J. M. CAMERON.

INERTIA SPINDLE LUBRICATOR.

APPLICATION FILED FEB. 15, 1910.

1,006,908.

Patented Oct. 24, 1911.

2 SHEETS—SHEET 1.

FIG. 1.

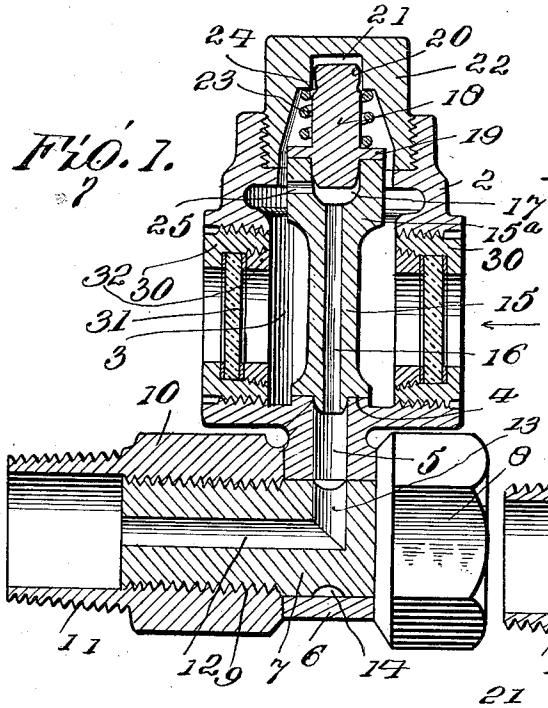


FIG. 2.

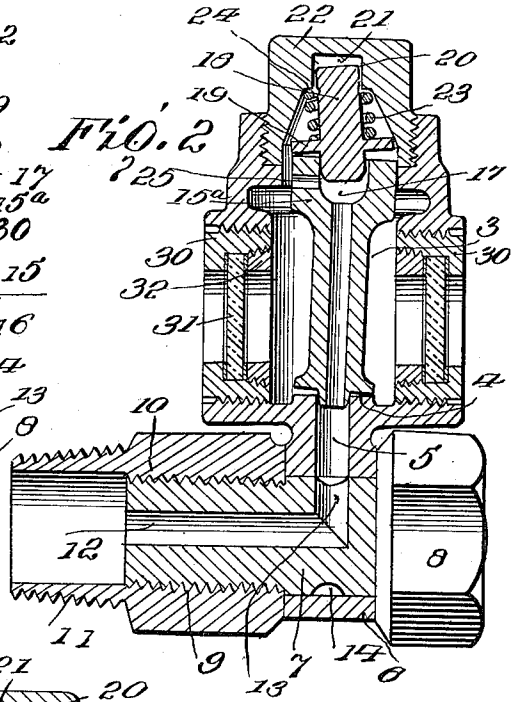
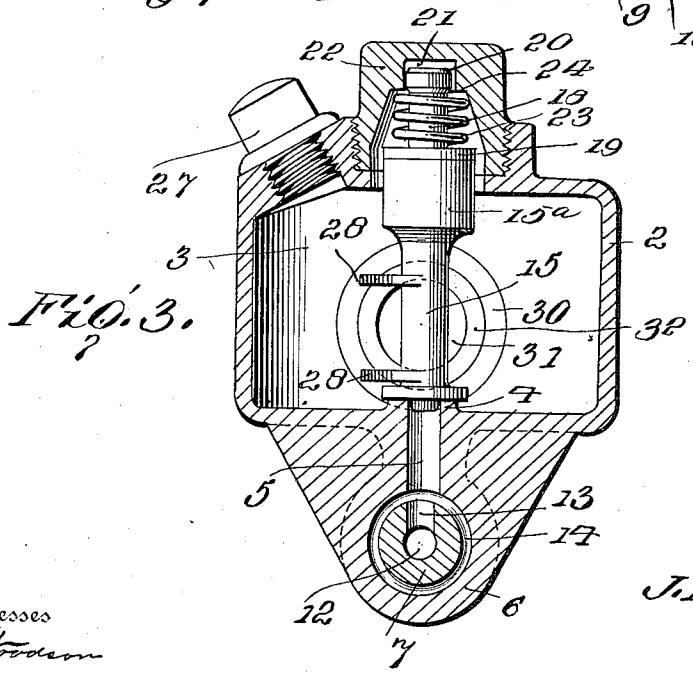


FIG. 3.



