Nov. 26, 1929. W. G. PHELPS 1,737,124

SYSTEM OF LUBRICATION

Filed Oct. 28, 1927

Fig. 1.

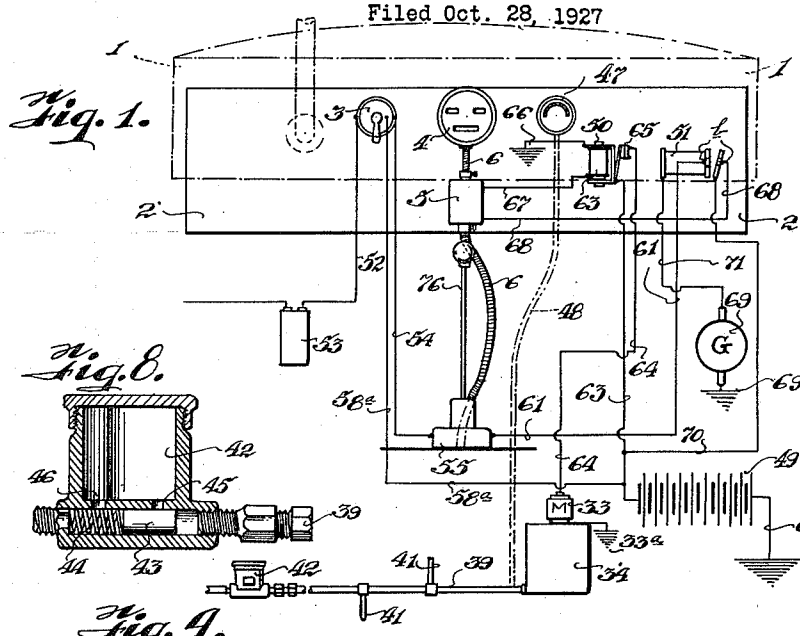


Fig. 8.

Fig. 4.

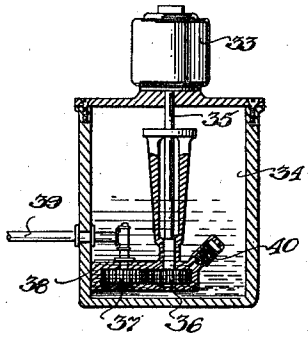


Fig. 2.

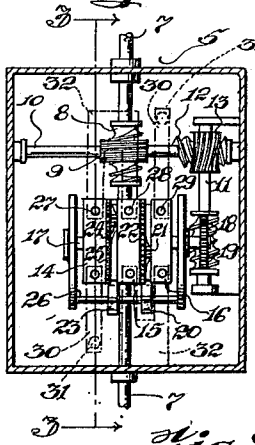


Fig. 3.

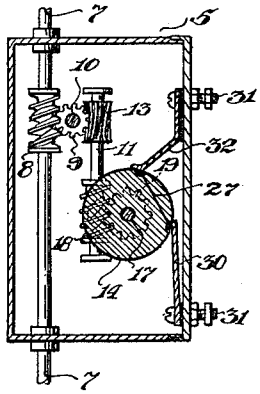


Fig. 5.

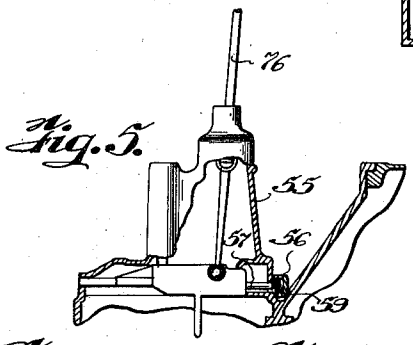


Fig. 9.

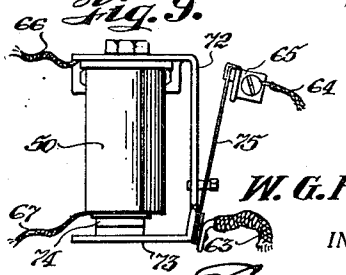


Fig. 6.

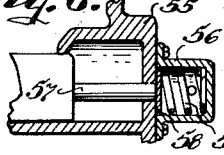
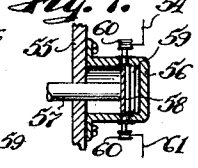


Fig. 7.



