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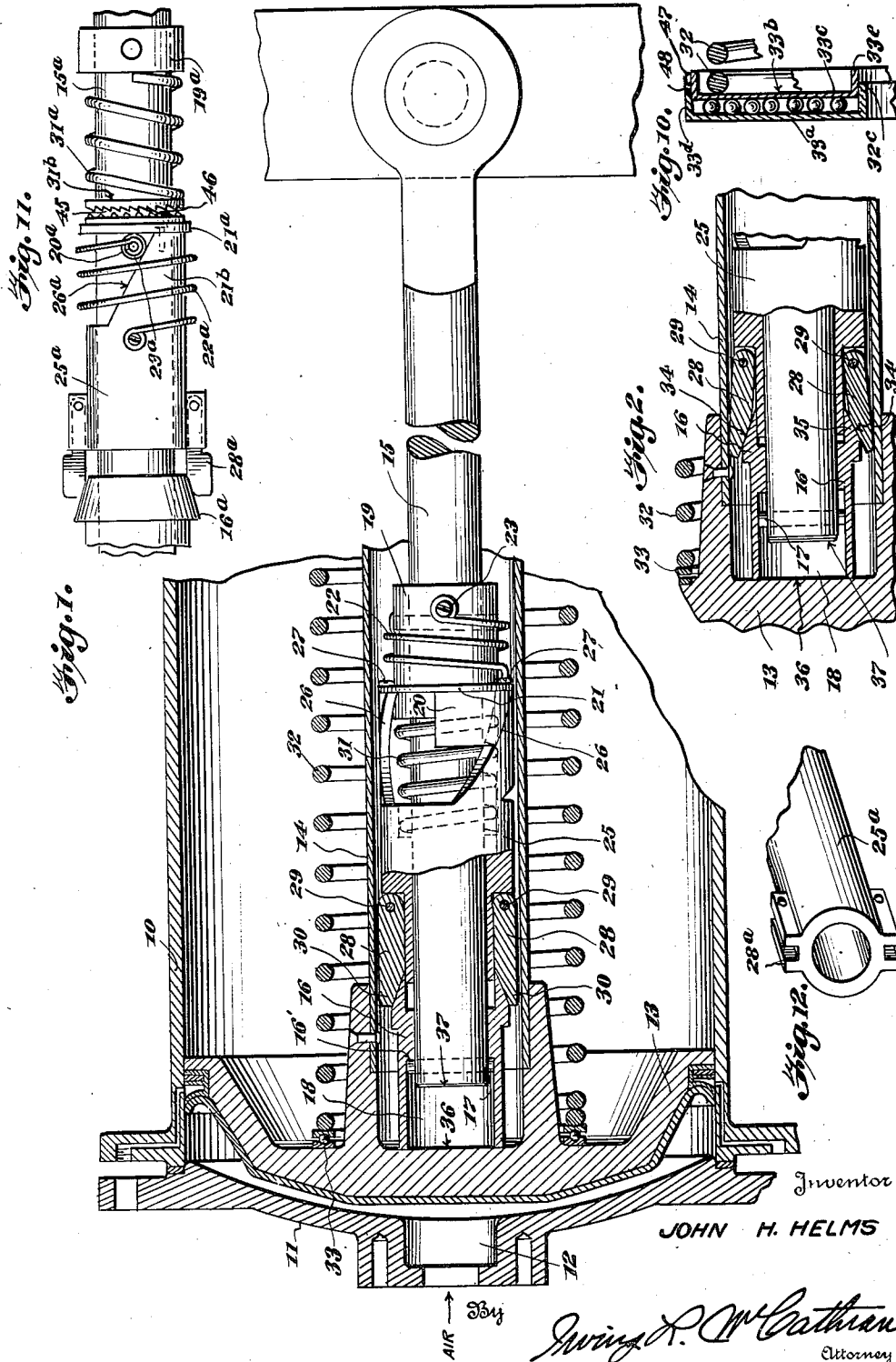
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LUBRICATING PUSH-ROD