Witnesses

W. T. Woodson

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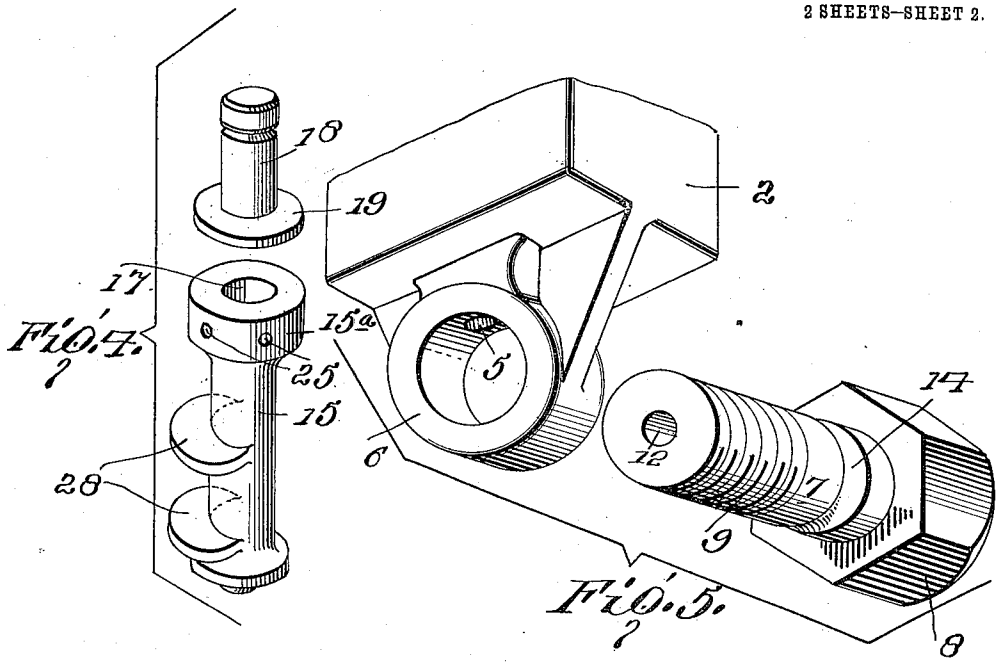

FIG. 4.

FIG. 5.

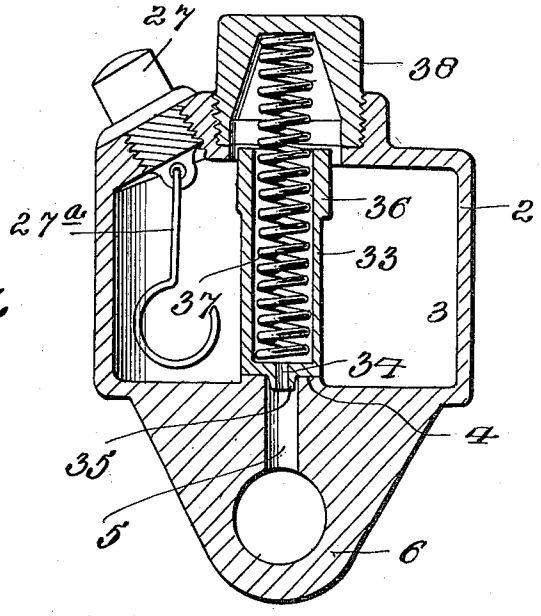

FIG. 6.