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UNITED STATES PATENT OFFICE

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SYSTEM OF LUBRICATION

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This invention relates to vehicles, and it refers more particularly to an improved lubricating system especially for automobile vehicles, and aeroplanes and the principal object of the invention resides in the provision of a lubricating system adapted to supply a predetermined quantity of lubricant to every frictional point throughout the vehicle at intervals determined according to mileage during normal operation thereof.

Another object of the invention resides in the provision of an improved system of the character specified wherein is provided a pressure pump effecting distribution of lubricant to the various parts of the motor and vehicle, the means for operating the pump being placed in position preparatory to operation by operating the ignition switch of the motor, and not until the motor transmission is thrown into high gear will the said pump operating means begin to function normally to distribute lubricant as aforesaid according to mileage.

Still another object of the invention lies in the provision of an improved timing unit, acting as the medium through which distribution of lubricant takes place according to the mileage designated by the motor speedometer, from which the said timing unit directly operates.

Yet another object of the invention resides in the provision of an arrangement of relays, one of which closes an electrical circuit through the storage battery and pump operating means when the timing unit, in co-operating with the speedometer, registers a predetermined lubricating time, and the other of said relays being adapted to maintain inoperative position of the system when the vehicle is not in motion, or in low gear.

Broadly, the invention comprehends the provision of an improved lubricating system for all types of engines and vehicles providing adequate and positive lubrication automatically in the absence of human attention, at intervals during the period in which the vehicle is in normal motion.

With the foregoing objects as paramount, the invention has particular reference to certain salient features of construction and operation of parts by which the foregoing objects are attained, to become manifest as the description proceeds taken in connection with the accompanying drawings wherein:

Figure 1 represents a diagrammatic view of the preferred controlling system of the improved lubricator embodying the invention.

Figure 2 is a plan view of the timing unit for intermittently distributing lubricant.

Figure 3 is a side view in section on lines 3—3 of Figure 2.

Figure 4 is a vertical sectional view of a preferred type of liquid pump used in connection with the invention, with a motor associated therewith.

Figure 5 is a fragmentary view, proportionately reduced, of the motor transmission showing the relative position of the switch by which the invention is rendered operative in high gear.

Figure 6 is an enlarged fragmentary view of the motor transmission showing the switch in cross-section.

Figure 7 is a plan view in lateral cross-section, showing the switch in operative position.

Figure 8 is a side elevational view in vertical cross section of a preferred type of oil receptacle or subsidiary reservoir, one of which is arranged relative to each bearing, and

Figure 9 is a relatively enlarged detail view of the starting relay, by which the invention is rendered operative.

It may be primarily stated for clarity, in addition to the expressed objects of the invention, that the invention does not claim the broad idea of automatically lubricating a vehicle, as such a means of lubrication is well known to the art, but it is the purpose of the invention to effect such automatic lubrication at properly required intervals, during the time such lubrication is necessary, that is to say, while the vehicle is in motion at a normal rate of speed.

In Figure 1 is shown suggested in broken lines the instrument board 1, behind which in solid lines is shown the dash 2. The conventional ignition switch 3 is disposed in the

instrument board, as is the conventional speedometer, 4.

The most important element of the invention comprises, what may be termed herein, a timing unit 5, which element is shown in sectional detail in Figures 2 and 3 and in operative relationship with other parts in the diagrammatic view, Figure 1. This timing unit is situated adjacent the speedometer 4 in such a manner as to receive its operating power from the cable 6 of the speedometer. To accomplish this, a rigid shaft 7 passes through the unit 5, as seen in Figures 2 and 3, and the speedometer cable 6 is attached to either end of this shaft so that rotation imparted to the speedometer cable from the motor transmission will operate both the timing unit 5 and speedometer in a like manner, relieving neither of its efficiency.

Referring especially to Figures 2 and 3, the shaft 7 has thereon a spiral or worm gear 8, enmeshing a gear 9, carried by a shaft 10, extending laterally through the unit housing. Rotation thus imparted to shaft 10 is in turn imparted to shaft 11 disposed in parallel relationship to shaft 7, through spiral gear 12, carried by shaft 10, and gear 13, carried by shaft 11.

Approximately in the center of the unit housing, a series of discs, independently referred to as 14, 15 and 16, are mounted to revolve upon a shaft 17. Relative motion is imparted to shaft 17 by shaft 11, through spiral gear 18 carried by the latter, enmeshing gear 19 carried by shaft 17, upon which said discs are mounted.

