June 5, 1934. M. D. GJERDE 1,962,090

LUBRICATING DEVICE

Filed July 29, 1931 2 Sheets-Sheet 1

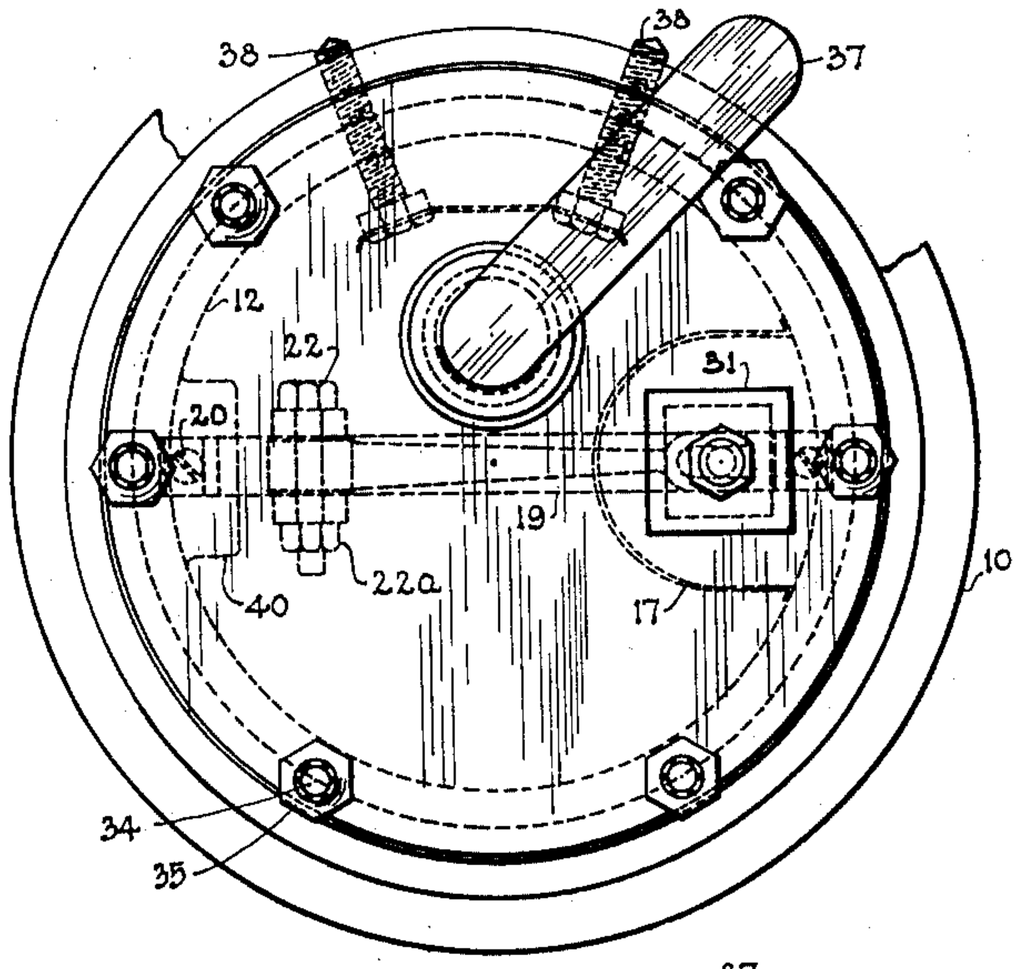

Fig. 2

