Dec. 12, 1961 C. D. KECK 3,012,382

GRINDING DEVICE

Filed June 6, 1960

Fig. 2.

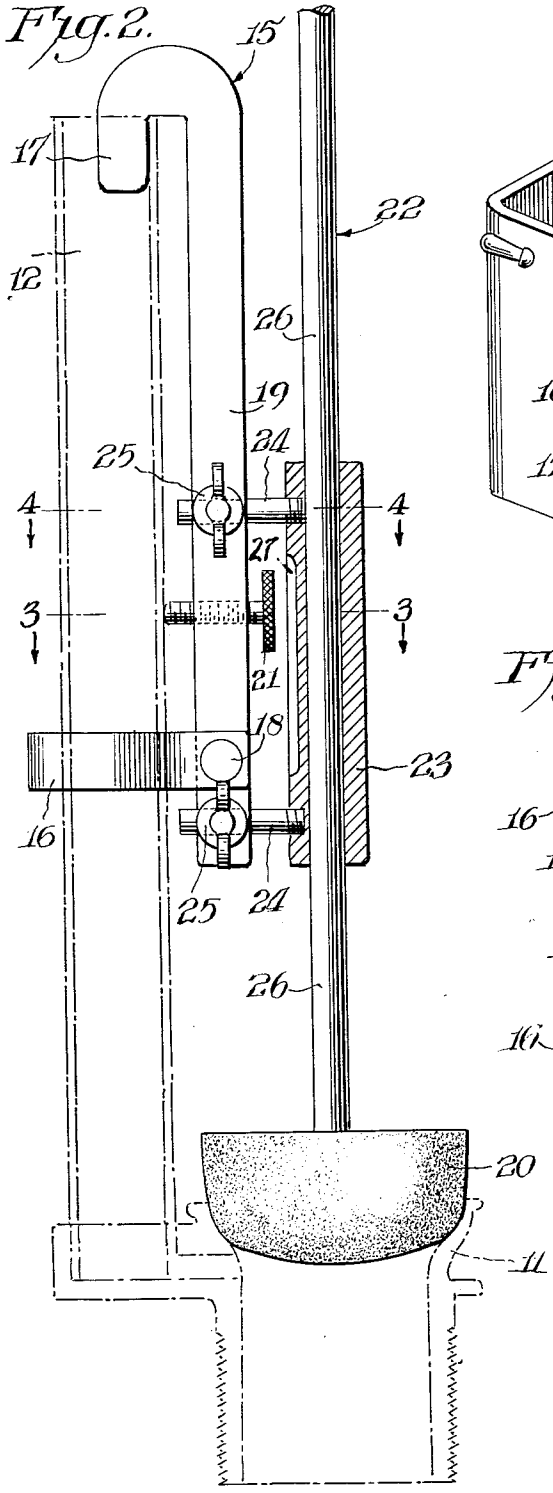


Fig. 1.

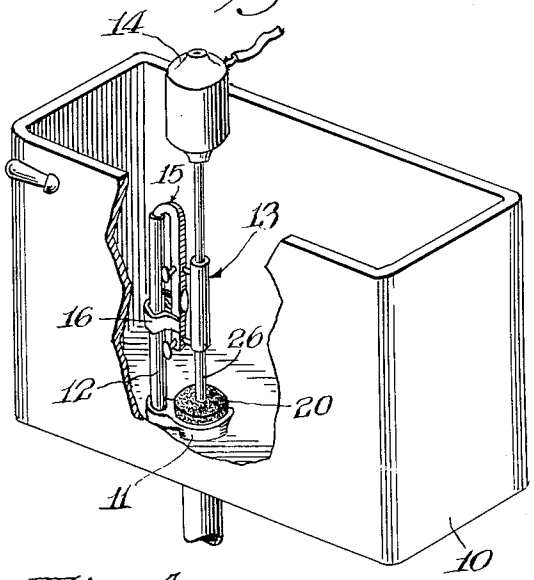


Fig. 4.