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2 Sheets-Sheet 1



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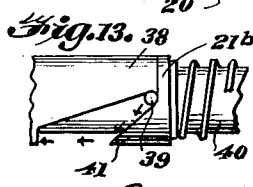
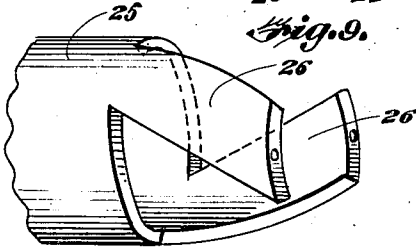
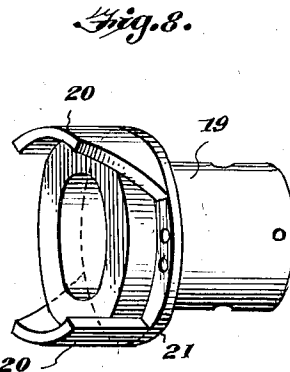
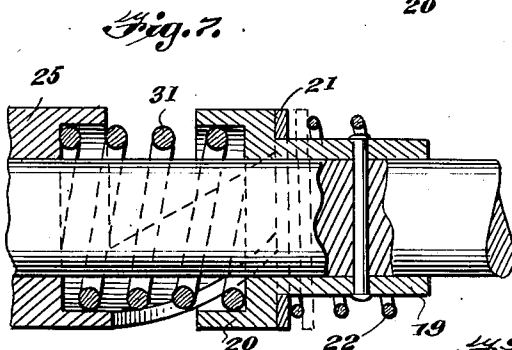
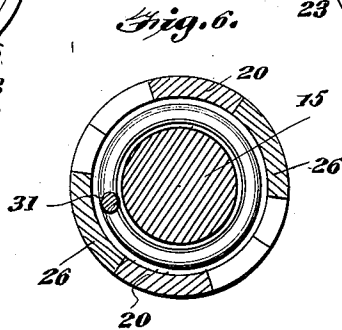
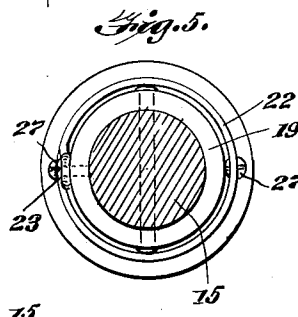
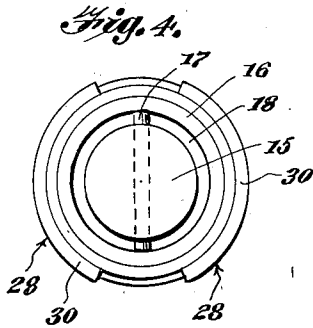
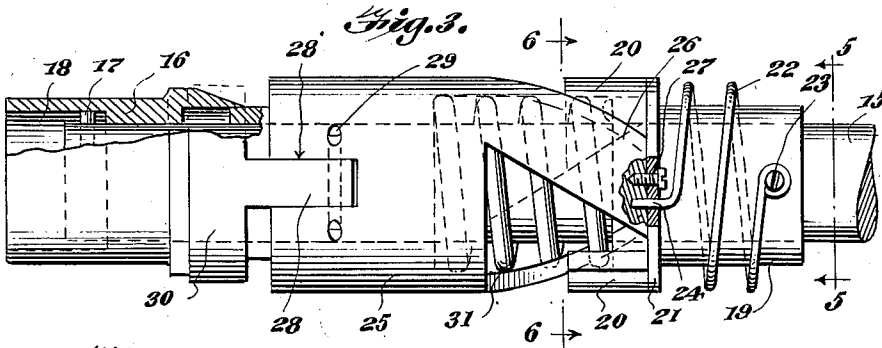
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LUBRICATING PUSH-ROD

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UNITED STATES PATENT OFFICE

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LUBRICATING PUSH ROD

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11 Claims. (Cl. 184—18)

This invention relates to lubricating push-rods and has for one of its objects the production of a simple and efficient means for distributing oil over the inner walls of a cylinder and preventing the accumulation of oil at the bottom air brake cylinders such as used on freight trains, engines, tenders, and other suitable and similar cylinders.

A further object of this invention is the production of a simple and efficient means for automatically rotating the piston as the piston is reciprocated in the cylinder, thereby causing the oil in the cylinder to be carried up the walls of the cylinder and in this manner thoroughly distribute the oil over the entire inner surface of the cylinder rather than permit the oil to remain in the bottom of the cylinder.

Other objects and advantages of the present investigation will appear throughout the following specification and claims.

