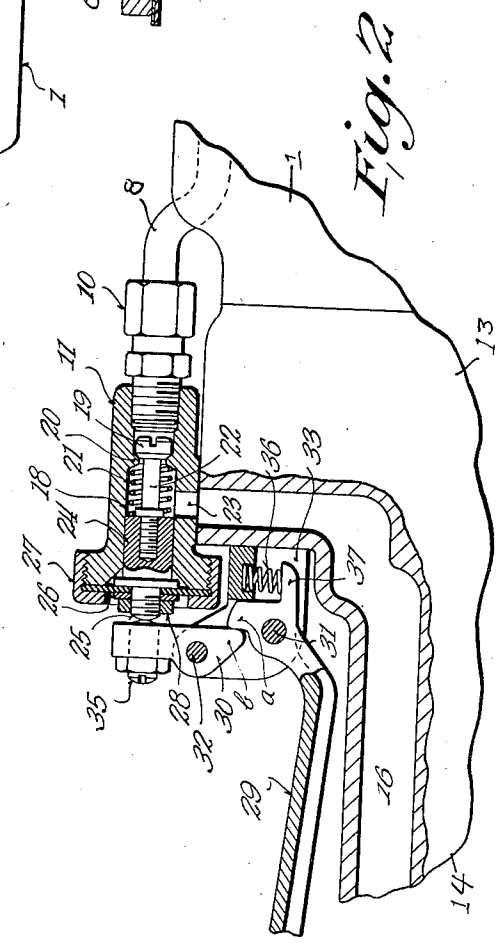


Fig. 2

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GRINDER AND CONTROL VALVE THEREFOR

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1 Claim. (Cl. 51—170)

This invention relates to portable motor driven abrading tools and more particularly to the regulating valve for the water attachments for such machines.

These tools are operated at relatively high speeds, high frequency electric motors being usually employed in these machines. Considerable dust is raised in the grinding or abrading operations of these tools, and this dust is injurious to the workmen if it contains lead particles which is usually the case in motor vehicle body grinding or smoothing work. The lead particles come from the solder material used to fill out the depressions or cavities which may occur in outer surfaces of the steel plates of which these vehicle bodies are formed or fabricated.

Water has been used to allay this dust. It is the practice to discharge water onto the surface being ground through the spindle of the tool while the tool is being used. The difficulty heretofore has been to have leak-proof connections for the water supply at the tool, and more especially at the valve which is opened and closed to turn-on and shut-off the water supply to the tool spindle. The previous valves have required packing arrangements about their movable parts to guard against water leakage because of the necessity to have these movable parts extend through the valve casing to be available exteriorly of the tool for operation to open the valve. These packing arrangements are subject to wear due to the sliding action of the operating member through them and a leak-proof joint is impossible to obtain. Also, these tools are subject to rather severe vibrations when in use, and this adds to the difficulty of obtaining leak-proof joints with the previous valve devices.

The general purpose and object of my invention is to provide an improved valve device which does not require the use of any packing and thus may be made leak-proof to prevent the entry of water into the tool to injure its windings or short circuit the motor as heretofore.

In accordance with my invention, I employ a flexible rubber or like diaphragm over the rear end of the valve housing and clamp the diaphragm about its margin in sealing relation to the housing to avoid water leakage at the housing and use the diaphragm to move the valve member within the housing into open position.

A further object of my invention is to provide a lever arrangement for flexing the diaphragm to open the valve member, and additionally dispose the lever which is engaged by the hand of the operator along the outside of the tool handle so that the operator must grasp both to hold and manipulate the tool.

A further object of the invention is to provide a spring arrangement, one acting on the valve member to close it when the lever is released, and the other spring acting on the lever to move it outwardly from the tool handle in the closing of the valve.

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

In the accompanying drawing—

Fig. 1 is a side view with parts broken away and in section, respectively, of a portable motor driven abrading tool having a water attachment, the controlling valve of which is constructed in accordance with my invention; and

Fig. 2 is a sectional view, with parts in elevation, detailing said valve and its operating mechanism.

In the drawing, 1 indicates the motor case of the tool, and 2 indicates the armature shaft of the high frequency electric motor located within the motor case as in tools of this type. The shaft 2 has a driving connection with the tool spindle 3 journaled in a nose section 4 secured to the motor case 1 at the forward end of the tool. As in tools of this character, the spindle 3 and the housing section 4 are arranged in right angular relation to the shaft 2, the driving connection referred to comprising a meshing beveled pinion and gear as shown in Fig. 1. The spindle 3 is hollow and contains a tube 5 which supplies water to an abrading disc 6 secured to the outer end of the spindle. The disc 6 is equipped with an abrading surface 6a which may be emery cloth or other desired material. The tube 5 discharges water through the center of disc so as to wet the work and allay dust which may be produced in the grinding action of the tool.

The tube 5 has a non-rotative fit in the head portion 7 of the hose section 4 and is supplied with water through a pipe 8 extending in part through the motor case 1 at one side of the motor unit 9 as shown in Fig. 1. The pipe 8 has a nipple and union connection 10, 10 at its opposite ends with the head portion 7 and the valve fixture 11 of my invention as shown in the drawing. At the head 7, the nipple 10 connects with ports in the tube 5 through a surrounding chamber as detailed in Fig. 1.