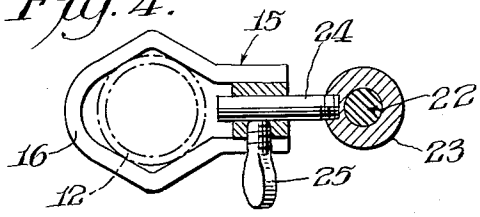
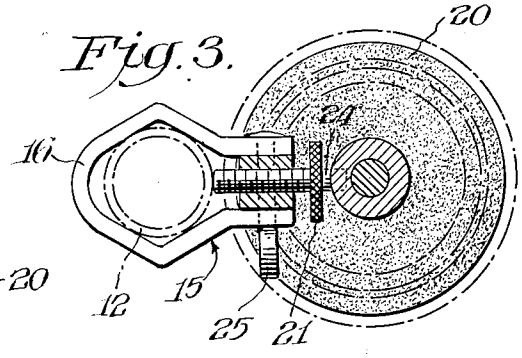


Fig. 3.



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GRINDING DEVICE

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9 Claims. (Cl. 51—241)

This invention relates to a device for reaming or reseating valves. More particularly, it relates to apparatus for reseating valves in flush tanks which apparatus provides a sturdy positioning of the grinding tool.

The replacement of a worn valve in a flush box is a time consuming and expensive procedure. Frequently, the leaking valve has ample metal in the valve seat but constant leakage of water will have caused grooves or channeling into which grooves or channel portions of the rubber flush ball will not fit. The replacement of the ball is of no avail, and because there is available no true grinding means, replacement of the entire valve seat has hitherto been the approach used in correcting the defect. While certain devices are described in such patents as U.S. 2,276,771 and 2,711,119, these devices contain certain defects which preclude their use on a large scale with accuracy. One of the most difficult problems is maintenance of the grinding tool in true grinding position with the valve seat. Another problem is the provision of a means to support firmly the grinding tool so that it can be rotated by an electric motor rather than by hand. A device which provides for controlled grinding while using a driven motor has long been needed.

Accordingly, it is an object of the present invention to provide apparatus for reseating valve seats to produce a true new seat corresponding to the initial seat of the valve. Another objective is the provision of a grinding tool which is readily mounted, firmly held in place and quickly removed after the grinding is effected. A further objective is the provision of a grinding tool which exerts a minimum of strain on the overflow tube. Another objective is the provision of a grinder which uses a grinding tool conforming to the shape of the ball which is to form the seal. These and other objectives will be presented hereinafter.

These objectives are accomplished by the provision of a grinding tool comprising a vertical support which is quickly slipped into place on and about the upright overflow tube and which contains an auxiliary support for the shaft of the grinding tool. The auxiliary support is composed of an upright, hollow member containing extending rods or pins which are slideably mounted in the main support. The grinding tool is positioned in the auxiliary support so that a substantial portion of the shaft of the grinding tool is contained in the auxiliary support and held therein during rotation and in true vertical alignment with the valve seat. A set screw in the main support holds it tightly on the overflow and, if desired, it may be used in directing the shaft of the grinding element out of the vertical if such an adjustment is needed in order to get true alignment with the valve seat, but usually the rods are used for this. These extending rods are positioned in the main support and held there by set screws so that the user may move the grinding element toward or away from the overflow tube in accordance with the distance of the valve from the bottom of the overflow tube.

Thus, this invention comprises a grinding device having a rotatable grinding element mounted on a shaft, the device being supported, as, for example, on an overflow pipe, by the curved section of a rod and/or by circular elements aligned with the curved section if it is present and held tightly against the pipe by set screws or other steadying means. A tubular element is supported on the main support by adjustable clamping means and within

the tubular part is a rotatable rod or shaft. The grinding element is easily aligned with the surface to be ground and the free end of the shaft is quickly powered by a rotator. These and other embodiments will be better understood by reference to the following descriptions and to the drawings which are given for illustrative purposes and are not limitative and in which

FIGURE 1 is a perspective, partially broken away, showing the apparatus of this invention in operative position relative to a tank, the overflow and the valve, an electric motor being shown as driving the mechanism;

FIGURE 2 is a front elevation of the grinding tool placed in position on the overflow tube and valve;

FIGURE 3 is taken on line 3—3 of FIGURE 2; and

FIGURE 4 is taken on line 4—4 of FIGURE 2.

With reference to FIGURE 1 there can be seen a tank **10** of the conventional type and positioned therein is the valve **11** and the overflow tube **12**. Positioned on and in connection with the overflow of this tank and in operative position is the device **13** of this invention driven by motor **14**. The device is shown in more detail in FIGURE 2.