In the drawings:

Figure 1 is a longitudinal section of the improved device, certain parts being shown in section, the expanding jaws being shown in a released position;

Figure 2 is a fragmentary longitudinal sectional form of a portion of the device, the expanding jaws being shown in a gripping position;

Figure 3 is a side elevational view of the inner end of the push rod and associated parts, certain portions being shown in section;

Figure 4 is an end view looking at the inner end of the structure shown in Figure 3;

Figure 5 is a transverse sectional view taken on line 5—5 of Figure 3;

Figure 6 is a transverse sectional view taken on line 6—6 of Figure 3;

Figure 7 is a fragmentary longitudinal sectional view of a portion of the push-rod assembly;

Figure 8 is a perspective view of primary twisting cam;

Figure 9 is a fragmentary perspective view of the co-acting twisting cam;

Figure 10 is an enlarged transverse sectional view of a modified type of ball-bearing for use with the present invention;

Figure 11 is a fragmentary side elevational view of a modified type of piston-turning mechanism;

Figure 12 is a fragmentary perspective view of the cam sleeve shown in Figure 11; and

Figure 13 is a fragmentary side elevational view of a modified type of twisting cam and associated parts.

By referring to the drawings, it will be seen

that 10 designates a conventional air brake cylinder having a conventional head 11 provided with an air port 12. The piston 13 is mounted in the cylinder 10, as shown in Figure 1, and this piston 13 carries a piston sleeve 14 which encases the push-rod 15 for a suitable distance. A wedging collar 16 is carried by the inner end of the push-rod 15 and abuts against the retaining pin 17 carried by the push-rod 15. The pin 17 slidably fits in the socket 18 of the collar 16, as shown in Figures 1 and 2.

A fixed cam sleeve 19 is fixed on the push-rod 15 and this fixed cam sleeve 19 is provided with spaced cam jaws 20. A circular plate 21 is loosely mounted on the fixed cam sleeve 19. A ratchet coil spring 22 fits freely around the fixed cam sleeve 19 and one end is anchored to the cam 19 by means of a screw 23. The opposite end 24 of the spring 22 extends through, and is anchored to, the plate 21, as shown in Figure 3.

A co-acting or twisting cam sleeve 25 is rotatably mounted on the push-rod 15, and this sleeve 25 carries a pair of cam jaws 26. The ends of the jaws 26 abut against the plate 21 and are anchored thereon by means of screws 27. The jaws 20 and 26 by co-action provide a ratchet mechanism. Friction jaws 28 are pivotally secured to the sleeve 25, as at 29, and these friction jaws are T-shaped and are provided with wedge-shaped segmental portions 30 which partially surround the wedging collar 16, as shown in Figures 3 and 5. An expansion coil spring 31 is mounted upon the push-rod 15 between the sleeve 25 and the cam sleeve 19 to normally urge the sleeves 19 and 25 apart. A cylinder release spring 32 of the conventional type, is carried within the cylinder 10 and preferably engages a ball-thrust bearing 33 which abuts against the piston 13 to allow the piston 13 to be turned freely in the cylinder 10 without being retarded by the resistance of the spring 32. A similar ball-thrust bearing may also be used on the opposite end of the spring 32, if desired.

The two friction jaws 28 which are in the nature of expanding jaws snugly fit within the notches 28' formed in the cam sleeve 25. The segmental portions 30 of these jaws 28 are provided with beveled under faces 34 for contacting with the beveled end 35 of the wedging collar 16, and these jaws are adapted to lock instantly when the air brakes are applied and unlock instantly when the air brakes are released. It should be noted that the lubricating push rod fits freely within the piston sleeve 14 and when the air brakes are released there is ordinarily a space

between the push-rod and the rear wall of the piston which may vary from five to seven inches in actual practice.

When air is applied to the cylinder, the back wall 36 of the piston 13 pushes the wedging collar 16 underneath the beveled ends 34 of the jaws 28, thereby causing these jaws 28 to expand against the inner face of the piston sleeve 14, the spring 31 also assisting in accomplishing this movement. This spring 31 during this movement will be compressed and the cam jaws 26 of the sleeve 25 engages the spaced cam jaws 23 causing the piston to turn or rotate within the cylinder 10, at the same time the spring 22 which is a ratchet spring is compressed and wound about the primary cam sleeve 19. Until the inner end 37 of the push-rod 15 engages the wall 36 of the piston 13, the piston 13 is gradually turned or rotated within the cylinder 10 throughout the entire stroke of the piston which in actual practice usually is a distance of from seven to nine inches. In view of the fact that the ball-thrust bearing 33 engages the inner end of the spring 32, as shown in Figure 1, the spring 32 will not have a twisting movement due to the fact that the piston 13 may rotate freely independently of the spring 32.