The valve fixture 11 has side lugs 12 by which it is mounted on and secured to the switch housing 13 at the rear of the motor case 1. The switch housing 13 mounts and encloses the

switch (not shown) by which the current supply to the tool motor is controlled. The fixture 11 overhangs the tool handle 14 connected to and extending rearwardly from said switch housing. Said handle is hollow being divided longitudinally into a pair of passages, one (not shown) for the wires for the cable 15, and the other passage 16 for the supply of water to the valve fixture 11. A water supply pipe 17 is connected to the handle 14 at the outer end of the water passage 16.

The valve fixture 11 has an outer casing having a bore 18 containing a slidably mounted shut-off valve member 19 normally urged toward its seat 20 within the bore by a spring 21 surrounding the stem 22 of the valve member. The water supply passage 16 in the handle 14 connects with the bore 18 on the rear side of the seat 20 through a port 23 in the valve housing as shown. A gasket is interposed between the valve and switch housings 11 and 13 at the port 23 and is clamped in place on clamping the valve housing to switch housing at the lugs 12. The stem 22 connects with a plug 24 also slidably mounted in the bore 18 on the rear side of the valve seat and which plug is connected by a stud 25 with a flexible rubber or like diaphragm 26 closing the bore 18 at the rear end of the valve housing 11. This diaphragm is clamped in sealing relation to the rear end of the housing 11 by a ring-nut 27. The nut 27 fits over the rear end of the valve housing and has screw threaded connection therewith as shown in Fig. 2. Hence, the nut may clamp the diaphragm against the housing and prevent the leakage of liquid therefrom.

The stud 25 is screw threaded and extends through the center of the diaphragm 26 and is secured thereto by a nut and washer assembly 28, the latter being on the outer side of the diaphragm as shown. The stud 25 provides a metal abutment on the diaphragm for contact by the operating mechanism to be now described for flexing with the diaphragm in a direction to unseat or open the valve member 19.

The actuating mechanism referred to comprises a pair of interacting levers 29, 30 arranged exteriorly of the tool casing and respectively fulcrumed at 31, 32 on a supporting bracket 33 secured to the switch casing 13 adjacent the rear end of the valve fixture 11. Said bracket has side lugs 34 for securing it to the switch housing and is bifurcated to accommodate the levers and hold them against lateral displacement. The lever 29 extends along the handle element 14 and is spaced sufficiently close thereto to be grasped by the hand of the operator grasping the tool handle while holding and operating the tool. Thus, the supply of water to the abrading disc is assured during the operation of the tool.

The other lever 30 operates on the stud 25 carrying a contact element 35 in the form of a set screw so that the extent of opening movement given the valve member 19 may be adjusted to regulate the flow of water to the tool. The levers 29, 30 have co-acting ends *a*, *b* arranged so that when the lever 29 is moved toward the tool handle 14 the outer end of the lever 30 will be moved inwardly to flex the diaphragm to open the valve 19. A coiled spring 36 is interposed between the bracket 33 and a land 37 at the inner end of the lever 29 to reset the levers when the operator releases the lever 29 to close the valve 19. It is to be understood that the valve spring 21 closes the valve 19 when the levers are released.

As shown in Fig. 2, the port 23 opens into the bore 18 between the valve seat 20 and the slidable plug 24, and that the set screw 35 is provided with a locking nut for holding the screw in its adjusted positions.

The valve structure shown and described is simple in construction and operation. It is also well adapted to a tool combination, fitting admirably on the switch housing and readily accessible for operation by the lever action which extends along the handle member of the tool. Moreover, none of the moving or sliding parts of the valve action extend through any parts requiring packing and thus leakage is effectively guarded against by the diaphragm which closes the rear end of the valve housing. With leakage eliminated, damage to the motor and its component parts is prevented and tool repair and upkeep is essentially reduced.

The details of construction shown and described may be variously changed and modified without departing from the spirit and scope of my invention, except as pointed out in the annexed claim.

I claim as my invention:

In combination in a portable power actuated grinding tool, an outer casing, an electric motor herein, a revoluble grinding element at the front end of said casing and driven by said motor, a handle member at the rear end of said casing, said handle member extending rearwardly from said casing and providing a recess at the junction of the handle member with the casing, means carried by the tool for conveying liquid to the grinding element to allay dust in the use thereof, said means comprising a passage-way for the liquid and a valve device in said passage-way for controlling the flow of the liquid therethrough, said passage-way having its supply section formed in the handle member and the connected portion of the outer casing with the outlet end of the supply section opening through the outer casing adjacent said recess, said valve device having a housing containing a bore extending therethrough and secured to the outer casing over the outlet end of the supply section of said passage-way with the rear end of the housing in said recess and facing the rear end of the handle member and a port in said housing connecting the bore between its ends with the outlet end of the supply section, a valve member slidably mounted in said bore and biased to a closed position against a seat in the bore forwardly of said port, a flexible diaphragm closing the bore at the rear end of the valve housing and operable on the valve member for opening the same, means for securing the marginal portion of the diaphragm in sealing relation to the housing and leaving the intermediate portion of the diaphragm exposed at the rear end of the housing, a bracket carried by the outer casing in said recess, and lever means fulcrumed on said bracket for opening the valve member through said diaphragm, said lever means having a grasping portion extending along and lying relatively close to the handle member to be grasped therewith.

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