Jan. 7, 1930. F. M. KING 1,742,959

LUBRICATING MEANS FOR ENGINES

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Fig. 1.

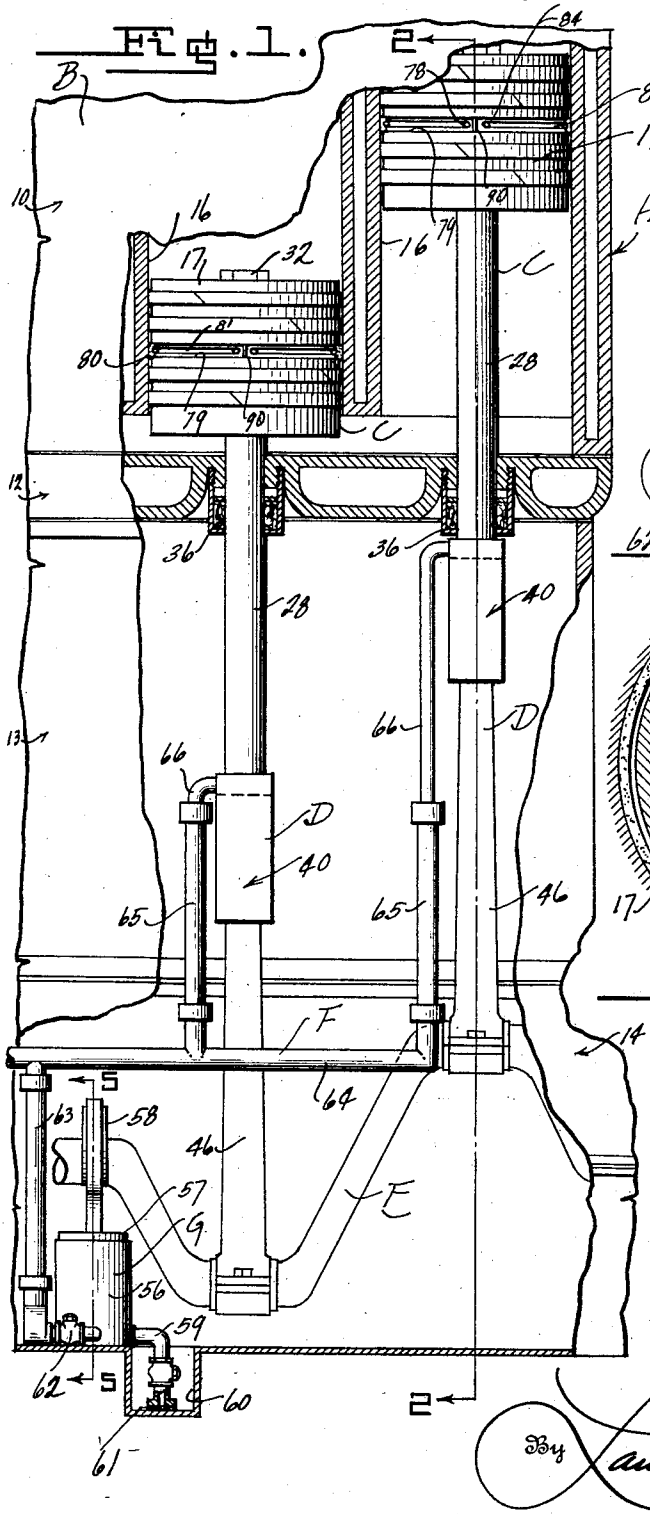


Fig. 5.

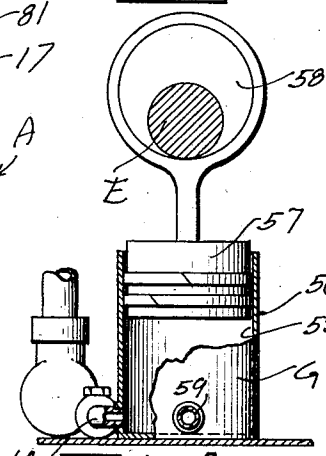


Fig. 4.

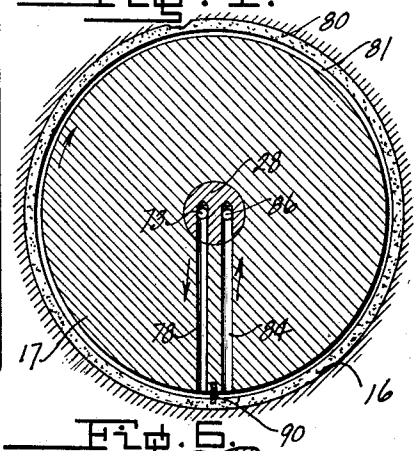
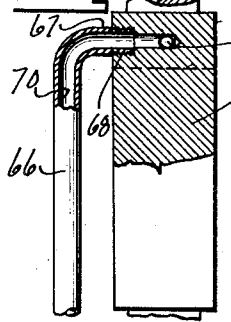


Fig. 6.