Witnesses

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INERTIA SPINDLE-LUBRICATOR.

1,006,908. Specification of Letters Patent. Patented Oct. 24, 1911.

Application filed February 15, 1910. Serial No. 544,110.

To all whom it may concern:

Be it known that I, JOHN M. CAMERON, citizen of the United States, residing at Cranberry, in the county of Mitchell and State of North Carolina, have invented certain new and useful Improvements in Inertia Spindle-Lubricators, of which the following is a specification.

My invention relates to lubricators and particularly to lubricators for machinery subject to shock in its operation.

The primary object of the invention is to provide for air or steam rock drills or other machinery which is subject to constant shocks or oscillation, due to the movement of reciprocating parts, a lubricator that will feed oil to the parts while under pressure and which will be to a certain extent operated by the oscillation of the machinery.

Another object is to provide a lubricator as above described, which will automatically supply oil to the moving parts of the engine or other machine to which it is attached, in quantity proportionate to the speed at which the engine or machine is operated on the principle that each individual stroke of the part being lubricated requires a certain quantity of oil. Thus a machine or machine element making two hundred strokes per minute calls for double the amount of oil which is required for a machine or element making only one hundred strokes per minute.

A further object of the invention is to provide a lubricator for the outside of the reciprocating parts of a machine or engine, which shall be dust proof.

In order to secure the objects above named, I have devised an oiler in which an oscillating valve is placed, this oscillating valve controlling the feed of oil to the machine and being so constructed that with every jolt or jar delivered to the machine by the motion of the parts, the valve will open to permit a certain amount of oil being delivered and will then close.

My invention is shown in the accompanying drawings, in which:

Figure 1 is a vertical transverse section through my improved lubricator and valve; Fig. 2 is a like view, but showing the valve in its opened position; Fig. 3 is a transverse section at right angles to Fig. 1; Fig. 4 is a detail perspective view of the valve; Fig. 5 is a detail perspective view of the oil reservoir and the bolt disassembled; and, Fig. 6 is a transverse section of a modified form of lubricator.

Corresponding and like parts are referred to in the following description and indicated in all the views of the drawings by the same reference characters.

Referring to these figures and particularly to Figs. 1 to 4, 2 designates a casing of any convenient shape, forming a chamber 3 for holding a supply of oil. At the bottom of the chamber is formed a valve seat 4 and the passage 5 extends from this seat and opens on the inside of a ring 6.

Passing through the ring 6 is a bolt 7 formed at one end with a head 8 and having its shank exteriorly screw threaded, as at 9, to engage with interior screw threads on a pipe connection 10. This pipe connection is exteriorly screw threaded at its end, as at 11, for insertion into the parts to be lubricated. The shank of the bolt 7 is formed with a longitudinally extending central passage 12 which at its inner end connects with a branch 13, which extends from the passage 12 at right angles thereto and opens at its outer end upon an annular groove 14, which when the bolt is in position is in alinement with the passage 5. It will thus be seen that the container or reservoir 2 may be rotatively moved around the bolt 7 to any angular position thereon, without interrupting the passage from the reservoir to the passage 12, and so to the part to be lubricated.

Mounted within the container or reservoir 2, is a valve 15 having the form of a somewhat elongated spindle. This valve is tubular and at its lower end is adapted to fit into the upper end of the passage 5, the end of the valve surrounding the central passage 16 therein, fitting against the seat 4 formed in the lower end of the reservoir, so that when the valve is in line with the passage 5 and resting squarely upon the seat 4, the valve will close the passage 5 and prevent the oil passing from the reservoir into said passage. The upper end of the valve 15 has a flat surface and is counterbored, as at 17. Resting upon the upper end of the valve 15 is the cap 18. This cap at its lower end is slightly rounded, the rounded lower end fitting into the counterbore 17 which is an enlargement of the upper end of the central passage 16. The inner end of the cap 18 is also provided with the annular flange 19 which fits upon the flat

upper face of the valve. The outer extremity of the cap 18 is rounded, as at 20, and engages preferably in a recess 21 formed in a plug 22, this plug being exteriorly screw threaded to engage with and close the upper end of the reservoir 2. There is sufficient play between the upper end of the cap 18 and the plug 22 to permit of an oscillation of the cap 18 to the position shown in Fig. 2.