As shown, the device comprises a main support **15** which is an element being in the shape of an inverted J having at the straight end opposite the curved section, a tubular or circular member **16**. The bent section **17** of the J, shown in FIGURE 2, is positioned at the top of the overflow tube **12** so that the finger or bent section is within the overflow tube **12**. While the J member may be replaced by a ring **16** or while such a ring may be used in conjunction wth the J, the simple use of the J section suffices and is preferred. The circular part at the opposite end is normally permanently fixed at **18** to the upright portion or stem **19** of the J member. The gripping or steadying means **16** can be slideably mounted on stem **19** instead of being riveted at **18**. The mounting may be by set screw, clamp or any such suitable means. Usually, this is not necessary for the overflow pipes are uniform in length and diameter. Thus, the steadying means **16** is normally in a fixed position on the device.

It has a configuration and a diameter such that it readily slides over the overflow tube **12** and is slightly larger than the outside dimension of the overflow tube. This freedom not only provides for ready positioning but it aids in the centering of the grinding element **20**. The repairer usually finds that the valve seats **11** vary in their position to the overflow tube **12**, and not only that, but the wearing of the valve seat is frequently such that the grinding tool must attack the worn seat at something other than a straight vertical. Set screw **21** assists the operator in setting the grinding element **22** with its grinding material or grinding head **20** in the most advantageous line of attack. But the main purpose of the set screw **21** is to draw up the main upright support **19** tightly against the overflow **12** so that the grip at the top through finger **17** and the girp at the bottom part of the upright main support at or by circular element **16** is very strong. In so doing the entire apparatus is held in firm position throughout the ensuing operations. The clearance **27** is normally not needed and set screw **21** may be positioned elsewhere on support **19** and if desired it can be positioned in element **16**. Further, other steadying means, such as straps, may be used.

As can be seen in FIGURE 2, there is provided a fairly long tubular member **23** through which the shaft of the grinding element passes and is held in position during rotation. At either end of this tubular member **23** there is a rod **24** extending toward the main upright member and positioned in holes which run laterally or through the main upright support. In each of these holes there is positioned a set screw **25** which permits the operator to align the grinding tool at closer or greater distances from

the upright overflow pipe as is needed. These rods 24 may be of the same or of different lengths. In either event, the top rod may be inserted to a greater or to a lesser extent in its positioning slot than is the lower rod. Thus, the operator may set rod 26 directly parallel to main support 19 or at an angle to it. The topmost part of rod 26 may then be closer or farther from support 19 than is the lower-most part of rod 26. By such adjustments the operator may grind specifically in one area as long as needed and gradually approach the true, final grinding with the full grinding head 20 in operation. Since this head is normally screwed onto rod 26, the operator can use a variety of sizes and shapes of grinding tools as desired and as directed by the surface being ground and its condition.

At the upper end of the shaft 26 of the grinding element there is an electric motor 14, as can be seen in FIGURE 1. This frequently is a small drill which usually has the regular hand grip and finger trigger to start and stop the motor. With the apparatus in place, the operator need only attach the conventional drill and carry out his drilling as needed. It is a simple matter to raise the grinding element out of grinding position even while the tool is running and examine the seat visually to give it intermittent checks. Since there is a minimum number of set screws that need to be adjusted to alter the line of attack, the operator can quickly make a slight and/or fine adjustment to bring the grinding into the needed or the successive line of attack required to effect the smooth grinding to a surface conforming to that originally present.

The firm mounting of this tool is further shown in FIGURE 3. There, the circular element 16 is shown firmly gripping the overflow pipe 12 with the set screw 21 bearing against the outside surface of the overflow pipe. The set screw 25 is shown holding rod 24 in place.

The positioning of the rod 24 is more clearly shown in FIGURE 4, in which the grinding element is omitted for convenience. The abrasive or grinding element 20 may be any of a wide variety of grinding materials including Carborundum, silica, garnet, silicon carbide and many others. The size of particles in the mounted grinding head may vary from coarse to fine as needed. Usually, Carborundum is used.

