May 5, 1931. E. W. DAVIS 1,803,524

LUBRICANT COMPRESSOR

Filed June 8, 1927 2 Sheets-Sheet 1

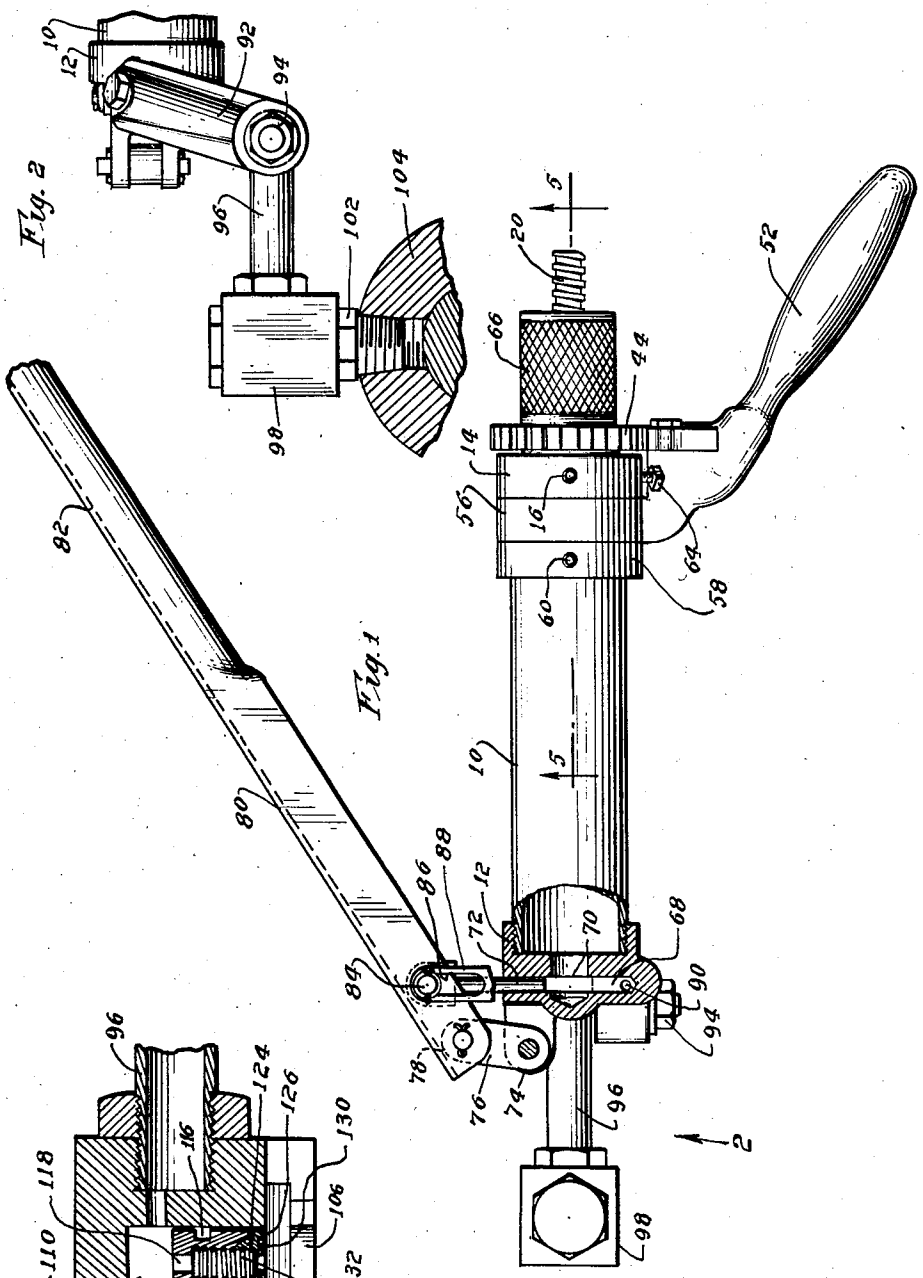

Fig. 1

Fig. 2

Fig. 3

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Fig. 4

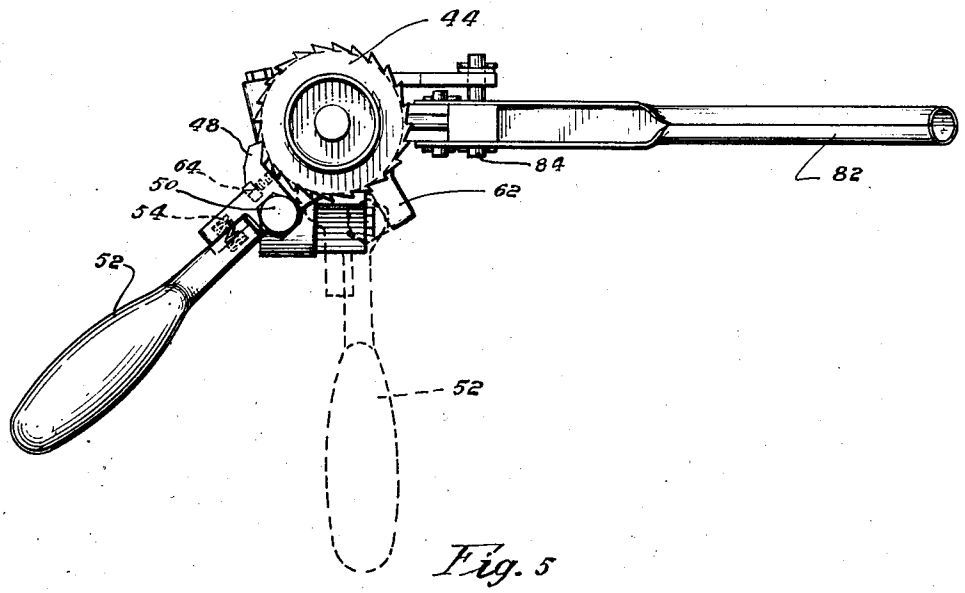
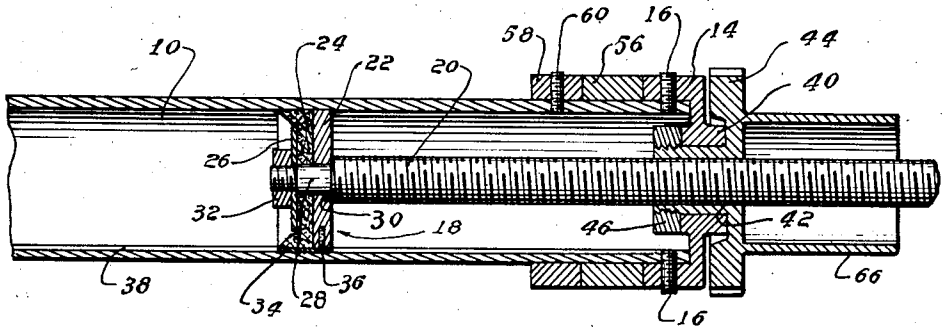


Fig. 5



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UNITED STATES PATENT OFFICE

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LUBRICANT COMPRESSOR

Application filed June 8, 1927. Serial No. 197,271.

My invention relates to lubricant compressors and is particularly adapted for use with compressors designed for use with heavy grease. Such compressors, as have been heretofore made, have usually comprised a low pressure or reservoir cylinder and a high pressure cylinder filled therefrom, each cylinder having a piston for expelling lubricant therefrom, a single handle being provided for operating both pistons, the low pressure piston being actuated during the inoperative stroke of the high pressure piston. Such compressors have commonly used a positive driving connection between the operating handle and the low pressure piston which necessitates extreme accuracy in manufacture in order to provide the proper amount of lubricant to the high pressure cylinder, as an over-feed of lubricant thereto would result in breakage to the compressor and an under-feed of lubricant thereto would materially lessen the amount of lubricant discharged by the compressor. Furthermore, this construction has made the compressor hard to operate as the high pressure piston is usually used to control communication between the high pressure cylinder and the low pressure cylinder and this construction limits the feeding movement of the low pressure piston to that part of the upward stroke of the high pressure piston which occurs after the high pressure piston has uncovered the port communicating with the low pressure cylinder. This has necessitated a comparatively great movement of the low pressure piston during a comparatively short part of the return stroke of the operating handle and requires that the operator thereof exert great force thereon during this short part of the return stroke.