The cap 18 and the valve 15 are yieldingly held in alinement with each other by means of a spring 23, which as shown in Fig. 3, is coiled around the cylindrical cap 18 and bears at its upper end against a shoulder 24 formed on the inner face of the plug 22. The valve 15 is formed with radial passages 25 which connect with the passage 16 so that communication may be established between the passage 5 and the space above the surface of the oil. It will be seen that the internal diameter of the circular recess 21 in the plug 22 which forms the top of the chamber 3, is somewhat larger than the upper end of the valve 15 to permit a movement of the upper end of valve 15 at right angles to its longitudinal axis. The reservoir 2 is also provided with a filling opening closed by a plug 27.

The upper end of the valve 15, it will be seen, is enlarged and hence considerably heavier than the lower end thereof so that the valve, if it were not for the spring 23, would be in a condition of unstable equilibrium. The valve stem is also provided with the projecting wings 28 for a purpose to be later described. On each side of the chamber or reservoir 2 is an opening which is interiorly threaded to receive a threaded plug 30 which carries a sight glass 31 held against a shoulder on the plug by means of a screw threaded ring 32. This glass is cushioned by a rubber or felt gasket.

The operation of my invention as described is as follows: The connection 11 is first securely screwed into the engine, drill or other part to which the lubricator is to be applied, and the chamber or reservoir 15 is then disposed in a vertical position and clamped tightly in place in this position by means of the bolt 7. Assuming for purposes of explanation, that the lubricator is connected to a rock drill, it will be seen that as the machine operates, the reciprocating piston thereof will be subjected to a constant succession of shocks. The number of blows struck by the drill of a rock drilling machine may be varied from fifty to five hundred per minute, and hence the number of shocks to which the piston is subjected will vary. When the piston is suddenly stopped by the end of the drill contacting with the rock, the whole machine is jarred and anything attached to the machine partakes of this jar. By the mechanism described, I provide means whereby this shock, jar or vibration caused by the reciprocation of the piston or other like part is utilized to feed oil to the machine. It will be seen that the valve whereby the flow of oil is controlled is made up of two parts, namely, the valve proper 15 and the cap piece 18, these parts being held in alinement with each other by the spring 23. With the chamber 2 filled with oil, each blow of the drill upon the rock will cause the valve to take for an instant the position shown in Fig. 2, wherein the two sections of the valve 15 and 18 are at an angle to each other. This lateral movement of the upper end of the spindle-shaped valve 15 raises the valve from its seat on one side, as shown in Fig. 2, sufficiently to allow a small quantity of oil to pass through the passage 5 and into the drill cylinder. In order to insure this tipping or rocking of the valve upon this seat, the upper end of the stem 15 is preferably made relatively heavy by the enlargement 15ª; hence if the side of the lubricator be struck a horizontal blow in the direction shown by the arrow in Fig. 1, the upper or weighted end of the spindle 15 and the lower end of the member 18 will move horizontally relatively to the valve casing, a distance proportionate to the force of the shock or jar to the position shown in Fig. 2. Immediately following the opening of the valve, as above described, the valve will be closed by the action of the spring 23 which brings the two sections of the valve 15 and 18 into alinement. This spring constantly tends to retain the parts 15 and 18 in alinement and at right angles to the plane of the seat 4, thus keeping the passage 5 closed. Thus, for each stroke of the drill or for each reciprocation of the engine or machine part, there will be a partial opening of the valve at the seat 4, permitting oil to pass into the passage 5 and in this way the parts are lubricated at each stroke.