When the air brakes are released, the piston moves backwards releasing the spring 31, and also forcing the sleeve 25 backwardly. The space between the jaws 26 and 20, as shown in Figures 1, 3 and 6 is provided to permit the piston to move back to its original position in a straight path without rotating movement. In other words in one stroke while the piston 13 is moving away from the head 11 the piston will rotate and in its return stroke the piston will move in a direct line without rotation, or at least without any material rotation. After the piston 13 has released the wedging collar 16, the jaws 28 force the collar 16 backwardly until the pin 17 abuts against the shoulder 16'. The jaws 28 will be released from engagement with the sleeve 14 and the ratchet spring 22 will return the plate 21 to its normal position causing the jaws 20 and 26 to assume the position shown in Figure 1. The expanding jaws 28 will then be placed in a new position within the sleeve 14. This procedure is continued each time the piston 13 reciprocates and each time the brakes are applied and released, thereby causing the oil within the cylinder 10 to be spread over the circumference of the entire cylinder due to the rotation of the piston 13, and in this way prevent the oil from accumulating in the bottom of the cylinder and also preventing the upper portion of the cylinder from being without lubrication.

It should be understood that the jaws 20 and 26 when co-operating provide a clutch action and that the spring 22 is adapted to coil about the primary cam sleeve 19, and that the sleeve 25 will rotate against the tension of the spring 22 when the piston 13 is moved in one direction, and this spring 22 is adapted to return to its normal position when pressure is released, thereby setting the jaws 26 in their proper relation with respect to the jaws 20.

In Figure 10, I have shown a modified type of ball-bearing for use in connection with the present invention to be used in a manner similar to the bearing 33. Figure 10 illustrates a seal-tight thrust bearing comprising an encasing section 33^a and a ball-retaining section 33^b to be engaged by the spring 32. Balls 33^c are retained between the sections 33^a and 33^b. The section 33^a is pro-

vided with flanges 33^d which overlie the flanges 33^e of the section 33^b, thereby retaining the balls 33^c and preventing the balls 33^c from becoming loose and falling into the cylinder such as the cylinder 10.

In the form shown in Figure 11, the push-rod is indicated at 15^a, upon which is slidably mounted the cam-sleeve 25^a which fits snugly around the push-rod 15^a. This sleeve 25^a carries the friction jaws 28^a between the ears 28^b which jaws are adapted to engage the wedging collar 16^a in a manner similar to that described with reference to Figure 1. A steel pin 20^a carries a roller 23^a and engages the push-rod 15^a. The roller 23^a carried by the pin 20^a rides against the inclined face 26^a of the cam 21^b. An expansion spring 31^a is carried by the push-rod 15^a and abuts against the anchored cap or roller 19^a and the circular plate or bearing 31^b. The ratchet spring 22^a is anchored at one end to the pin 20^a and at the other end to the sleeve 25^a. The numerals used in describing the modified form indicate similar parts designated in Figure 1 with the exception that a letter is added to the numeral. The operation of both forms is similar, but the modified form has been included to provide an assembly which might be used on some older models of cars, or some newer ones of certain design. The bearing 31^b is preferably a ball-bearing and is interposed between the spring 31^a and the plate 21^a, as shown in Figure 11.

One side of the bearing 31^b carries a ratchet 45 and the opposite side of the bearing 31^b carries a spring pawl 46 to engage the ratchet 45, thereby allowing the bearing to turn in one direction only at the point where the spring 31^a engages. When the brakes are released the spring 31^a does not quite touch the end of the bearing. This allows ratchet spring 31^a and the triangular lug to turn gripping jaws 28^a to their new location in the sleeve.

A similar locking device may be used in the nature of a spring pawl 47 carried by the section 33^e shown in Figure 10, for engaging a ratchet 48 formed on the edge of the section 33^a, if desired.