The discs 14, 15 and 16 are adapted to be progressively rotated to indicate mileage in accordance with the mileage indicated by the speedometer 4, but while the speedometer visibly indicates miles by figures brought into numerical alinement on the respective discs, the timing unit brings into alinement contact points carried by the respective discs therein which as will be presently disclosed, closes a circuit, effective to lubricate the motor and vehicle.

It will be understood that the disc 16 in the timing unit, after having made one complete revolution, moves the adjacent disc 15, through the ratchet 20, co-operating with the teeth 21 carried upon the wafer 22, and upon one complete revolution of the disc 15, the disc 14 is caused to rotate in a similar manner through ratchet 23, co-operating with teeth 24 on the wafer 25, interposed between discs 14 and 15. These ratchets 20 and 23 are mounted upon a short shaft 26 disposed forward of the disc assembly. Contact points 27, 28 and 29, respectively carried by discs 14, 15 and 16 are brought into alinement after the vehicle has progressed a predetermined number of miles.

In Figure 3 is shown the manner in which a circuit is made when the disc contacts are relatively alined. Contacts 30, shown in dotted lines in Figure 2 form single contacts through which the current enters and leaves the timing unit 5. Binding posts 31 are connected to these contacts to which suitable wires are connected, as will be presently set forth. Double contacts 32 convey the current through the discs, over-reaching those engaged by the single contacts 30, consequently the current enters at one point and is progressively conveyed through each disc, when all contact points are alined. The discs, while the vehicle is in motion, of course continue to rotate, but the short period of time contact is made as described is sufficient to complete a circuit to effect distributing of the required amount of lubricant to the several parts of the motor and vehicle.

With reference to the pump, by which distribution is accomplished; attention is directed to Figure 4 showing in vertical cross-section, the preferred type of pump. A small electric motor 33 is mounted upon the top of the pump housing 34, and the armature shaft 35 of the motor depends within the said pump housing. A gear 36 is carried upon the lower end of the motor shaft 35, which enmeshes a similar gear 37, within a casing 38. Rotation of gears 36 and 37 creates within the casing 38 sufficient amount of pressure to expel through oil line 39, quantities of oil from the reserve within the housing 34. The pump casing 38 has connected thereto a back pressure valve 40. No claim is made herein to the type of pump set forth, except to complete the combination of elements constituting the invention.

The main oil line 39 has communicating therewith several auxiliary lines 41, as shown in Figure 1, extending to the several parts of the vehicle and motor to be lubricated. At the termination of each of these lines, an oil cup 42, herein termed as a subsidiary reservoir, is mounted, and illustrated in detail in Figure 8, especially. Fluid entering through oil line 39 under pressure of the pump, urges the sliding valve 43 against the resistance of coil spring 44, filling the cup 42 through port 45. When pump pressure is relieved, sliding valve 43 resumes its normal position, permitting the lubricant to flow to the bearing through opposing port 46. The arrangement described prevents bleeding of the lines, and enables the pump to be immediately effective in filling each cup, even in its limited operating period as described. Fluid pressure may be visibly determined by the operator of the vehicle by glancing at the pressure gauge 47, on the instrument board, communicating with oil line 39 through line 48, shown in dotted lines in Figure 1.

Electrical operating energy for the invention is supplied by the storage battery 49, carried by all such vehicles. A pair of re-

lays are arranged in the circuit intermediate the timing unit and battery, one of which is termed the starting relay and indicated by reference character 50 in Figure 1, and shown in detail in Figure 9, while the other is identified by reference character 51, and termed the cut-out relay, so named because it is so disposed and arranged as to render the invention inoperative except when the vehicle is traveling at a rate of speed greater than the minimum, or at normal speed.

Referring especially to the wiring system by which the invention is operated, wire 52 extends in the usual manner from the ignition switch 3 to the conventional coil 53, forming no part of the invention but shown for clarity. Wire 54 extends from ignition switch 3 to motor transmission 55, and it is at this point that the invention is rendered operative by shifting of gears from low or intermediate into high gear. In this regard, reference is temporarily made to Figures 5 to 7 inclusive showing different views of the transmission switch by which the foregoing is accomplished. A small housing 56 is riveted or otherwise suitably affixed to the transmission housing 55, into which the high speed shifter shaft 57 moves upon emerging from the transmission when the gear shift lever 76 is actuated. Movement outward of shifter shaft 57, in the manner shown in Figure 7 urges the contact plate 58 outward against the resistance of the coil spring 59, bringing the edges of the plate into engagement with contact points 60, insulated in opposing sides of the switch housing 56, thus closing the circuit between these points during the time the motor is in high gear. Current consequently is enabled to flow freely through wire 61, through plate 58 into wire 54 thence to the ignition switch controlling the current to the motor coils.

