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CRANK CASE DRAIN-VALVE

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The invention relates to valves which are adapted for controlling a drainage flow of lubricant from the crank case of a motor or similar machine, and a general aim of the invention is to provide such a valve which is readily and easily manipulable from one side or the end of the machine without requiring an operator to reach or otherwise get under the machine.

In motors or like machines, as for example in motor vehicles, the crank case is inaccessible for drainage except from underneath the vehicle and the crank case drainage opening is usually closed by an ordinary screw threaded plug. To remove this plug, an operator must be underneath the vehicle and in large establishments, such as garages and filling stations, pits are provided to facilitate access to the plug. The individual who undertakes to service his own vehicle does not have such a convenience and must, therefore, crawl under the vehicle where removal of the plug is frequently accompanied by spilling oil over himself and injury by burning when the oil is hot.

An object of the invention is, therefore, to provide such a valve which may be used to replace the customary plug and by which an individual may effect drainage of the crank case without difficulty and without coming in contact with the draining liquid.

A further object resides in the provision of a new and improved valve of this nature which is mounted for vertical movement in the bottom of the part to be drained and is controlled by a horizontally movable member arranged for actuation from a remote point beyond the sides of the part being drained.

In conjunction with the foregoing, other objects reside in the provision of means for maintaining the valve member in either position of operation and requiring a positive act on the part of the operator to change the member to its other position; in the provision of spaced guides or bearings for directing the movement of the valve member; in the provision of means positively actuated by the operator to insure a close seating of the valve member; in the provision of what may be termed a secondary valve mechanism for preventing the entrance of dirt and the like from the outside into the interior of the valve casing; and in other advantages which will become apparent in the following description and from the accompanying drawing, in which:

Figure 1 is a central vertical section through a device embodying the features of the invention,

the operating device therefor being shown in elevation.

Fig. 2 is a side elevation of the device looking from the left-hand side of the device as shown in Fig. 1.

Fig. 3 is a bottom plan view of the device.

Fig. 4 is a view similar to Fig. 1 but showing the parts in a valve open position.

Fig. 5 is a view in perspective of the slide device by which the valve member is actuated.

Fig. 6 is a plan view of the guide spider.

Fig. 7 is a central section through the device showing a slightly modified structure.

Fig. 8 is a transverse section through the outer end of the device and showing a modified arrangement of structure.

While the invention is susceptible of various modifications and alternative constructions, I have shown in the drawing and will herein describe in detail the preferred embodiment, but it is to be understood that I do not thereby intend to limit the invention to the specific form disclosed, but intend to cover all modifications and alternative constructions falling within the spirit and scope of the invention as expressed in the appended claims.

With reference to the drawing, wherein one form of device embodying the features of the invention is shown merely for illustrative purposes, 10 designates generally the bottom wall of the crank case of a vehicle motor or the like. This wall usually has an internally screw threaded drainage port or opening 11 which customarily is closed by an ordinary screw threaded plug. As illustrated, the port receives, in place of the plug, an externally screw threaded portion 12 on a tubular valve case 13. The remaining part 14 of the case preferably has an angular exterior, formed similarly to a nut, for engagement by a conventional tool in the assembly of the device. The portion 14 may be enlarged to abut against the bottom about the port 12 to insure against leakage.

The end of the case which is within the crank case has an intumed annular flange 15 and the end of the flange is internally beveled, as at 15^a, in any suitable manner for engagement by a complementary surface 16 on a valve 17. The valve has an elongated stem 18 which is rigid therewith and extends through and slightly beyond the opposite or outer end of the valve case. Guide means for the stem is provided in this instance by a spiderlike structure 19 comprising (see Fig. 6) a central hub portion 20, through which the stem may pass, and radial arms 21.

The spider is located within the case with the ends of the arms 21 resting against the internal shoulder formed by the flange 15. In a modified form of spider, as shown in Fig. 7, the arms are somewhat arcuate to form a substantially concave structure thereby providing a greater unobstructed area for drainage past this assembly.

The outer end of the stem 18 is guided by a plate 22 which is seated in a rabbeted groove formed in the outer end of the case and is rigidly secured therein in any suitable manner as by upsetting the edge of the case at a number of points (see 23, Fig. 3). The stem passes slidably through a bore 24 in the plate and other apertures or drainage ports 25 are provided to allow lubricant or other liquid to drain freely from the case.