An object of my invention is to provide a new and improved lubricant compressor.

Another object is to provide a lubricant compressor which is free from the disadvantages of those heretofore made.

Another object is to provide a lubricant compressor having high and low pressure cylinders and in which the feed to the high pressure cylinder is automatically varied according to the needs thereof.

Another object is to provide a lubricant compressor having high and low pressure cylinders in which the feed to the high pressue cylinder is automatically timed to take place after the inlet port of the high pressure cylinder has been uncovered.

Another object is to provide novel means for advancing the low pressure piston.

Another object is to provide a lubricant compressor which is more easily operated than those heretofore known.

Another object is to provide novel means for preventing rotation of the piston.

Another object is to provide a new and novel lubricant coupling.

Another object is to provide a lubricant coupling which will not be affected by a limited movement between the parts connected thereby.

Other objects and advantages will become apparent as the description proceeds.

Referring to the drawings:

Figure 1 is an elevation of my new and improved compressor, parts being cut away to show the construction of the high pressure cylinder;

Figure 2 is a view looking in the direction of the arrow 2 in Figure 1, showing the discharge end of the compressor connected to a lubricant-receiving member;

Figure 3 is a sectional elevation of my new and improved coupling on an enlarged scale;

Figure 4 is an end view of Figure 1; and

Figure 5 is a section on line 5—5 of Figure 1.

In the drawings I have disclosed my invention as embodied in a lubricant compressor especially designed for delivering hard grease, having substantially the consistency of laundry soap, to the bearings of steam locomotives and other heavy machinery at pressures approximating 10,000 pounds per square inch. It is to be understood, however, that my invention is not limited to such use and that the broad features thereof are applicable to lubricant compressors designed for all kinds of uses and adapted to operate with various kinds of lubricants.

The main body of my new and improved lubricant compressor comprises a low pressure or reservoir cylinder 10 closed at its forward or discharge end by a cap 12 threadedly secured thereto and locked firmly in place by a set screw (not shown), and closed at its rearward end by a cap 14 secured thereto by studs 16. Located within the cylinder 10 is a low pressure piston 18 mounted upon a threaded stem 20 and comprising a metal washer 22, a cup leather 24 and a facing washer 26, all mounted on a reduced portion 28 of the stem 20 and clamped against a shoulder 30 by a nut 32 threadedly engaging the forward end of the stem 20.

I have found it desirable in this type of compressor to provide special means for preventing rotation of the low pressure piston and I have designed novel means for this purpose. This means comprises a metal tongue 34 secured to the piston 18 by a pin 36 and lying in a grove 38 extending axially of the cylinder 10. As there is no tendency for the tongue 34 to move sidewise and thereby withdraw the pin 36 from the metal washer 22, this pin may fit loosely in a cavity in said washer, or, if desired, the pin 36 may be firmly secured in said washer. The latter construction has the advantage of preventing loss of the tongue 34 when the piston is withdrawn from the cylinder 10. The forward end of the tongue 34 is pressed into the groove 38 by the edge of the cup leather 24, thereby effecting a leak-proof contact with the cylinder wall which prevents lubricant from leaking past the piston. Where the pin 36 is firmly secured in the washer 22, the resiliency of the tongue 34 is sufficient to permit the cup leather to push the outer end of said tongue into the groove 38 and effect a lubricant-tight seal.

An important feature of my invention is the novel means which I have provided for advancing the low pressure piston 18 in such a way as to automatically supply the needs of the high pressure cylinder under all conditions of operation. In a bearing 40, formed in the cap 14, is rotatably mounted the journal part 42 of a ratchet wheel 44, the journal part and ratchet wheel being held against axial movement by the nut 46 engaging the forward end of the journal part and clamping said part against axial movement in the bearing part 40. The journal part 42 is provided with threads which co-operate with threads on the stem 20 to advance and retract the piston 18.

