LUBRICATORS

SOME INTERESTING MECHANICAL LUBRICATORS.

The question of lubrication is so vital to the proper operation of an automobile, that every attention is now being paid to the design of the mechanism which will positively circulate the oil to the various bearings. At the same time, simplicity of design is at a premium; and among the various examples of lubricators which are herewith illustrated, a great deal of ingenuity has been exhibited, with the purpose of cutting down the number of parts to a minimum, and eliminating all such elements as are liable to get out of order. In Fig. 1 we show a lubricator in which the pumps are arranged in pairs, one of each pair being adapted to force oil to the sight feed, and the other from the sight feed to the point of lubrication. The two pumps are indicated at *C* and *D*. Each is attached to a yoke lever, *E*, which engages the eccentric, *J*. The latter is rotated by means of a worm, *L*, and gear, *K*. A pin carried by the arm, *F*, is adapted to engage a groove in the lever *E*, and serve as a pivot therefor. The arm, *F*, is threaded onto the rod *G*, which extends through the upper end of the reservoir *A*, and terminates in the thumb nut *I*. By turning this nut the pivot pin may be raised or lowered to regulate the stroke of the pump *C*. The latter pump delivers to a standpipe *S* in the sight-feed glass, whence the oil drops into the tube *B*, and is forced by the pump *D* to the point of lubrication.

In Fig. 2 we show a pump which is not fitted with a sight feed because the plungers operate in plain sight. This is a very compact oiler, in which the pump pistons are driven directly by a camshaft without any intermediate gearing. The piston rods are formed with rectangular offsets, against which the cams operate. The pistons are arranged in two banks of three each, and there are two oppositely-disposed cams on the camshaft, which serve alternately to lift the banks of pistons. On the downward stroke the pistons are lowered by means of coil springs. The upper ends of the pistons project through the cover of the oil reservoir or tank, and each carries a thumb nut and jam nut. These nuts serve to limit the extent to which the pistons may be forced down into the cylinders, and they may be adjusted to regulate the length of the stroke of any one of them. The camshaft is intermittently driven by means of a ratchet wheel and pawl. By regulating the throw of the pawl, the speed of the camshaft may be varied, as desired. The ratchet mechanism is operated by a crank projecting through the cover of the oil tank. There is thus no chance for leakage, as none of the moving parts passes through the tank below the surface of the oil.

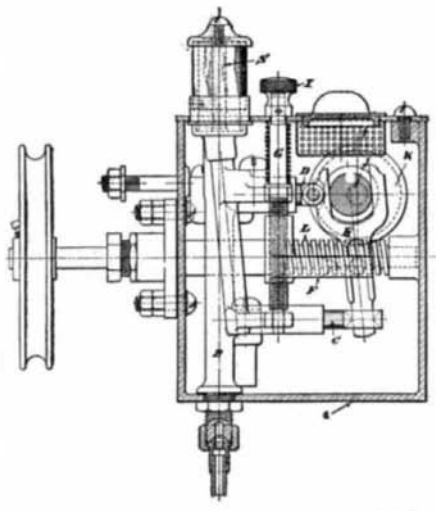


Fig. 1.—A SINGLE YOKE DRIVES BOTH SIGHT-FEED AND DELIVERY PUMPS.

Many lubricators have been ingeniously devised to avoid the use of springs and loose valves. Some of these mechanisms are provided with rotary valves, positively driven. An interesting example is shown in Fig. 3. As in the first example, this lubricator is formed with pairs of pumps serving respectively to force oil to the sight feed and to the delivery points. The worm *A* drives the gear *B*, and on the gear shaft are the eccentrics which operate the straps *X*. Hinged to each strap is a lever *E*, which at one end carries the piston *F*, and at the opposite end is allowed a certain amount of play between the pin *N* and the slide *O*. The amount of play may be regulated by operating the nut *P*. The piston *F* operates in a cylinder *G*, at the upper end of which is the valve *H*. The latter is rotated by means of a crank *J*, shown by dotted lines, which is connected with a crank offset on the main shaft. On the downward stroke the suction port *L* is uncovered, permitting the cylinder to fill with oil. On the upward stroke this port is closed and the port *M* uncovered, permitting the piston to force oil to the sight feed. From this point the oil is pumped to the delivery points by an adjacent pump identical with the one just described, except that the lever *E* is pivoted to the pin *N*, and cannot be adjusted to vary the stroke of the piston.