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Fig. 2.

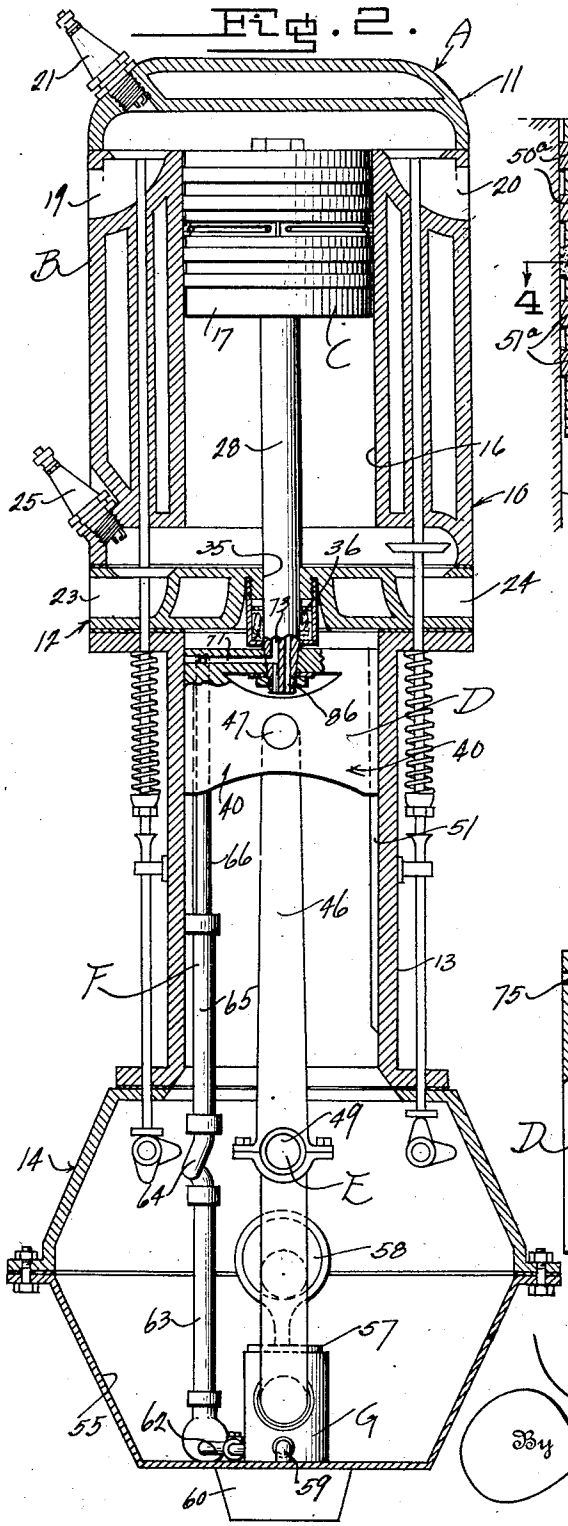
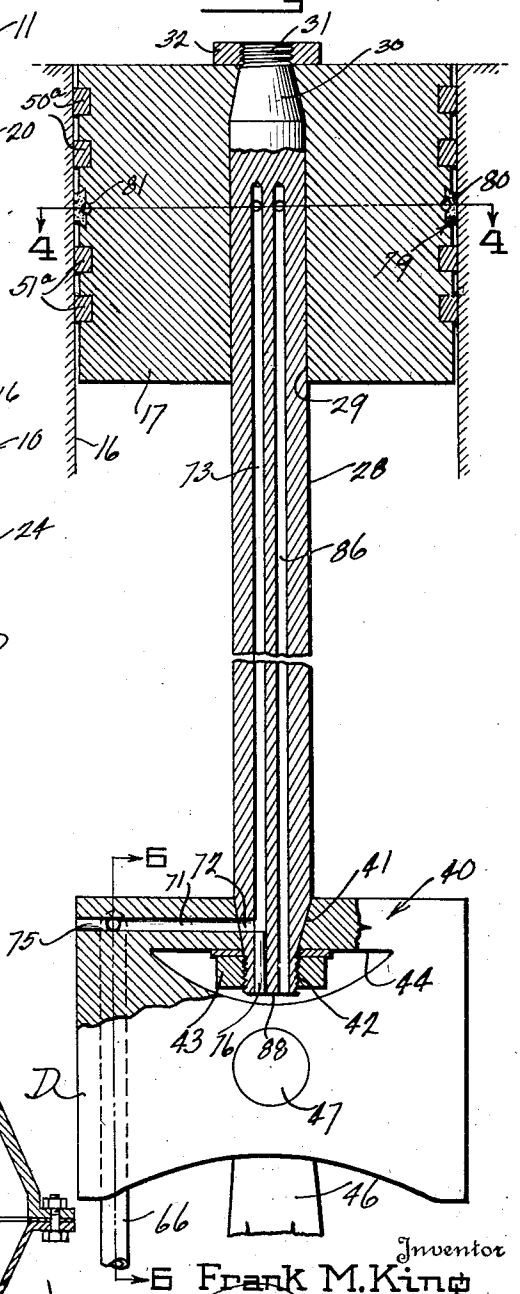