The ratchet wheel 44 is given step by step rotation by the pawl 48 pivotally mounted by means of a bolt 50 on the handle 52 and held in engagement with the ratchet wheel 44 by the compression spring 54. The handle 52 is pivoted on the cylinder 10 by means of a ring-like part 56 which is freely rotatable on said cylinder but is held against axial movement by the cap 14 and collar 58 secured to the cylinder 10 by a stud 60 or other suitable means. The handle 52 is freely oscillable between the dotted and full line positions shown in Figure 4 and is prevented from further movement in either direction by the stops 62 and 64, the latter of which may be adjusted, if desired, to vary the stroke of the handle and thus vary the maximum feeding movement of the piston 18. The ratchet wheel 44 is provided with a knurled cylindrical part 66 which may be easily grasped and rotated by the operator to quickly retract the piston 18 prior to reloading the cylinder 10 with a fresh charge of lubricant.

The cap 12, which closes the forward end of the low pressure cylinder 10, has formed therein a high pressure cylinder 68 which communicates with the low pressure cylinder through a port 70 which is alternately covered and uncovered by the high pressure piston 72. The cap 12 is further provided with a lug 74 which serves as a support for one end of a pivoted link 76 having its upper end pivoted to the forward and U-shaped end 78 of a lever 80 having its other end formed as a handle 82. The high pressure piston 72 is pivotally connected by a pin 84 to the end 78 of the lever 80 and adjacent the link 76 so as to provide the leverage necessary for a man to exert high pressure on the lubricant contained in the high pressure cylinder. The pin 84 projects from one side of the U-shaped end 78 of the lever 80 and reciprocates in a slot 86 formed in a guide 88 attached to the cap 12 by any desirable fastening means. The guide 88 relieves the high pressure piston 72 of unnecessary bending stresses and also limits the outward movement of the lever 80.

The high pressure cylinder 68 has an outlet port 90 leading to a conduit (not shown) located in the transverse projection 92 (Figure 2) forming part of the cap 12, said conduit communicating through swivel connection 94 and conduit 96 with the novel discharge nozzle 98 which forms a feature of my invention. As shown most clearly in Figure 3, this discharge nozzle or coupling member is provided with a slot 100 for receiving a flanged head of a nipple 102 (Figure 2) secured to a part to be lubricated, as the bearing 104 shown in Figure 2. Beneath the slot 100 in the coupling member 98 is a semi-circular flange 106 adapted to grip the under side of the flanged head of the nipple and cut away, as at 108, to permit the nozzle 98 to be slipped sidewise over the head of the nipple. It should be noted that the nozzle and conduit arrangement is such that the operator may connect the nozzle with a lubricant-receiving nipple located in substantially any position without removing his hands from the handles 52 and 82.

This feature greatly facilitates the ease and speed with which a locomotive or other machinery may be lubricated.

The nozzle 98 is provided with a cylindrical bore 110 in which is located my new and improved sealing means comprising a sleeve 112 slidably carried in said bore and limited as to the extent of its sliding movement by the engagement of the inner end of the set screw 114 with the sides of the groove 116 formed in the outer surface of said sleeve. The conduit in said sleeve, through which the lubricant is discharged, has a small cylindrical inlet part 118, a threaded part 120 and a flaring discharge part 122 which receives and serves as a socket for the spherical part 124 of a sealing member 126 having an opening therethrough provided with internal threads 128. The sealing member 126 carries a washer 130 of leather or other suitable material for effecting a lubricant-tight seal with a lubricant-receiving nipple. The sealing member 126 is held against moving out of the bore 110 and yieldingly pressed against the sleeve 112 by the tension created in the spring 132 when it is screwed into the threaded passages in the sleeve 112 and sealing member 126.

It will readily be seen that my novel form of discharge nozzle has sealing means which is movable through a small distance to facilitate the insertion of a lubricant-receiving nipple and which is firmly pressed thereagainst by the pressure of the grease being supplied to said nipple. Furthermore, my new and improved nozzle provides a sealing member which is carried by a ball and socket connection which permits said member to accurately adjust itself to the position of the end of the nipple and thus insures a leak-proof connection when there is slight movement between the nozzle and the nipple.