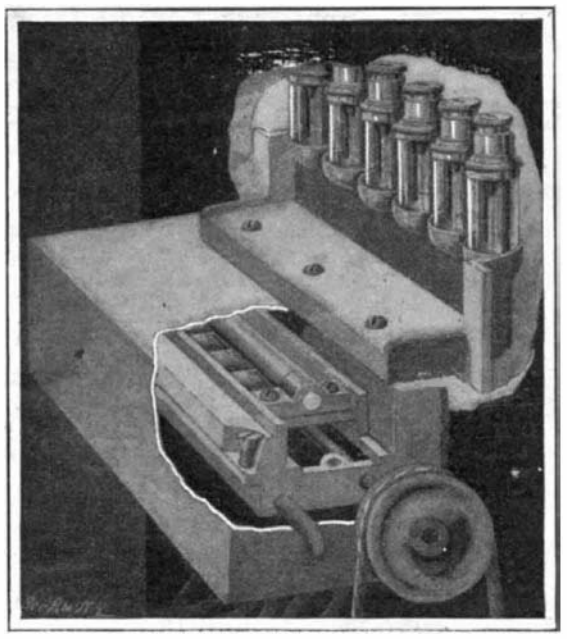


Fig. 5.—SLIDING CYLINDER PUMP.

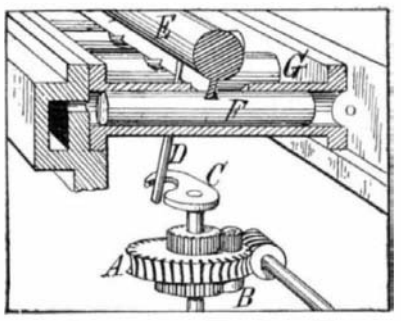


Fig. 6.—DETAILS OF SLIDING CYLINDER PUMP.

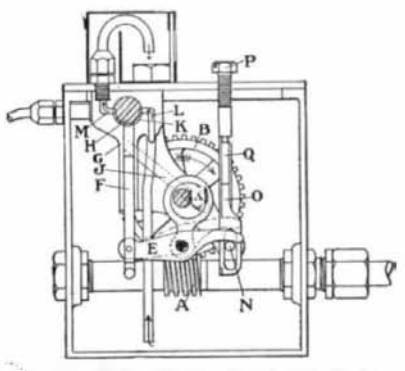


Fig. 3.—DOUBLE PUMP LUBRICATOR WITH ROTARY VALVE.

Fig. 4 illustrates a lubricator of somewhat similar type, except that in this model a single pump serves first to force oil to the sight feed and then to deliver this oil under pressure to the various bearings. The power shaft *S* drives the valve shaft *V* through the medium of the worm gear *W*. The valve chamber communicates with each pump cylinder through a port *Q*. The valve shaft is formed with ports *R* at opposite sides, there being a pair of opposite ports for each cylinder. These ports are not cut in the same plane, but are adapted to communicate alternately with the delivery ports *N* and *D*, which lead respectively to the sight-feed tube and to the parts which are to be oiled. The pump pistons *P* are operated by a crosshead *K*, which is reciprocated by the cam *L*. On the upward stroke the crosshead bears against the nuts *H* and, on the downward stroke, against the pins *J*. By means of the thumb nuts *A*, the pistons may be screwed down through the nuts *H*, providing a certain amount of play between the latter and the pins, and thus shortening the stroke of the pistons, or even stopping the motion of any one of the pistons, if desired. Each piston makes two complete operations during every revolution of the valve shaft. In operation, on the upward stroke of the piston, the port *R* of the valve shaft will open communication between the cylinder port *Q* and the suction port *O*, and on the downward stroke it will open communication between the port *Q* and the delivery port *N*. On the next upward stroke the alternate port *R* will connect port *Q* with port *O*, while on the next downward stroke it will connect port *Q* with port *D*.