It is obvious from the foregoing how the invention is constrained to function only when needed. With this in view, the flow of current will be taken up at the source of supply, which is the battery 49, grounded at 62. The positive wire 63 leads from the battery to the starting relay 50, as shown in Figure 1. A wire 64 leads from the contact point 65 adjacent the relay 50 to the motor 33 on the pump 34. The negative wire 66 from relay 50 is grounded as shown, and the positive wire 67 is connected to one of the binding posts 31 of the timing unit 5 in the manner previously described. To the opposite binding post 31 of the timing unit is connected a wire 68, which extends to cut-out relay 51. Thus, under normal conditions, when the discs within the timing unit 5 are in such position as to complete alinement of contact points, a complete circuit from battery 49 is established through the relays and pump motor 33, by way of wires 63, 67, 68, 61 and 64.

It is particularly pointed out that the invention is completely controlled at four points, to prevent its operation prematurely or out of time. One of these points is at the ignition switch 3, another at the transmission switch, another at the timing unit 5, and still another at the cut-out relay 51. It is through this latter relay that effective operation of the invention may be carried out without affecting normal function of the generator 69. To eleminate possibilities of any interference in this regard, a separate circuit composed of battery wire 70 and wire 71 connecting the relay 51 with the generator 69, which latter is grounded at 69^a. It is of course understood that in the normal operation of an automobile vehicle especially the generator does not begin to function until the vehicle attains a speed of about 8 to 10 miles per hour, and not until this occurs is the relay energized, but upon being so energized, contact is made at *b* on the relay, completing a circuit through wire 61, relay, 51 and wire 68, thereby placing the invention in position to operate when the timing unit becomes operative. The foregoing arrangement of wiring makes it impossible for the invention to operate during periods when the vehicle is idle, being reversed or parked.

Before entering into a detailed description of operation of the invention, the preferred construction of the starting relay 50 as shown in Figure 9 will be described. This relay consists of the usual coil, to which is connected ground wire 66 and positive wire 67. A bracket member 72 is secured to the top of the coil and insulated therefrom in the manner shown, and to the overhanging end of which is attached a contact plate 73, engageable with the magnetic core 74 of the coil. Connected to this plate 73 is an arm 75, which, when the coil is energized to attract the contact plate 73, falls against the contact 65 closing the circuit through the coil from wire 67 to wires 63 and 64 to the battery and motor pump.

Having described the several parts in detail and their relative positions throughout the system, the operation thereof is as follows:—

When the ignition switch 3 is turned on, preparatory to starting the motor, current from battery 49 flows through wire 58^a to ignition switch, thence through ignition switch to ignition coils 53. This action does not affect the invention, other than placing the same in position for operation, and not until the motor transmission is shifted to high gear is the invention really operative. The wire 58^a while shown as extending directly from the battery to the ignition switch, may under normal operative conditions constitute the starter circuit and is shown merely to illustrate that the invention and electric con-

trol circuits thereof operate independently with respect to the wiring system of the motor upon which it is installed.

It is obvious therefore, that the starting of the motor has no effect whatsoever on the invention until the gear shift lever 76 is moved to change the transmission from intermediate to high gear. When this is done, high speed shifter shaft 57, in Figures 5 to 7 inclusive moves outward into switch housing 56, moving contact plate 58 against the resistance of spring 59 until the said plate engages contact points 60 and accordingly closes the circuit between wires 54 and 61. An operative circuit is thus established from the battery 49 to the pump motor 33, and in which circuit is disposed, as a control for the pump motor, the relays 50 and 51, and the timing unit 5. It is understood however, that the circuit is not completed until the discs contained within the timing unit 5 are in such position as to properly aline the contact points 27, 28 and 29, and then only momentarily, that is, long enough to effect several revolutions of the motor armature shaft 35 to charge the several cups with lubricating fluids.

The closing of the circuit described as taking place upon alinement of the contact points within the timing unit is accomplished in the following manner.