In Figure 13, a modified type of means for operating the twisting cam is shown, wherein 38 indicates the twisting cam which engages the lateral pin 39 carried by the push-rod 40. This pin 39 engages and rides against the triangular lug 41 fixed to the plate 21^b, and as the end of the cam 38 pushes against the plate 21^b similar to the plate 21 and compresses the spring 22^b similar to the spring 22, the pin 39 causes the cam to twist or rotate, the pin 39 following the path of the arrows.

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

1. A mechanism of the class described comprising a cylinder, a piston slidably mounted in the cylinder, a push-rod for the piston, and means carried by the push-rod for rotating the piston as the piston is moved longitudinally of the cylinder for causing lubrication accumulated in the bottom of the cylinder to be distributed over the inner walls of the cylinder as the piston rotates.

2. A mechanism of the class described comprising a cylinder, a piston slidably mounted in the cylinder, a push-rod for the piston, and means carried by the push-rod for rotating the piston as the piston is moved longitudinally of the cylinder for causing lubrication accumulated in the bottom of the cylinder to be distributed

over the inner walls of the cylinder as the piston rotates, said means comprising a releasable twisting mechanism carried by the push-rod and engaging the piston for turning the piston as the piston moves in one direction.

3. A mechanism of the class described comprising a cylinder, a piston slidably mounted in the cylinder, a push-rod for the piston, a piston sleeve carried by the piston, a wedging collar carried by said push-rod, a fixed cam sleeve carried by the push-rod, a co-acting cam sleeve loosely mounted upon the push-rod, expanding jaws carried by said co-acting cam sleeve and engaging said wedging collar, and co-operating means carried by the fixed cam sleeve and the co-acting cam sleeve for rotating said piston as said push-rod moves longitudinally in one direction through said piston sleeve.

4. A mechanism of the class described comprising a cylinder, a piston slidably mounted in the cylinder, a push-rod for the piston, a piston sleeve carried by the piston and fitting over said push-rod, a wedging collar slidably mounted upon the inner end of the push-rod and fitting within said sleeve, said wedging collar having a tapering end, a fixed cam sleeve carried by the push-rod, a co-acting cam sleeve carried by the push-rod and loosely mounted thereon and fitting between the wedging collar and the fixed cam sleeve, expanding jaws pivotally secured to the co-acting cam sleeve and having beveled inner faces overlying the tapering end of said wedging collar, the wedging collar being adapted to abut against the piston, and the push-rod being slidable longitudinally of the wedging collar for moving the expanding jaws longitudinally of the tapering end of the wedging collar to cause said expanding jaws to frictionally grip said piston sleeve and lock the co-acting cam sleeve into frictional engagement with said piston sleeve, a tension spring connecting the fixed cam sleeve with the co-acting cam sleeve, resilient means interposed between the fixed cam sleeve and the co-acting cam sleeve, and means carried by the fixed cam sleeve for rotating the co-acting cam sleeve and piston in one direction as said piston is moved longitudinally of said cylinder in one direction for causing the piston to rotate simultaneously with its longitudinal movement within the cylinder.

5. A mechanism of the class described comprising a cylinder, a piston slidably mounted in the cylinder, a push-rod for the piston, a piston sleeve carried by the piston and fitting over said push-rod, a wedging collar slidably mounted upon the inner end of the push-rod and fitting within said sleeve, said wedging collar having a tapering end, a fixed cam sleeve carried by the push-rod, a coacting cam sleeve carried by the push-rod and loosely mounted thereon and fitting between the wedging collar and the fixed cam sleeve, expanding jaws pivotally secured to the co-acting cam sleeve and having beveled inner faces overlying the tapering end of said wedging collar, the wedging collar being adapted to abut against the piston, the push-rod being slidable longitudinally of the wedging collar for moving the expanding jaws longitudinally of the tapering end of the wedging collar to cause said expanding jaws to frictionally grip said piston sleeve and lock the co-acting cam sleeve into frictional engagement with said piston sleeve, a tension spring connecting the fixed cam sleeve with the co-acting cam sleeve, resilient means interposed between the fixed cam sleeve and the

co-acting cam sleeve, means carried by the fixed cam sleeve for rotating the co-acting cam sleeve and piston in one direction as said piston is moved longitudinally of said cylinder in one direction for causing the piston to rotate simultaneously with its longitudinal movement within the cylinder, a resisting spring engaging the piston to normally return the piston to its original position, and a ball-thrust bearing carried by the piston and engaging the last mentioned spring.