Fig. 3.



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UNITED STATES PATENT OFFICE

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LUBRICATING MEANS FOR ENGINES

Application filed May 20, 1925. Serial No. 31,646.

This invention relates to improvements in lubricating systems for internal combustion engines.

The primary object of this invention is the provision of an improved type of lubricating system which is particularly well adapted for use in connection with the lubrication of double acting types of internal combustion engines.

A further object of this invention is the provision of an improved lubricating system which is particularly well adapted for use in connection with that type of double acting internal combustion engine set forth in my Patent #1,531,702, dated March 31, 1925.

Other objects and advantages of this invention will be apparent during the course of the following detailed description.

In the accompanying drawings, forming a part of this specification, and wherein similar reference characters designate corresponding parts throughout the several views,

Figure 1 is a longitudinal sectional view taken through a double acting type of internal combustion engine, showing the details of the improved lubricating apparatus and system applied thereto.

Figure 2 is a transverse sectional view taken substantially on the line 2—2 of Figure 1.

Figure 3 is an enlarged fragmentary sectional view showing cooperating details of the piston and cross head construction of the internal combustion engine.

Figure 4 is a sectional view taken substantially on the line 4—4 of Figure 3.

Figure 5 is an enlarged view, partly in section, taken substantially on the line 5—5 of Figure 1.

Figure 6 is an enlarged sectional view taken substantially on the line 6—6 of Figure 3.

In the drawings, wherein for the purpose of illustration is shown only a preferred embodiment of this invention, the letter A may generally designate the internal combustion engine, which comprises the housing construction B; within which pistons C are slidably mounted in operating connection with cross heads D and the crank shaft E. These details are cooperatively provided with structure to function in connection with lubricating apparatus F.

As to the housing B, the same is of the preferred construction set forth in my patent above referred to, and comprises the cylinder casing 10; upper and lower cylinder heads 11 and 12 respectively; cross head casing 13; and crank case 14. The cylinder casing 10 preferably is provided with any approved number of cylinder compartments 16, and the piston 17 of each piston construction C is slidable therein. As before mentioned the engine is preferably of the double acting type, and to this end intake and exhaust ports 19 and 20 are preferably provided at the upper end of the casing 10, for that portion of the cylinder compartment above the piston 17, and the cylinder top 11 may carry a spark plug 21, as in approved formation. The bottom cylinder head 12 may be provided with intake and exhaust ports 23 and 24 respectively, for the portion of the cylinder compartment 16 below the piston member 17, and preferably for this bottom compartment a spark plug 25 is carried by the casing 10.

Any approved valve means for the intake and exhaust ports may be provided, as has been set forth in my patent above referred to, and it is not necessary to specifically describe the same.

Referring to the piston construction C, for each cylinder, the same comprises the piston head 17 above mentioned, which is preferably of solid formation, although the same may be hollowed at appropriate places to lighten the same. The construction D furthermore includes the piston rod or stem 28, which is fixedly connected at its upper end in a passageway 29 thru the piston body 17. The upper end of the rod 28 is tapered at 30, and preferably screw threaded at 31, to receive a clamping nut 32 whereby to maintain the rod 28 in its assembled relation to the head 17, and as is well illustrated in Figure 3 of the drawings. The piston rod 28 slidably extends through a suitable passageway 35 in the bottom cylinder head 12, into a packing 36 carried thereby, and at its lower end the same

is rigidly bolted to the body 40 of the cross head construction D. To effect this connection the piston rod 28 at its lower end is preferably tapered at 41, and screw threaded at 42, by means of which a nut 43 may be employed in the pocket 44 below the top wall of the cross head body 40 to effect the piston rod connection to the said cross head, as is well illustrated in Figure 3 of the drawings.