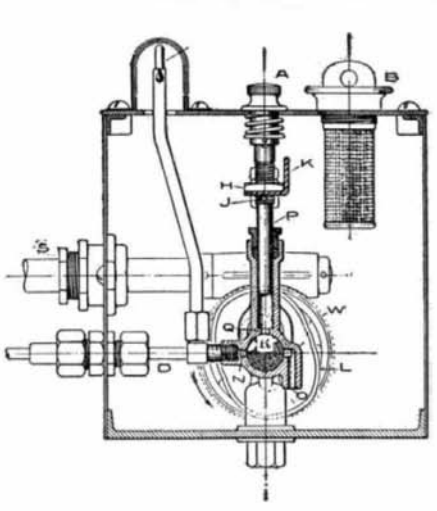


Fig. 4.—PUMP DELIVERS ALTERNATELY TO SIGHT-FEED AND BEARINGS.

Figs. 5 and 6 illustrate a pump of peculiar type, in which valves are dispensed with, but the cylinders instead are bodily moved from suction port to delivery port. The pistons operate at one end to pump oil to the sight-feed tubes, while at the other end they force oil to the bearings. The pumps are driven by means of a worm gear, *A*, which acts through a ratchet *B* to rotate a vertical shaft carrying a crank *C*. This crank engages a pin *D* on the rockshaft *E*, and as the crank revolves, it not only rocks the shaft, but gives it an axial reciprocating motion. This axial movement of the shaft alternates with its rocking motion. The pump cylinders are formed in a slide *G*, through which the pin *B* projects, and by which the slide is carried back and forth, bringing the cylinders alternately into register with the suction and discharge ports. At the same time the pistons *F* are reciprocated by a feather on the rockshaft *E*. Four distinct operations are produced by each complete rotation of the crankshaft. In the first quarter the rockshaft is rotated, causing the pumps to fill at one end from the receiving ports, and at the other to discharge oil to the bearings. In the second quarter the slide *G* moves lengthwise, bringing the cylinders into register at one end with the delivery ports leading to the sight feed, and at the other with the ports leading from the same, so that in the third quarter, when the pistons are again operated, at one end they force oil into the sight-feed tubes, while at the other end they suck in oil from the same. The cycle is completed in the next quarter, when the parts are returned to the first position ready to force the oil from the cylinders to the various delivery points.

An ingenious pump of the valveless variety, in which the piston itself serves as a valve, is shown in Fig. 7. The sight feed in this construction is rendered unnecessary by reason of the fact that the pump pistons project through the cover of the oil tank, and as there are no valves or springs, the motion of these plungers is sufficient to guarantee that the oil is being properly delivered to the bearings. The mechanism is driven by a worm gear, which drives the camshaft. The cams are eccentric in form, serving to produce a reciprocating motion of the pistons, which are connected to them by means of straps. The straps, however, do not directly engage the cam, but they carry adjustable studs, which bear against the working faces of the cams. In addition to the reciprocating motion, the pistons are given a rotary motion by a pin projecting from each cam, which bears against the curved face of the strap. At its upper end each strap is held vertical by means of a shank projecting through an open-

(*Continued on page 56.*)