In order to provide means for rocking the spindle 15 upon its seat under a vertically delivered shock or blow, I use the oil in the chamber 15 as a means of causing the valve spindle to rock. To this end I provide the projecting wings 28 whereby the inertia of the oil is transmitted to the spindle 15. For lubricating certain classes of slowly moving reciprocating machinery, it is not necessary to provide the cap piece 18 nor the spring 22, these parts being dispensed with, but the lower end of the spindle 15 is increased in dimaeter so as to get a relatively broad seat at 4.

The sight glasses 31 permit the condition of the oil in the chamber or reservoir to be noted at any time. This is done by holding a light on one side of the lubricator and looking through the lubricator from the other side. A glance is sufficient to deter-

mine whether or not the oil chamber is empty or full.

Two details may be pointed out with regard to the operation of the valve. The first is that the widened flange forming the lower end of the valve spindle forms a fulcrum upon which the spindle rocks or tips. This flange being annular permits the spindle to tip in any direction. The lower end of the spindle preferably projects into the opening 5 so that the spindle may be seated properly when it returns to its normal position perpendicular to the face of the seat 4. It is also pointed out that the tipping movement of the spindle is limited by the upper end of the valve or spindle projecting into the plug in the upper wall of the reservoir or chamber 2. The opening in this plug is larger than the diameter of the upper end of the valve or spindle, hence permitting the valve or spindle to rock slightly upon its base, but preventing too great tipping of the spindle.

In Fig. 6 is shown a modified form of my invention and therein 2 designates the oil chamber constructed precisely as heretofore described, having the seat 4, passage 5 and the ring 6 through which passes the bolt 7. The valve in this case, however, consists of a hollow shell 33 which is closed at its lower end, save for a passage 34. The lower face of the shell 33 is provided with a central projecting portion 35 which extends down into the opening 5. The upper end of the shell 33 is thickened or weighted, as at 36, and carried within the shell is the coil spring 37 which extends upward above the upper end of the shell and bears against the inside face of a plug 38 which is similar to the plug 22, except that it is not provided with the shoulder 24. The spring 37 may either be loose or may be attached at its upper end to the plug 38 so as to move with the plug. The operation of this form of my invention is precisely the same as heretofore described. A shock or jar will cause the valve to tip upon its seat, thus opening the passage 5 to the oil and the valve will then be closed by the action of the spring 37. While I have shown what I believe to be the two preferable forms of my invention, I do not wish to be limited to the exact construction shown, as it is obvious that the principle of my invention might be embodied in a large number of different forms. I have found my invention entirely effective in practice, particularly for the purpose of lubricating rock drills and like machinery.

In order to prevent the plug 27 from being lost, I may provide it with the link 27 which is attached to the plug and depends within the chamber 3, the lower end of this link being enlarged by being formed into a loop, this loop being larger than the opening which the plug closes. When the device is inserted, the coil or loop at the end of the link may be depressed sufficiently to permit it to be inserted into the opening in the reservoir 2, and it will then expand, taking the form shown in Fig. 6.

While I prefer to use a spring for returning the valve to its seat after it has been oscillated, I do not wish to limit myself to this, for even without a spring the valve will return to its seat unless the angle of inclination be such as will move the center of the weighted part of the valve to a point vertically outside of the edge of the valve seat. In other words, assuming that the valve at its lower end has a seat $\frac{5}{8}$ of an inch in diameter, the center of gravity of the whole valve must move $\frac{5}{16}$ of an inch or more from the vertical position before the valve will open by gravity and allow oil to waste. As the center of gravity of my improved valve is about one inch above the seat, the lubricator may be as much as $\frac{5}{16}$ of an inch out of plumb to each inch of height before the valve will open of itself and waste oil. This ratio corresponds to an inclination of 18° and my lubricator even without a spring is capable of being used on any machine through a range of 18° above or below the horizontal and will automatically close the oil outlet by gravity alone until the inclination exceeds 18° when the spring is required. An inclination of 18° corresponds to what is known in railroad parlance as a 32% grade. My lubricator may therefore be used on railroad car axles and without a spring on all practical grades and will close the oil outlet when at rest.