In operating my new and improved compressor, the operator grasps the cylinder 66 and rotates it in such a direction as to retract the piston 18 in the low pressure cylinder 10. Thereafter he removes the cap 12 and fills the low pressure cylinder with a charge of lubricant and then replaces the cap on the end of the cylinder. He next grasps the handles 52 and 82 and connects the nozzle 98 with a lubricant-receiving fitting by sliding the nozzle over the head of the fitting. If we assume that the handles 52 and 82 are in the full line position shown in Figure 4, he pushes the handles 52 and 82 towards each other, thereby causing the lever 80 to assume a position substantially parallel to the low pressure cylinder 10 and the handle 52 to move to the dotted position shown in Figure 4. This movement of the lever 80 results in the high pressure piston 72 discharging lubricant from said high pressure cylinder at high pressure, providing said cylinder contains lubricant left from preceding operations of the lubricant compressor. As the lubricant compressor is rigidly connected to the lubricant receiving nipple, except for the pivotal connection 94 whose axis is substantially parallel to the direction of application of force to the handles 52 and 82 and therefore is not effected thereby, the connection of the discharge nozzle 98 to the lubricant-receiving nipple 102 serves to prevent twisting of the compressor under this application of force to the handles 52 and 82. Any slight rocking movement which may take place between the discharge nozzle 98 and the nipple 102 is prevented from creating a leak therebetween by the novel sealing means contained in said nozzle which is specifically designed to take care of such rocking movement. The operator next exerts force to move the handles 52 and 82 away from each other. This causes the lever 80 to return to the position shown in the drawings, at the same time withdrawing the high pressure piston 72 and uncovering the port 70 leading to the low pressure cylinder. Thereafter the handle 52 moves from the dotted to the full line position in Figure 4 and the pawl 48 rotates the ratchet wheel 44 to advance the low pressure piston 18 and force a new charge of lubricant into the high pressure cylinder. If all of the previous charge was not expelled from the high pressure cylinder, the handle 52 does not return to the full line position of Figure 4 but stops in an intermediate position corresponding to the amount of lubricant supplied to the high pressure cylinder. In the normal operation of the device, the low pressure piston does not commence its feeding stroke until the high pressure piston has been completely retracted.

Having thus illustrated and described a preferred embodiment of my invention, what I claim and desire to secure by United States Letters Patent is:

1. A lubricant compressor comprising, in combination, a low pressure cylinder adapted to serve as a lubricant reservoir, a high pressure cylinder supplied therefrom, a piston for said high pressure cylinder, a lever for operating said piston, a piston mechanism for said low pressure cylinder, a second lever and power multiplying means positively connecting said second lever to said low pressure piston mechanism to advance the same when the levers are pulled apart.

2. Apparatus of the class described comprising a low pressure cylinder, a high pressure cylinder supplied therefrom, a handle adapted to be grasped by one hand of the operator and movable toward and from said low pressure cylinder, a second handle adapted to be grasped by the other hand of the operator and oscillable about said cylinder as a pivot, a high pressure piston advanced by movement of said first handle

toward said low pressure cylinder, and mechanism actuated by said oscillable handle to advance the low pressure piston.

3. A lubricant compressor of the class described comprising, in combination, a low pressure cylinder, a high pressure cylinder supplied therefrom, a piston for said high pressure cylinder, means for operating said piston, a piston for said low pressure cylinder, and an operating lever pivoted upon said low pressure cylinder as an axis for advancing said low pressure piston.

4. A lubricant compressor of the class described comprising, in combination, a cylinder having ends, closure means for said ends, a discharge conduit, a nozzle carried by said conduit and adapted to make a lubricant-tight connection with a lubricant-receiving nipple, a piston for said cylinder, and a handle pivotal about said cylinder as an axis for operating said piston.

5. A lubricant compressor of the class described, comprising in combination a low pressure cylinder and a high pressure cylinder supplied therefrom, expelling means for the high pressure cylinder, expelling means for the low pressure cylinder, a lever for actuating the expelling means of the high pressure cylinder, and a second lever connected to the expelling means of the low pressure cylinder for feeding it forward when the levers are pulled apart.

6. A lubricant compressor comprising, in combination, a low pressure cylinder adapted to serve as a lubricant reservoir, a high pressure cylinder supplied therefrom, a piston in said high pressure cylinder, a lever for actuating said piston, a piston mechanism for said low pressure cylinder, and a second lever actuating and feeding forward the piston in the low pressure cylinder when the levers are pulled apart.

In witness whereof, I hereunto subscribe my name this 28th day of May, 1927.

ERNEST W. DAVIS.