The cross head construction D furthermore includes a connecting rod 46, which is pivotally connected by bearing trunnions 47 to the head 40, and said connecting rod at its lower end is connected on a throw portion of the crank shaft E, as is illustrated in the drawings.

The operation of the double acting internal combustion engine is well understood. The cross head 40 moves in a rectilinear vertical path by means of guides 51, and the piston head is slidable in the compartment 16; explosions occur below and above the piston head 17 cooperating to render the operation of the engine double action, in accordance with well known principles.

Referring to the lubricating details and the system of lubrication, it is preferred to provide an oil pump G, carried in the crank case compartment 55, and including a cylindrical casing 56, within which a piston 57 slidably operates in vertical manner; the piston 57 having eccentric connection at 58 with the crank shaft E, as is well illustrated in Figures 1 and 5 of the drawing. The compartment 58^a in the casing 56 has a lower connection by an L-shaped pipe 59, in an oil sump 60, the pipe 59 at its lower end preferably employing a screen 61, to prevent entrance of sediment into the pump compartment 58^a. The oil pump has an outlet connection 62, which may lead vertically upward at 63, for connection to a horizontally arranged manifold 64, disposed just to one side of the operating path of the crank shaft E. The oil system contemplates the provision of laterals for each of the piston and cross head constructions of the cylinders of the internal combustion engine A, and to this end, for each piston and cross head construction of the engine, the conducting manifold 64 is provided with a substantially vertically arranged stationary conduit or lateral 65, which telescopically receives therein at its upper end a slidable conduit 66, which at its upper end is bent laterally, preferably at right angles, as at 67, and is detachably connected as at 68, in the upper portion of the cross head, so that the passageway 70 of the conduit 66 communicates directly into an oil duct 71 horizontally extending along the cross head 40 toward the piston rod 28. This duct 71 at its end adjacent the piston rod 28 has communication with a lateral duct 72 formed in the piston rod 28; the duct 72 leading into a vertically arranged longitudinal oil passageway 73 thru the rod 28. Suitable plugs 75 and 76 may be provided in the outermost ends of the passageways 71 and 73 to seal the same, and so that the oil will be directed along the passageway 71 of the cross head thence into the duct 72, and into the passageway 73, and be forced upwardly thereof and into the radially extending duct or pasasgeway 78 which is formed in the piston head 17, substantially as is illustrated in Figure 4 of the drawings. The piston head 17 is preferably provided with a dove-tailed shaped groove 79, adapted to receive a flexible packing 80 therein, with a dove-tailed joint, substantially as is illustrated in Figure 3 of the drawings. At the bottom periphery of the groove 79, an annular grooved recess 81 is provided, which the packing 80 does not enter, and the radially extending duct 78 outlets at its outer end into this groove 81, so that the oil passes from the duct 78 into the groove 81 and thence around the body of the piston 17, in the direction illustrated by the arrows in Figure 4 of the drawings, to lubricate the flexible packing, which is preferably absorbent, and of such a nature as to lubricate the walls of the cylinder compartment, during the reciprocating action, as can readily be understood. The oil flows about the groove 81 until it approaches the radial duct 78, and adjacent to the duct 78 is a second radial duct 84 through the piston 17, and into which the oil flows on its return, towards the piston rod 28. The return flow of the oil is through this radial duct 84, and into a return passageway 86 which is longitudinally formed in the piston rod 28 in parallel relation with the passageway 73 first mentioned. This passageway 86 opens at its lower end on the bottom surface 88 of the rod 28, just above the bearing trunnions 47, so that the returning lubricant from the duct or way 86 will drop onto the bearing trunnions 47, lubricating the same. The lubricant may thus return to the crank case. In order to direct the oil flow in the piston head 17 in the manner above described, a partition wall 90 of any approved material is preferably located in the body 17, radially extending across the annular groove 81, between the ways 78 and 84, so that the oil must of necessity pass in the direction above described. This wall 90 or baffle also may have connection in the material of the packing, to render the seal more effective.

It is of course understood that during the operation of the internal combustion engine the pump will direct the oil from the sump 60 into the manifold 64, from whence it will be distributed into the lateral pipes 65. The reciprocating conduits 66 telescope in the conduit 65, during sliding operation of the cross heads 40, and as will be obvious from the drawings. The cycle of lubricating operation is as above described, and it will be apparent that this lubrication apparatus is in-

tended for each piston and cross head arrangement of each cylinder of the internal combustion engine.

Various changes in the shape, size, and arrangement of parts may be made to the form of invention herein shown and described, without departing from the spirit of the same or the scope of the claims.