It is to be particularly noted that my valve responds to jolts or jars coming from any direction, and not only to jars which occur parallel to the axis of the valve.

Having thus described the invention, what is claimed as new is:

1. The combination with a chamber having an outlet opening and a valve seat surrounding the opening, of an elongated valve within the chamber oscillatable in all directions, the lower end of the valve having a rocking engagement with the seat as upon a fulcrum, the other end of the valve being free to move laterally in all directions under shock to rock the valve upon its seat, and means having a rocking engagement with the chamber and acting to press the valve upon its seat, and also acting to return the valve to a position perpendicular to the valve seat.

2. The combination with a lubricant containing chamber having an outlet opening, of an elongated, loose valve within the chamber, the lower end of the valve having rocking engagement with the seat, the other end of the valve being free to move laterally in all directions and having a flat face, and an oscillatable member having

rocking engagement in all directions with the upper end of the chamber and having a flat face disposed in rocking engagement with the flat face of the end of the valve.

3. The combination with a chamber having an outlet opening and a seat surrounding the opening, of an oscillatable valve, one end of the valve having rocking engagement with the seat, the other end of the valve being laterally movable under shock to rock the valve upon the seat as upon a fulcrum, said valve being formed with a central passage opening at one end through the seat-engaging end of the valve and at the other end communicating with the exterior of the valve, said passage when the valve is in a position perpendicular to the valve seat communicating with the outlet opening.

4. The combination with a chamber having an outlet opening and a flat seat surrounding the opening, of a valve loosely disposed within the chamber, the lower end of the valve having a flat face contacting with the face of the valve seat when the valve is in a position perpendicular thereto and having a rocking engagement with the seat as upon a fulcrum, the other end of the valve being free to move laterally in all directions to rock the valve upon its seat, and resilient means yieldingly forcing the valve in the direction of its axis toward the seat and acting to urge the valve to a position perpendicular to the valve seat.

5. In a lubricator, the combination with an oil containing chamber having an outlet opening at its lower end and a seat surrounding the opening, of a spindle shaped valve disposed within the chamber, the lower end thereof resting on the seat, the other end of the valve being weighted, but free to move laterally under shock to tip the valve upon the seat as a fulcrum, and a spring acting to hold the valve in a position perpendicular to the face of the valve seat.

6. In a lubricator, the combination with an oil containing chamber having an outlet opening at its lower end and a seat surrounding the opening, of a spindle shaped valve disposed within the chamber, the lower end thereof resting on said seat and closing the outlet opening, the other end of the valve being free to move laterally under shock, thus tipping the valve upon the seat as a fulcrum, said valve being tubular and opening into the chamber.

7. In a lubricator, the combination with a chamber having an outlet opening at its lower end, and a seat surrounding the opening, of a tubular valve disposed within the chamber, the lower end of the valve resting on the seat, the upper end of the valve being weighted, a spring engaging with the upper end of the valve to hold it in a vertical position, and means for limiting the tipping movement of the valve.

8. In a lubricator, the combination with a chamber having an outlet opening at its lower end, and a seat surrounding the opening, of an elongated valve within the chamber, the lower end thereof resting on the seat, the upper end of the valve projecting into a contracted portion of the upper end of the chamber and being thereby limited in its lateral movement, the upper end of the valve being free to move laterally under shock to tip the valve upon the seat as a fulcrum, and a spring engaging the upper end of the chamber and the valve and holding the valve in a vertical position.

9. In a lubricator, the combination with an oil containing chamber having an outlet opening at its lower end and a seat surrounding the opening, of a spindle shaped valve, the lower end thereof having a central projection normally disposed within said opening, the upper end of the valve being weighted and free to move laterally under shock to rock the valve upon the seat as a fulcrum, and a spring holding the valve in a vertical position.