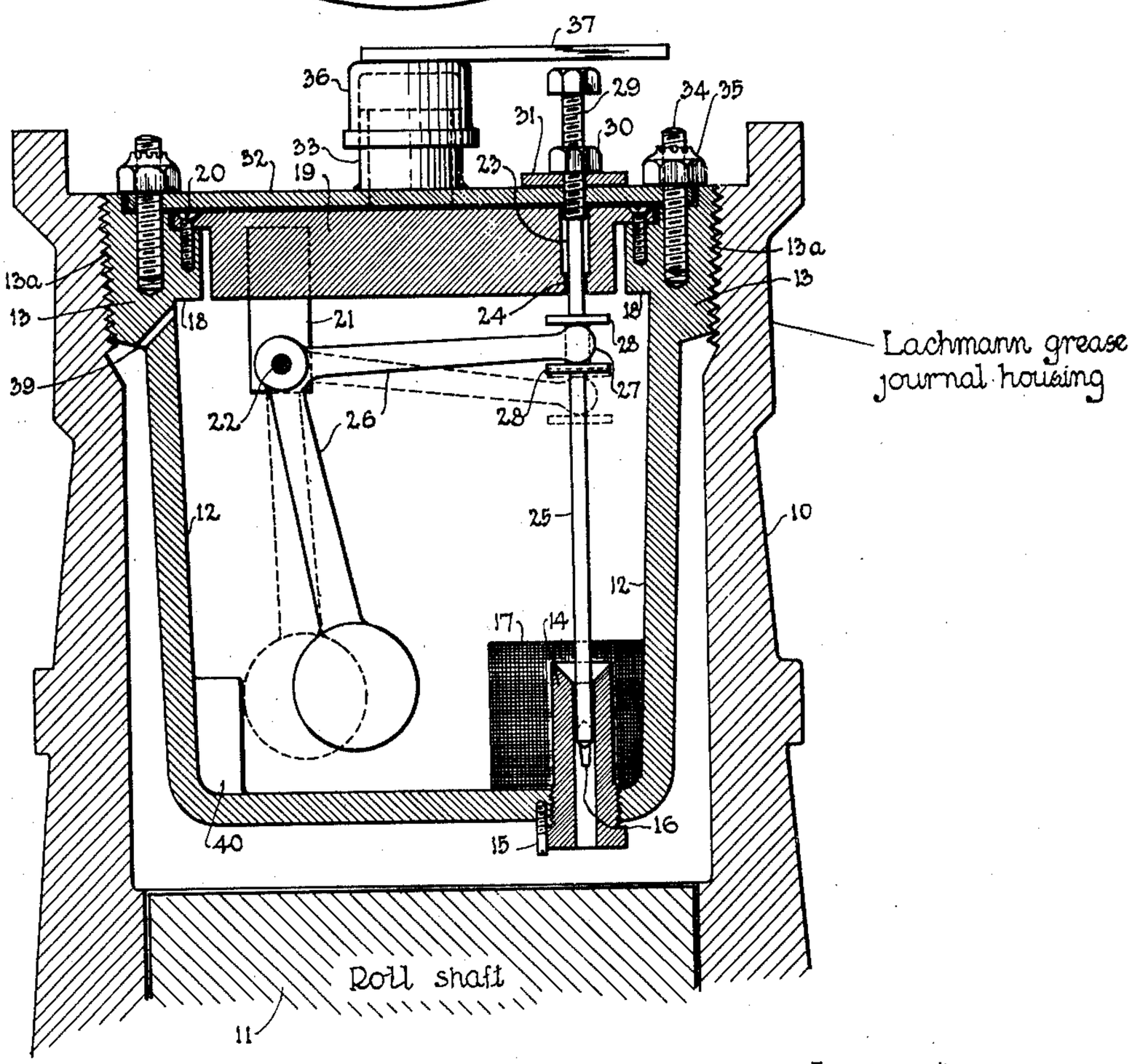

Fig. 1

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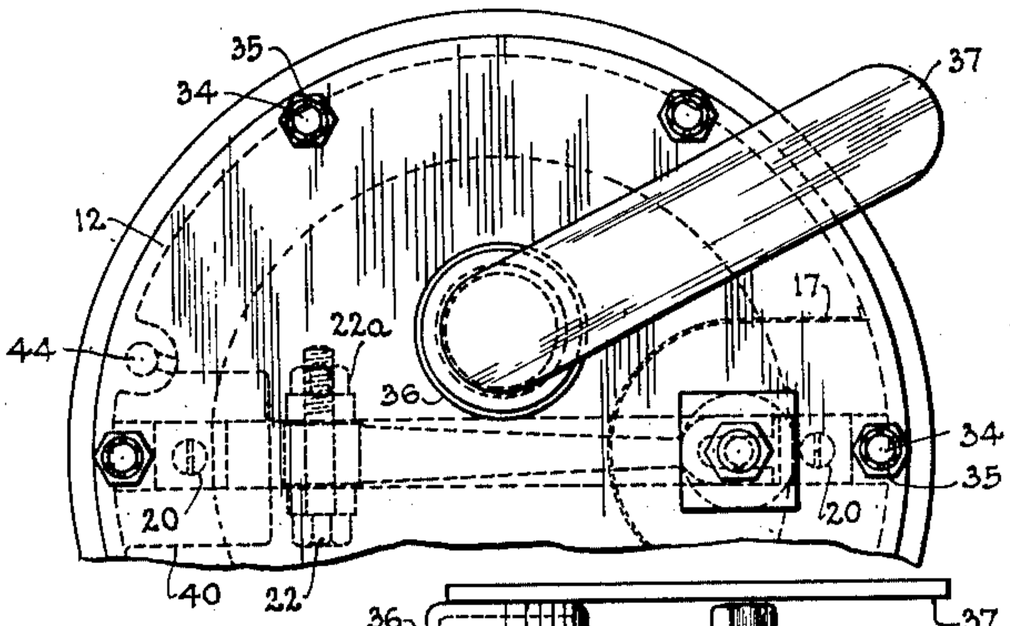