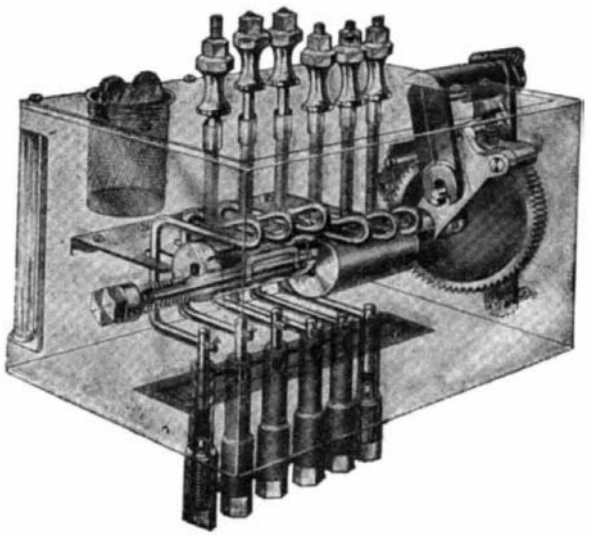


Fig. 2.—THE PISTONS ARE DIRECTLY ACTUATED BY CAMS.

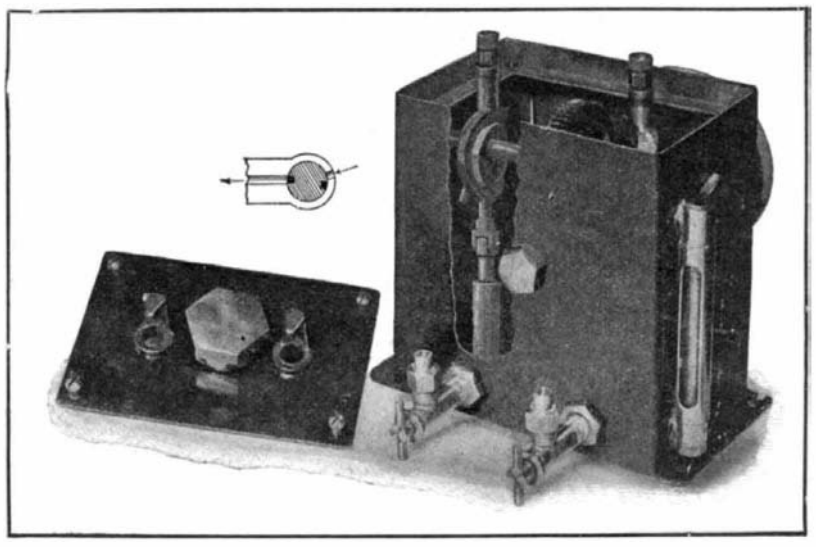
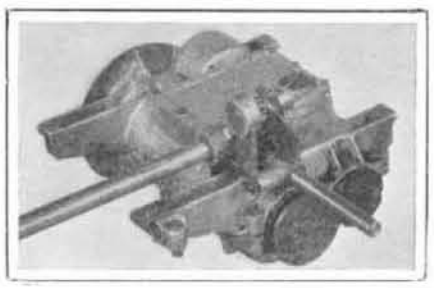


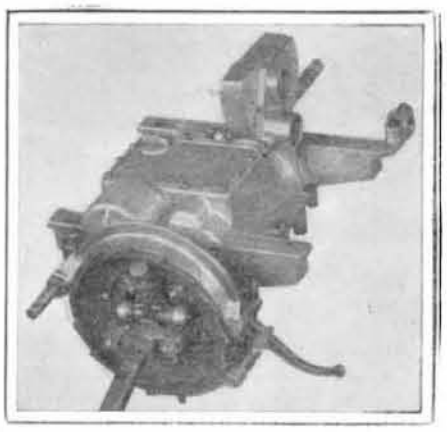
Fig. 7.—THE PISTONS ROTATE TO SERVE AS VALVES.

noticed that if one of the rear springs rises over an obstruction, the rear platform spring serves as an equalizing lever, depressing the spring on the opposite side an equal amount. The center, or pivotal point, on the platform spring is not raised, as it remains neutral, and thus no shock is imparted to the body or passengers. With this construction it is claimed that the passengers in the rear seats ride as comfortably as those in the front seats of the car. The rear side springs are 60 inches in length, and serve a twofold purpose as springs and strut rods. These springs, owing to their length, render a support to the frame at points which are well forward and under the load which the car is designed to carry. The wheel base is short considering the high power of the engine, and the turning radius is extremely short, thus making the car very easy to drive through crowded traffic and narrow streets.