10. In a lubricator, an oil containing chamber, one end of said chamber being formed with a ring, the chamber having an oil passage extending to the inner face of the ring, a valve disposed within the chamber and resting at one end against the outlet opening, the other end of the valve being free to move laterally under shock to tip the valve upon its lower end as a fulcrum and open the oil opening, a screw threaded member passing through the ring on the lower end of the chamber, said member being formed with an annular groove normally in alinement with the oil outlet passage and with an internal passage opening to said groove, and a nipple into which said screw threaded member screws.

11. In a lubricator, the combination with an oil containing chamber having an outlet opening at its lower end and a flat seat surrounding the opening, of an elongated valve, the lower end thereof having a flat face disposed in rocking engagement with the valve seat, the other end of the valve being free to move in all directions under shock to rock the valve upon a seat as upon a fulcrum and having a flat face at right angles to the axis of the valve, and a member freely oscillatable laterally in all directions and loosely seated in the upper end of the chamber, the other end of the member being flat and having rocking engagement with the outer end of the valve.

12. In a lubricator, the combination with an oil containing chamber having an outlet opening at one end and a flat seat surrounding the opening, of an elongated spindle-shaped valve disposed within the chamber,

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The primary object of the invention is to provide for air or steam rock drills or other machinery which is subject to constant shocks or oscillation, due to the movement of reciprocating parts, a lubricator that will feed oil to the parts while under pressure and which will be to a certain extent operated by the oscillation of the machinery.

Another object is to provide a lubricator as above described, which will automatically supply oil to the moving parts of the engine or other machine to which it is attached, in quantity proportionate to the speed at which the engine or machine is operated on the principle that each individual stroke of the part being lubricated requires a certain quantity of oil. Thus a machine or machine element making two hundred strokes per minute calls for double the amount of oil which is required for a machine or element making only one hundred strokes per minute.

A further object of the invention is to provide a lubricator for the outside of the reciprocating parts of a machine or engine, which shall be dust proof.

In order to secure the objects above named, I have devised an oiler in which an oscillating valve is placed, this oscillating valve controlling the feed of oil to the machine and being so constructed that with every jolt or jar delivered to the machine by the motion of the parts, the valve will open to permit a certain amount of oil being delivered and will then close.

My invention is shown in the accompanying drawings, in which:

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Passing through the ring 6 is a bolt 7 formed at one end with a head 8 and having its shank exteriorly screw threaded, as at 9, to engage with interior screw threads on a pipe connection 10. This pipe connection is exteriorly screw threaded at its end, as at 11, for insertion into the parts to be lubricated. The shank of the bolt 7 is formed with a longitudinally extending central passage 12 which at its inner end connects with a branch 13, which extends from the passage 12 at right angles thereto and opens at its outer end upon an annular groove 14, which when the bolt is in position is in alinement with the passage 5. It will thus be seen that the container or reservoir 2 may be rotatively moved around the bolt 7 to any angular position thereon, without interrupting the passage from the reservoir to the passage 12, and so to the part to be lubricated.

Mounted within the container or reservoir 2, is a valve 15 having the form of a somewhat elongated spindle. This valve is tubular and at its lower end is adapted to fit into the upper end of the passage 5, the end of the valve surrounding the central passage 16 therein, fitting against the seat 4 formed in the lower end of the reservoir, so that when the valve is in line with the passage 5 and resting squarely upon the seat 4, the valve will close the passage 5 and prevent the oil passing from the reservoir into said passage. The upper end of the valve 15 has a flat surface and is counterbored, as at 17. Resting upon the upper end of the valve 15 is the cap 18. This cap at its lower end is slightly rounded, the rounded lower end fitting into the counterbore 17 which is an enlargement of the upper end of the central passage 16. The inner end of the cap 18 is also provided with the annular flange 19 which fits upon the flat