I claim:

1. In lubricating means for internal combustion engines the combination with an engine casing including a cylinder chamber, a piston slidable in the cylinder chamber having a circumferential groove inwardly thereof and a reduced groove at the rear surface of said circumferential groove, an absorbent packing in said first mentioned groove in non-obstructing relation with the last mentioned groove extending to the outer periphery of the piston, and means for circulating oil into and about the last mentioned groove in one direction for lubricating said packing.

2. As an article of manufacture a piston construction comprising a body having a circumferential groove, an absorbent packing in said circumferential groove, said piston body inwardly of said packing having a second circumferential groove, said body having inlet and outlet ducts communicating with said second mentioned groove in adjacent relation, and a baffle across said second mentioned groove between the inlet and outlet ducts.

3. In a lubricating system for internal combustion engines the combination with an engine casing including a cylinder chamber, a crank case, a piston member in the cylinder chamber, a piston rod for the piston member, a crank shaft, means connecting the piston rod with the crank shaft, said piston member having a circumferential groove at the periphery thereof, a packing in said circumferential groove adapted to transmit oil therethrough, said piston member having a second groove inwardly thereof at the inner periphery of said packing, said piston member and piston rod having inlet and outlet passageways leading into and from said second mentioned groove of the piston member, baffle means across the second mentioned groove of the piston member between said inlet and outlet passageways, and means for pumping oil from the crank case into the inlet passageway of the piston rod.

4. In an internal combustion engine the combination of a housing structure including a cylinder chamber and a crank case, a piston member slidable in the cylinder chamber, a cross head slidable in said housing, a crank shaft in the crank case, a piston rod connecting the cross head with said piston member, a connecting rod connecting the cross head with said crank shaft, oil pump means in the crank case, said piston member having a circumferential oil groove inwardly of the periphery thereof, said piston member and piston rod having inlet and outlet oil ducts communicating with said oil groove, said cross head having an inlet oil duct communicating with the inlet oil duct of said piston rod, and telescopic conduit means connected between said pump and cross head for conveying oil from the pump into the inlet duct of said piston rod.

5. In a lubricating system for internal combustion engines the combination with an engine casing including a cylinder chamber, a piston member slidable in the cylinder chamber, a piston rod for the piston member, a crank shaft, means to connect the piston rod with the crank shaft, said piston member having a circumferential groove at the periphery thereof, a baffle in said groove, said piston member having an internal lubricant receiving passageway therein communicating into the circumferential groove at one side of the baffle and a second internal oil receiving passageway communicating with said groove at the opposite side of said baffle, and means for forcing oil into one of said passageways around the circumferential groove and returning thru the other passageway.

6. In an internal combustion engine the combination of a housing having a cylinder chamber therein and a crank case having a compartment therein, a piston slidable in the cylinder chamber, a piston rod, packing means slidably guiding the piston rod for rectilinear movement in the housing, a cross head slidable in the housing connected with the end of the piston rod opposite the piston, a crank shaft in the crank case, a connecting rod connecting the crank shaft with the cross head for operation of the latter and for operation of the piston, said cross head, piston rod and piston having ducts communicating therethrough and having an exit on the outer periphery of the piston, said piston and piston rod having communicating ducts leading from the external surface of the piston to the crank case compartment below the cross head, an oil pump in the crank case, means connecting the same for operation by the crank shaft, and extensible conduit means connecting the oil pump with the first mentioned oil duct in the cross head for pumping of oil upwardly thru the first mentioned duct to the external surface of the piston and for return thru the last mentioned ducts to the crank case.

7. In a device of the class described, a cylindrical piston having a circumferential groove, a piston rod having an end fixed to the piston and provided with two longitudinal conduits, lubricant supply means connected to one of said conduits, bores in said piston leading respectively from said last named conduit to the groove, and from another part of said groove to the other conduit,

whereby lubricant may be circulated through said groove.

8. In a device of the class described, a piston, a rod connected therewith having a pair of conduits extending therealong, the piston having a groove in the outer periphery thereof, the piston having conduits connecting the rod conduits with the groove, and means for circulating oil through one of the rod conduits into one of the piston conduits, along the groove for lubricating the outer periphery of the piston, into the second piston conduit and for return into the second rod conduit.

9. In a device of the class described a piston having an oil groove opening at and extending around the outer periphery of the same, the piston having an inlet conduit opening into the groove and an outlet conduit also opening into the groove, and baffle means disposed in the groove between said conduits to direct a circulating flow of oil from the inlet conduit longitudinally about said groove and thence from the groove by way of the outlet conduit.

FRANK M. KING.