6. A mechanism of the class described comprising a cylinder, a piston slidably mounted in the cylinder, a push-rod for the piston, a piston sleeve carried by the piston and fitting over said push rod, a wedging collar slidably mounted upon the inner end of the push-rod and fitting within said sleeve, said wedging collar having a tapering end, a fixed cam sleeve carried by the push-rod, a coacting cam sleeve carried by the push-rod and loosely mounted thereon and fitting between the wedging collar and the fixed cam sleeve, expanding jaws pivotally secured to the co-acting cam sleeve and having beveled inner faces overlying the tapering end of said wedging collar, the wedging collar being adapted to abut against the piston, the push-rod being slidable longitudinally of the wedging collar for moving the expanding jaws longitudinally of the tapering end of the wedging collar to cause said expanding jaws to frictionally grip said piston sleeve and lock the co-acting cam sleeve into frictional engagement with said piston sleeve, a tension spring connecting the fixed cam sleeve with the co-acting cam sleeve, resilient means interposed between the fixed cam sleeve and the co-acting cam sleeve, cam jaws carried by said fixed cam sleeve, cam jaws carried by said co-acting cam sleeve and engaging one side edge of the adjoining jaws of the fixed sleeve for rotating said co-acting cam sleeve as said fixed cam sleeve moves longitudinally in one direction.

7. A mechanism of the class described comprising a cylinder, a piston slidably mounted in the cylinder, a push-rod for the piston, a sleeve carried by the piston and fitting over the push-rod, a fixed cam sleeve carried by the push-rod, a co-acting cam sleeve rotatably mounted upon the push-rod, friction grip means carried by the co-acting cam sleeve for frictionally engaging said piston sleeve, said fixed cam sleeve having a pair of spaced cam jaws, cam jaws carried by said co-acting cam sleeve and normally engaging one side edge of the jaws of the fixed sleeve, the jaws of the fixed sleeve and the co-acting sleeve being spaced upon their opposite side edges, a tension coil spring fixed at one end to the fixed sleeve and connected at the other end to the co-acting cam sleeve for permitting rotation of the co-acting cam sleeve relative to the fixed sleeve against the tension of said spring, the longitudinal movement of the push-rod and the associated parts causing the rotation of the piston as the piston moves longitudinally in one direction within the cylinder, the spacing of the respective jaws of the sleeves upon one side of the jaws permitting the piston to return to its normal position independently of rotation in a manner whereby a step-by-step rotation of the piston is provided upon each successive reciprocation for causing an even distribution of lubricant within the cylinder, and spring means engaging the piston to return the piston to its normal position when pressure is relieved therefrom.

8. A mechanism of the class described compris-

ing a cylinder, a piston slidably mounted in the cylinder, a push-rod for the piston, a piston sleeve carried by the piston and fitting over said push-rod, a wedging collar slidably mounted upon the inner end of the push-rod and fitting within said sleeve, said wedging collar having a tapering end, a cam sleeve rotatable upon said push-rod, friction jaws carried by said sleeve and engaging said collar means for yieldably urging said sleeve toward said collar, a transverse pin secured to said push-rod and engaging said cam sleeve for rotating said sleeve as said rod reciprocates, and means for resisting the rotation of said sleeve.

9. A device of the class described comprising a push-rod, a lateral pin carried by the rod, a spring-pressed plate slidable on the rod, a triangular lug fixed to the rod and engaging the pin, and a twisting cam secured to the plate and having a cam face engaging the pin for causing

the cam to twist as the cam and plate are moved longitudinally of the rod.

10. A mechanism of the class described comprising a cylinder, a piston slidably mounted in the cylinder, a push-rod for the piston, a cam clutch carried by the push rod, a ratchet spring carried by the push-rod, and a ratchet controlled bearing rotatable in one direction interposed between the ratchet spring and said cam clutch.

11. A mechanism of the class described comprising a cylinder, a piston slidably mounted in the cylinder, a push-rod for the piston, and means for rotating the piston as the piston is moved longitudinally of the cylinder for causing lubrication accumulated in the bottom of the cylinder to be distributed over the inner walls of the cylinder as the piston rotates.

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