The gas lamps are placed on top of the front fenders for the following reasons, which have been worked out and demonstrated in practice: (1) The lamps



FRONT OF ROYAL TRANSMISSION, SHOWING PINION AND SECTOR FOR SHIFTING GEARS.



REAR OF ROYAL TRANSMISSION, SHOWING BRAKE, SAFETY RATCHET RING, AND UNIVERSAL JOINT OF PROPELLER SHAFT.

are removed from the point where they are in danger of being smashed in traffic and in collision. (2) The focal plane is materially raised, thus throwing a better diffused light and eliminating long shadows on a rough road, which would be made most apparent with lamps in a lower position. (3) The direct line of travel of the wheels is lighted. (4) The lamps being placed at the outside edge of the car, at once establish to the other driver the clearance that is necessary in passing. (5) The lamps are thus removed from being in close proximity to the starting arrangement, which gives ample room to take care of the initial start of the car.

SOME INTERESTING MECHANICAL LUBRICATORS.

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ing in the cover of the lubricator. In this shank is the stud which bears against the cam, and it may be adjusted by means of thumb nuts to vary the stroke of the piston. The pistons are formed with slots at each side which are not directly opposed. While the piston is being drawn upward, it is rotated to bring one of the slots into engagement with the suction port. This draws oil into the bottom of the cylinder. On the downward stroke, the piston is rotated to bring the opposite slot into registry with the delivery port, so that the oil in the cylinder is then forced out to the points of application.

AN INSTRUMENT FOR TESTING SHOCK ABSORBERS.

(*Continued from page 38.*)

it may be stated that the second line, No. 10 of Fig. 2 corresponds very nearly with the second line No. 9 of Fig. 1. For the portion of the diagram between *a* and *b* the average motion of the car body toward the axle for the diagram of Fig. 2 is 1.12 inches, against the average of the similar motion for diagram Fig. 1 of 0.94 inches. In other words, the average motion toward the axle has been reduced 16.1 per cent. The average motion away from the axle for the same portion of the diagram in Fig. 2 is 1.02 inch, against an average of 0.71 inch in Fig. 1, giving a reduction in the average motion away from the axle of 30.4 per cent.

The total average motion of the car body relative to the axle without eliminators for this portion of the diagram (Fig. 2) is 1.12 + 1.02, or 2.14 inches; while the total average of the same motion when the shock eliminators were applied is 0.94 + 0.71, or 1.65 inches, which gives a reduction of the average motion of the car body while passing over this crosswalk of 22.9 per cent.

The maximum motion of the body toward the axle *Z* in the diagram Fig. 2 is 2.58 inches, against the similar motion *Z* in the diagram Fig. 1 of 2.22 inches, or the maximum downward movement of the body was reduced 0.36 inch, or 14.0 per cent. The maximum motion toward the axle *Y* in Fig. 2 is 2.40 inches, against 1.52 inch in Fig. 1 or the upward motion of the body was reduced 0.88 inch, or 36.7 per cent. The maximum vibration, then, without the eliminators, Fig. 2, was 2.58 + 2.40, or 4.98 inches, against 2.22 + 1.52, or 3.74 inches, in Fig. 1, with the eliminators applied, which gives a reduction in the maximum vibration of the body by the use of the eliminators of 1.24 inches, or 24.9 per cent.

INDEX OF INVENTIONS

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