Within the case and near the plate 22, the stem carries a lateral projection such as a pin 26 of substantial length extending through a transverse bore in the stem. Resilient means, herein indicated as being a helical spring 27 disposed about the stem and bearing between the spider and the pin, exerts a force normally urging the valve against its seat. This resilient means is, of course, of ample strength to hold the valve firmly seated and to prevent any leakage there-through.

It will be seen that the valve in opening and closing has a vertical movement. In order to permit of actuation thereof from beyond the sides of the motor or vehicle, a transversely and horizontally shiftable control means or actuator is provided. Thus, one side of the valve case is cut away, as at 28, adjacent to the plate 22, to allow an actuator 29 to extend therethrough into the interior of the case. In the present embodiment, referring particularly to Fig. 5, the actuator comprises an elongated flat plate having the end within the case longitudinally recessed as at 30 to provide two arms arranged to straddle the stem between the pin 26 and plate 22. Each arm has an upturned flange 31 of considerable length thereon arranged to be positioned on the side of the stem and pin which is opposite to the opening 28 in the case. The flanges 31 are movable, in a sliding motion of the actuator outwardly of the case, into engagement with the pin and have connections with the pin for moving the valve into the open position thereof. To this end, the sides of the flanges adjacent to the pin are fashioned as cam surfaces 32 which rise from the flat plate part of the actuator at a relatively steep slope. Hence, when the actuator is pulled outwardly of the case, the cam surfaces engage the pin and cause the valve to rise from its seat.

Preferably, the highest parts of the rise on the cams terminate in flat dwell surfaces 33 which may be moved beneath the pin to support the valve in its open position. Abrupt fingers 34, adjacent the surfaces 33, limit the extent of outward movement of the actuator. It should be noted that the actuator, when idle or inoperative is loosely mounted on the device but in operation abuts against and is supported by the plate 22 as a base over which the actuator slides.

The external end of the actuator is adapted for engagement by an instrumentality in the hands of the operator for manipulation of the valve from a remote point. As shown in Fig. 1, this instrumentality may be in the form of an elongated rod 35 of indeterminate length having a handle 36 at one end and a short bent finger or hook 37 at the other end for engaging

an aperture 38 in the outer end of the actuator. By this means the actuator may be easily moved in either direction from a remote point.

Since lubricant from a crank case frequently carries small solid particles of foreign matter which might lodge between the valve and its seat and thus prevent a tight seating of the valve, means is provided for dislodging or eliminating any such matter. In this instance, this end is attained by providing, on the actuator, a short upstanding lug 39 located on the side of the pin opposite the flanges 31. Only one lug 39 is provided. Hence, upon movement of the actuator in an inward direction, the engagement of the lug with the pin produces a short rotational swing of the pin, thereby imparting to the valve a rotational movement relative to its seat. Such relative movement serves to eliminate or dislodge any foreign particles between the parts and effects a tight seating of the valve. Where a single rotational movement of the valve does not suffice, the valve may be rotated back and forth by a short reciprocating movement of the actuator.

In view of the fact that a crank case valve of this nature is constantly exposed to dirt from the roadbed, it may be desirable to provide means on the valve for preventing entrance of foreign matter into the case through the drainage ports or apertures 25 in the plate 22. This may be accomplished in a simple manner by forming the bottom plate of the actuator of substantial width and locating the apertures 25 so that the plate overlies and closes the apertures when the device is in the normal inoperative position thereof and uncovers the apertures when the actuator is moved to open the valve. Such an arrangement is shown in Fig. 8 where each arm on the actuator has a wide portion 40 normally covering an aperture 25 while a third aperture is closed by a part of the plate beyond the recess 30. Movement of the actuator shifts the aperture covering parts thereof to open the apertures.

From the foregoing, it will be evident that a novel drainage controlling valve for crank cases or the like has been provided which is simple in construction and assembly, may be quickly installed in a motor in place of the usual plug and which allows an operator to perform all of the operations incidental to draining the crank case without difficulty.

I claim as my invention:

1. A valve for controlling a drainage flow from the crank case of a motor or the like comprising, in combination, a tubular casing fashioned to be mounted in the drainage port of said crank case and having a valve seat, a valve arranged to engage said seat and having a stem thereon extending through said casing, a spider in said casing near said seat providing a bearing for said stem, a perforated disk rigid with the casing near the outer end thereof and providing a second bearing for the stem, a transverse pin carried by said stem between the bearings, a spring bearing between the pin and the spider for normally urging the valve toward its seat, and a slide mounted in said casing and abutting said disk for movement transversely of the axes of said stem and said pin, said slide having cam surfaces engageable with the pin on opposite sides of the stem for opening said valve against the force of said spring.