Fig. 4

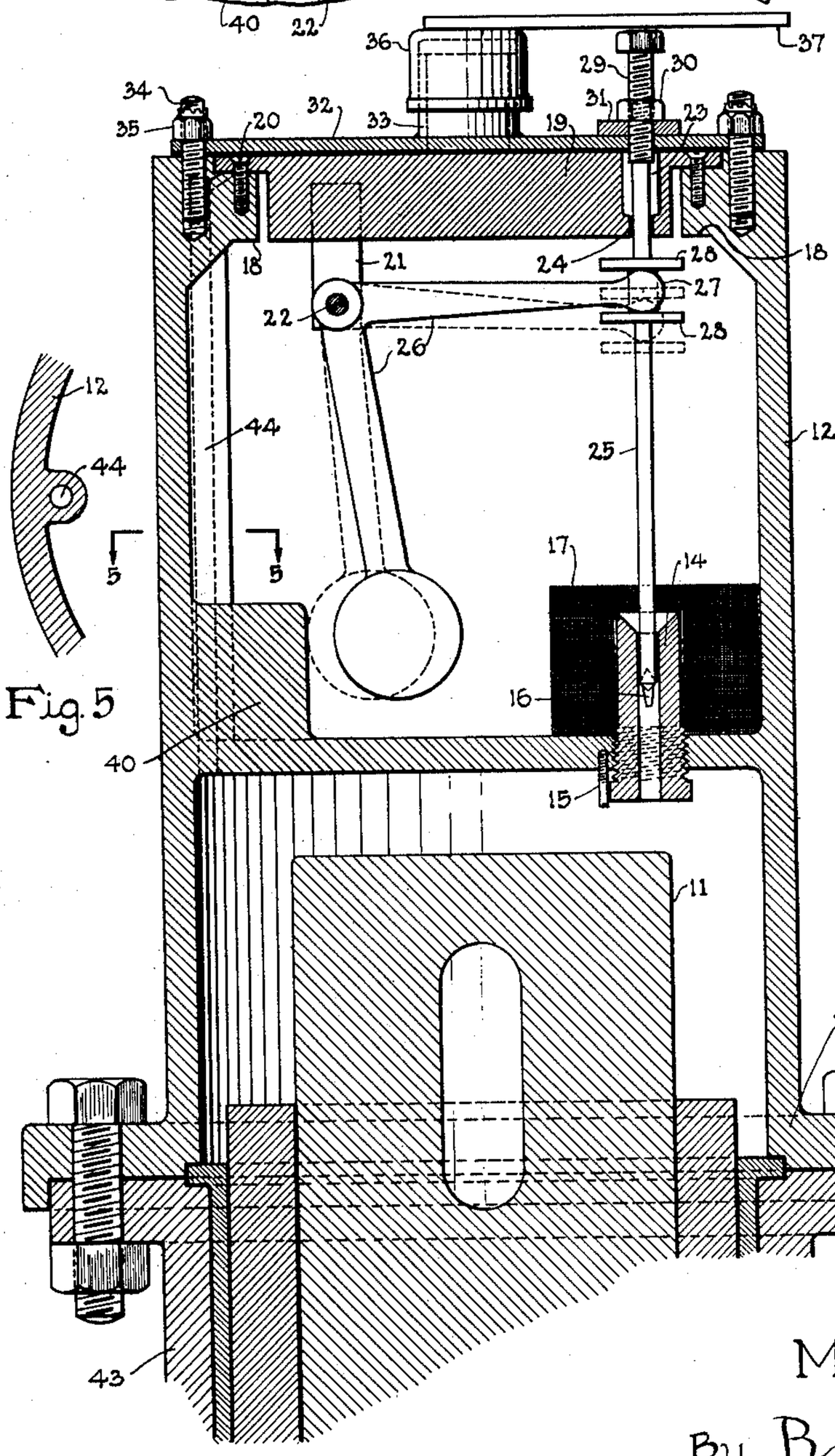

Fig. 3

Fig. 5

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LUBRICATING DEVICE

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Application July 29, 1931, Serial No. 553,807

3 Claims. (Cl. 184—70)

This invention relates to a centrifugally operated lubricating device.

The object of the invention is to provide a lubricator that may be used in an upright position on any revolvable member and that is particularly adapted to be used on the roll shaft of a Raymond mill and the like.

Another object is to provide a simple, efficient, and substantial lubricator constructed of very few movable parts and adapted to discharge a predetermined quantity of oil at any speed.

A further object is to provide a lubricating device that regulates the flow of oil to the moving parts by centrifugal force and is adapted to completely cut off the flow of oil when the machine is not in operation.

The construction and operation of the lubricator will be apparent from the following description when read in connection with the drawings, and in the accompanying drawings like reference numerals denote like parts.

Figure 1 is a vertical section of the lubricator showing it assembled on the end of a vertical shaft.

Figure 2 is a top plan view of the lubricator.

Figure 3 is a vertical cross section of a modified form of the lubricator, showing a different means for attaching the lubricator to a vertical shaft.

Figure 4 is a partial top plan view of the lubricator shown in Figure 3.

Figure 5 is a section along the line 5—5 showing the pressure equalizing vent.