The rest of the apparatus may be made of light-weight materials such as aluminum. In addition to being light the apparatus of this invention is readily placed in operative position and is readily dismantled upon completion of the grinding. The operator simply slips means 16 around the pipe 12 and lets the device slide downwardly to let finger 17 rest on the top edge of pipe 12. With set screws 21 and 25 loose, he then places head 20 in the desired grinding contact; rods 24 slide into position. Simple tightening of the set screws places the device fixedly into the position desired. Thus, the device requires the adjustment of only three set screws. The device is readily and firmly positioned about the overflow pipe. The long tubular member 23 in which the grinding rod 26 is positioned requires no set screw and the need for setting the grinding element in a desired vertical or substantially vertical path by means of a set screw is eliminated. Further, the setting of tubular element 23 at its extremities gives very great stability to the rotating rod 26.

The device can be set to grind in an exact vertical path or at angles therefrom and further the device permits the operator to set the grinding at such distance from the overflow pipe as is needed. The operator can effect all of the variations in setting very quickly and he can examine his work repeatedly during the grinding. The device is operated through an electrical motor and hand grinding is eliminated. Further, the operator can conveniently carry with him any number of grinding elements the heads 20 or grinding portions of which vary in size and weight as well as in composition. Normally, however, only one grinding element 20 is needed, this being of substantially the shape shown in FIGURE 2. It is readily mounted on the shaft 26 and replacements can be made to grinding elements of different shapes or different compositions or sizes as is desired.

While the invention has been disclosed herein in connection with certain embodiments and certain structural and procedural details, it is clear that changes, modifications or equivalents can be used by those skilled in the art; accordingly, such changes within the principles of this invention are intended to be included within the scope of the claims below.

I claim:

1. A grinding device having a rotatable grinding element mounted at the end of a shaft which device comprises an upright main support adapted to be mounted on a second upright independently of the surface to be ground, said main support having at least two gripping means for holding it steady on said second upright; an auxiliary support comprising a tubular element adapted to receive a substantial portion of said shaft and containing means for slideably positioning the said tubular element closer and farther away from the said main support as desired; positioned for rotation in the said tubular element, the said shaft; and at one end of the said shaft for contact with the surface to be ground an abrasive.

2. A grinding device having a rotatable grinding element mounted at the end of a shaft which device comprises an upright main support adapted to be supported on a second upright independently of the surface to be ground; said main support having at least two gripping means for holding it steady on said second upright and a set screw bearing against the said second upright to move the said main support toward and away from said second upright as desired; clamping means in said main support for receiving a second support in slideable relationship to it, said second support comprising a tubular element containing mounts for positioning in said clamping means of the first said support; and within the said tubular element a rotatable shaft of a grinding element, at the end of which is positioned an abrasive for grinding said surface.

3. Apparatus in accordance with claim 2 in which the said mounts in said second support are two rods extending toward and mounted in the said clamping means of the main support, providing sliding of the said tubular element toward the main support and away from the main support as desired.

4. A grinding device having a rotatable grinding element mounted at the end of a shaft which device comprises an upright main support adapted to be mounted on a second upright independently of the surface to be ground, said main support having at least two gripping means for holding it steady on said second upright; in said main support means for mounting a tubular element adapted to receive a substantial portion of a rotatable shaft; a rotatable shaft positioned in said tubular element; at one end of said shaft for contact with the surface to be ground an abrasive; and at the opposite end of said shaft and attached to it a motor for rotation of said shaft and abrasive.

5. A device in accordance with claim 4 in which said main support contains means for mounting said support on an overflow pipe of a flush tank.

6. A device in accordance with claim 4 in which said main support is a rod having at one end a curved section for insertion into the top of the overflow pipe of a flush tank.

7. A device in accordance with claim 4 in which said main support is a rod having at one end a curved section for insertion into the top of the overflow pipe of a flush tank and at the opposite end a ring having a diameter slightly greater than that of said pipe.

8. Apparatus in accordance with claim 7 which in-

cludes a means for clamping said pipe firmly within said ring.

9. A grinding device having a rotatable grinding element mounted at the end of a shaft which device comprises an upright main support adapted to be held on the overflow pipe of a flush tank; at one end of said support a curved section for insertion into the open end of said pipe; at the other end of said support a circular element aligned with said curved section; means for firmly positioning said pipe within said ring to hold said main support in the true vertical and out of the vertical toward the said pipe and away from the said pipe as desired; means in said support for receiving in slideable relationship to said support a tubular element and for clamping the said tubular element in the true vertical and out of the vertical toward said pipe and away from said pipe as desired; positioned for rotation within said tubular element, a shaft; mounted at one end of said shaft a grinding element rotatable with said shaft; and at the other end of said shaft an electric motor.

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