2. A valve for controlling a drainage flow from the crank case of a motor or the like comprising, in combination, a tubular casing fashioned to be

mounted in the drainage port and having a valve seat, a valve arranged to engage said seat and having a stem thereon extending through said casing, a spider in said casing near said seat providing a bearing for said stem, a perforated disk rigid with the casing near the outer end thereof and providing a second bearing for the stem, a transverse pin carried by said stem between the bearings, a spring bearing between the pin and the spider for normally urging the valve toward its seat, and a slide mounted in said casing and abutting said disk for movement transversely of the axes of the stem and the pin, said slide having cam surfaces engageable with the pin on opposite sides of the stem for opening said valve against the force of said spring, said surfaces having a flat or dwell portion engageable with said pin to hold the valve open.

3. A valve for controlling a drainage flow from the crank case of a motor or the like comprising, in combination, a tubular casing fashioned to be mounted in the drainage port and having a valve seat, a valve arranged to engage said seat and having a stem thereon extending through said casing, a spider in said casing near said seat providing a bearing for said stem, a perforated disk rigid with the casing near the outer end thereof and providing a second bearing for the stem, a transverse pin carried by said stem between the bearings, a spring bearing between the pin and the spider for normally urging the valve toward its seat, and a slide mounted in said casing and abutting said disk for movement transversely of the axes of said stem and pin, said slide having cam surfaces engageable with the pin on opposite sides of the stem for opening said valve against the force of said spring, and a projection on said slide engageable with only one side of said pin to impart a short rotary movement to the valve.

4. A valve for controlling a drainage flow from the crank case of a motor or the like comprising, in combination, a tubular casing fashioned to be mounted in the drainage port of said crank case and having a valve seat, a valve arranged to engage said seat and having a stem thereon extending into said casing, guide means for said stem, a spring for normally urging the valve toward its seat, a slide carried by said casing for movement transversely of the axis of said stem, said slide having connections with said stem for moving the stem and valve against the force of the spring as the slide is moved in one direction, and means on the slide for moving the stem and valve rotatably when the slide is moved in an opposite direction.

5. A valve comprising a casing, a valve member therein having a reciprocatory non-rotative movement between its open and closed positions, means tending to hold said valve member in closed position, and reciprocatory means having a movement in one direction for shifting said valve member into open position and operable in a reverse

movement to impart a rotary movement to the valve.

6. A valve comprising a casing, a reciprocatory valve member therein, means tending to hold said valve member in closed position, and a valve operating device reciprocable transversely of the direction of movement of said valve member and having means operable when said device is moved in one direction for shifting said valve member to open position and for positively holding said valve member in open position at the end of such movement of said device, said device further having means operable in the reverse movement thereof for imparting a rotary movement to said valve member to effect tight sealing of the latter.

7. A valve device comprising, in combination, a valve casing having a valve seat, a valve cooperating with said seat including a stem on the valve, a projection on the stem, control means engaging said projection upon movement of the control means in one direction for moving said stem axially to open said valve, and means engaging the projection upon movement of the control means in another direction for rotating the valve relative to said seat.

8. In a valve device of the character described, the combination of a valve case having a seat, a valve cooperating with said seat and including a stem, a transverse plate rigid with said case and remote from said seat, said plate having a guide aperture therein for said stem and other apertures providing drain ports from said case, and an integral valve operator having a portion which extends laterally from said case and which is actuable by a lineal movement transversely of said stem to operate the valve said valve operator opening and closing said drain ports in its lineal movement.

9. A valve for controlling a discharging flow of lubricant from the crank case of a motor or the like comprising, in combination, a valve case having a valve seat thereon, a valve coacting with said seat, means normally urging said valve against said seat, a manually operable lineally slidable member connected with said valve and acting against said means to open the valve upon movement of the member, said valve case having discharge apertures disposed adjacent to said member and normally closed thereby, the parts being so arranged that the apertures are opened when the slidable member moves to open the valve.

10. In a valve device of the character described, the combination of a valve case having a valve seat thereon, a valve coacting with said seat, means normally urging said valve against said seat, manually operable valve control means acting against said means for opening the valve, and a discharge port from said case which is open only when said control means has moved to open said valve.

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