The lubricator is shown in Figures 1 and 2 as it would be installed in a Lachmann grease journal housing 10 of a Raymond mill for the purpose of lubricating the roll shaft 11 of the mill. By way of explanation, the Raymond mill comprises a vertical main shaft which supports four rigidly mounted radial arms (a spider). A housing which carries a roll shaft is pivotally mounted on the end of each arm. The roll shafts hang parallel to the main shaft, and the lower ends of the shafts carry rolls that rest against a die ring. When the main shaft of the mill rotates, the roll shafts revolve about the axis of the main shaft and also rotate on their own axes. So, a revolving, rotating motion is imparted to the roll shafts during the operation of the mill. The lubricator, which is described hereinafter, is mounted in the upper part of the journal housing as shown in Figures 1 and 3.

Figures 3 and 4 show the same lubricator, as illustrated in the first two figures, with a flanged base so that it may be used on vertical shafts other than the type shown in Figure 1.

The lubricator, as shown in Figures 1 and 2, comprises a one-piece open-ended cylindrical cup 12 with a built-up outer annular flange 13 at the open end, and a threaded hole in the bottom of the cup, near the side, to receive a slotted valve casing 14 which is held in position by the set screw 15. The casing 14 is provided with a cylindrical hollow core (orifice) extending through its long axis. A wedge-shaped slot 16 is cut in the side of the casing and communicates with the core and exterior of the casing. This slot may be changed to any desired shape or size, but I have found the wedge-shaped one to give good results. Also the valve casing may be surrounded by an open-ended screen strainer 17. The annular flange 13 is threaded, as shown at 13*a*, so that the lubricator may be screwed into the greast journal housing 10 above the roll shaft or moving elements.

The interior of the cup, near the opened end, is provided with two lugs 18 placed opposite each other and adapted to support the rib 19 that extends across the open end of the cup. The rib is rigidly held to the lugs by the machine screws 20. The underside of the rib carries a hanger 21 on which is pivoted a bell-crank by the bolt 22, which is held in position by the nut 22*a*. Also the rib is provided with a hole, as shown at 23, the lower end of which serves as a bearing 24 for a valve rod 25. The lower end of the cylindrical valve rod 25 slidably communicates with the interior of the slotted valve casing, and the upper end of the valve rod slidably communicates with the bearing surface 24. The rod is thereby held in a vertical position. The unweighted end of the bell-crank 26 is provided with a bi-furcated ball-shaped end 27 which engages the valve rod 25 between the two bearing plates 28 and forms a rocker connection with the valve rod. The weighted end of the bell-crank normally hangs in a substantially vertical plane that passes through the weight on the bell-crank and the pivot for the bell-crank. When the weighted end of the bell-crank is moved toward the center of the cup, or away from the axis of rotation of the main shaft, the valve rod 25 is moved upwardly and uncovers the slot 16; this movement of the valve rod permits the oil to flow through the slot 16 and out the valve casing to the roll shaft.

Instead of using the type of valve as described above, the lower end of the valve rod 25 may be provided with a slot parallel to its long axis and adapted to communicate with the slot in the side of the orifice when the valve rod is moved up-

wardly. This type of valve permits a finer adjustment of the flow of oil from the cup.

The maximum vertical displacement of the valve rod 25 is governed by an adjustable bolt 29 that screws through the top and abuts the upper end of the valve rod. The bolt 29 is held in an adjusted position by the lock nut 30. Means for retaining the bolt 29 are reenforced by the plate 31 fastened to the top of the lubricator.

The top for the lubricator is made in the shape of a flat disc 32 with a pipe nipple 33 projecting through the top, wherein the oil is added to the lubricator. The edge of the top is provided with six holes whereby it is bolted to the annular built-up flange 13 by the studs 34 and castle nuts 35. A pipe cap 36, provided with a handle 37 brazed thereon, screws over the nipple and serves as a cover for the oil inlet.

The two wired set screws 38 pass through the flange 13 and contact the sides of the journal housing 10 and thereby rigidly hold the lubricator so that it will not become unscrewed as the lubricator revolves. Also, the set screws hold the lubricator in position so that the bell crank can move away from the axis of revolution of the vertical shaft.

A small channel or hole 39 is cut in the side of the lubricator and communicates with the space above the roll shaft and the space above the oil lever in the cup, thereby equalizing the pressure in the two spaces and maintaining a static head in the oil cup.

The lubricator shown in Figures 1 and 2 would be used in the journal housing that extends above the roll shaft of a Raymond mill. As the roll shaft revolves about the axis of the main shaft of the mill, the weight on the bell-crank is moved by centrifugal force toward the center of the cup, or away from the axis of the main shaft of the mill, and thereby causes the unweighted arm of the bell-crank to raise and lower the valve rod 25 according to the speed of rotation. As the valve rod is raised the oil is permitted to flow through the slot 16 and out through the valve casing to the roll shaft 11, and as the speed of the mill decreases the valve rod is accordingly lowered and thereby diminishes the flow of oil through the slot. The maximum height to which the valve rod may be raised is determined by the adjustable screw 29. Also the maximum downwardly displacement of the valve rod is governed by the bumper 40 which is located on the bottom of the oil cup and in the rear of the bell-crank weight. When the operation of the mill ceases the weight of the bell-crank comes to rest against the bumper, as shown by the dotted lines, and thereby causes the valve rod 25 to slide over the slot 16 and completely cut off the flow of oil from the lubricator to the roll shaft or moving elements.

Figures 3 and 4 show the same lubricator, as described above, except for the means of attaching the lubricator to the shaft to be lubricated. If the shaft, or moving element to be lubricated, is not provided with a housing so that the lubricator may be screwed into position, as shown in Figures 1 and 2, the side of the cylindrical cup may project below the bottom of the cup 12 and form a flange 41 whereby the lubricator may be bolted, as shown at 42, to a housing 43 of the shaft. The pressure within the space above the shaft and above the oil level in the cup is equalized by a vent pipe 44, as shown in Figure 5.

Heretofore, the roll shafts on Raymond mills and similar types of revolvable, rotatable shafts have been lubricated by packing grease in the upper part of the journal and relying upon vibration, clearance in the bearings, working of grease, and the operating temperature of the mill to gradually feed the lubricant to the moving parts. This method of lubrication is unsatisfactory because the amount of lubricant supplied to the moving parts is not directly controlled by the speed of the mill. It is a well known fact that the amount of lubricant required on any moving elements is a direct function of speed.

By using the herein described lubricator I am able to supply the necessary amount of lubricant at all speeds and do not depend upon unreliable and variable forces, such as the working of grease and vibration, for the operation of the lubricator. Also by the use of my lubricator, the flow of lubricant to the shaft is not influenced by the wear in the journal, or clearance in the bearing, but is directly regulated by the speed of the mill.

Although the lubricator has been illustrated in Figures 1 and 2 as it should be used in a Lachmann journal housing of a Raymond mill, it should be appreciated that it may be used on any revolvable member. If the shaft, or moving elements on which the lubricator is to be used, does not have a journal housing projecting above the end of the shaft, as on the Raymond mill, the lubricator may be held in position by using the flanged type of lubricator as shown in Figures 3 and 4. Also it should be appreciated that other means may be used to fasten the lubricator to the parts to be lubricated without departing from the scope of the herein described invention.

I claim:

1. In a lubricating device as herein described for use on a revolvable member, the combination of an oil receptacle provided with a tube extending through the bottom part of the oil receptacle and projecting into said receptacle and provided with an opening in the part projecting into said receptacle, a top for said receptacle, a valve rod extending into said tube for regulating the flow of oil through said opening and into the tube, a member within said receptacle and across the upper part thereof, a bell-crank within the oil receptacle and pivotally attached to said member, one arm of said bell-crank pivotally engaging said valve rod, a weighted means on the other end of said bell-crank which is moved and continuously urged away from the axis of revolution as the lubricator revolves, whereby the valve rod is raised and permits a continuous supply of oil to flow through said opening and into the tube extending through the bottom of the oil receptacle.

2. In a lubricating device as herein described for use on a revolvable member, the combination of means providing an oil receptacle having a removable cover, a support located in the upper portion of the receptacle, a tube extending through the bottom part of said receptacle, said tube being slotted in the portion located within the receptacle, a valve rod cooperating with the slotted portion of the tube for controlling the flow of oil from the receptacle into said tube upon movement of the valve rod with respect to the tube, a weight pivotally attached to said support, and means connecting said weight and valve rod for imparting a vertical movement to said valve rod in response to the centrifugal force acting upon said weight, said centrifugal force being produced by the movement of the revolvable member.

3. In a lubricating device as herein described for use on a revolvable member, the combination of an oil receptacle provided with a tube extending through the bottom part of the oil receptacle and projecting into said receptacle, said tube being slotted in that portion located within the receptacle, a top for said receptacle, a valve rod cooperating with said tube for regulating the flow of oil through said slot and into the tube, a support located in the upper portion of the receptacle, a centrifugally operated weighted member within said oil receptacle and pivotally attached to said support and pivotally engaging said valve rod and normally tending to retain the valve rod in a position that closes said slot, said weighted member being moved and continuously urged away from the axis of revolution as the lubricator revolves, whereby the valve rod is raised and permits oil to flow through said slot and into the tube extending through the bottom of the oil receptacle.

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