It is noted in Figure 2 that the contact springs 30 have a single point of sliding engagement with the outer discs, while the contact springs 32 have a double engagement over-reaching the central disc. In this manner, current flowing into one of the contacts 30, after taking a zigzag course progressively through the discs passes out through the opposing contact spring 30, when proper operative alinement of the disc contacts is made. Such alinement being made at every twenty-five, fifty, hundred or more mile intervals designated by the speedometer. These figures may be altered of course, to suit varying conditions under which the vehicle is operated.

The purpose and function of the timing unit having been fully explained and assuming that the circuit is complete through the transmission switch 56 and timing unit 5, current from battery 49 energizes relay 51 by way of wire 70, which action is controlled by generator 69 through wire 71 and, as previously stated, does not occur until the vehicle attains a speed of more than 8 miles per hour.

Such energization of relay 51 closes circuit through wire 68, timing unit 5, and wire 67 to starting relay 50, grounded at 66. Starting relay 50 is energized simultaneously by current flowing from battery through wire 63, attracting contact plate 73, causing arm 75 to fall against contact 65, completing circuit to pump motor 33 by way of wire 64. Motor 33 is grounded, as shown at 33^a. It is estimated, when the vehicle is traveling at a normal rate of speed that the circuit will remain intact until the vehicle travels approximately one-twentieth of a mile, which is considered sufficient to maintain a supply of lubricant in the cups 42, one of which, as explained, is situated near each joint or bearing requiring lubrication. In keeping these cups filled, fluid is permitted to flow to the bearing without excess and keep the same constantly lubricated, and should the system be timed to operate before the supply of lubricant in the cups is depleted, no part of the system will be injuriously affected thereby, since the valve 43 in the oil line adjacent the cups prevents excess discharge of fluid from the cup through discharge port 46, and back pressure upon the pump as a consequence will be relieved by the valve 40 carried by the pump housing 38.

Manifestly, the construction shown is capable of considerable modification, and such modification as is in keeping with the appended claims is also considered within the spirit of the invention.

I claim:

1. A lubricating system for vehicles including a lubricant reservoir having communication with various bearing surfaces in said vehicle; a pump in said reservoir, a motor for operating said pump; a source of electrical energy for operating said motor; a circuit connecting said source and motor held normally open during inoperative periods of said vehicle, and means arranged in the speed indicator line of said vehicle adapted to close said circuit at intervals during operative periods of said vehicle according to the distance traversed by the latter, to operate said motor and pump.

2. A lubricating system for vehicles including a reservoir for containing said lubricant, said reservoir having communication with various bearing surfaces of said vehicle; means adjacent said bearing surfaces to receive a temporary supply of lubricant from said reservoir to distribute the same on said bearings; a pump in said reservoir; a motor for operating said pump; a source of electrical energy; a circuit between said source and motor held normally open; and means for closing said circuit at predetermined intervals during operative periods of said vehicle.

3. A lubricating system for vehicles including means containing a supply of lubricant having communication with various bearing surfaces of said vehicle and engine; a pressure pump in said container; a motor for operating said pump; a source of electrical energy; a circuit connecting said source and motor and held normally open; and means for closing said circuit at predetermined intervals when said vehicle is in motion to effect uniform distribution of lubricant from said container.

4. A lubricating system for vehicles and

engines comprising a lubricant reservoir having communication with various bearing surfaces throughout said engine and vehicle; a pressure pump in said reservoir; a motor for operating said pump; a source of electrical energy; a circuit connecting said source and motor held normally open at two points during inoperative periods of said engine and vehicle; means for closing the circuit at one of said points when the engine transmission is shifted to high gear, and means automatically closing the circuit at said other point at predetermined intervals when said vehicle is in motion, according to the distance traversed by said vehicle.

5. A lubricating system for vehicles and engines comprising a lubricant reservoir having communication with bearing surfaces throughout said engine and vehicle; means for discharging lubricant from said reservoir; a motor for operating said latter means; a source of electrical energy; a circuit between said motor and source held normally open at two points when said engine and vehicle are idle; means controlled from the engine transmission for closing the circuit at one point preparatory to operation when said transmission is shifted to high speed gear, and means controlled according to distance traversed by said vehicle for closing said circuit at said other point at intervals, to momentarily operate said pump motor to effect distribution of lubricant.

6. A system of lubrication including a fluid reservoir having a discharge; a pump therein; a motor for operating said pump; a source of electrical energy; an electric circuit connecting said source and motor and held normally open at two points; means for closing said circuit at one of said points preparatory to operating said system, and means for closing said circuit at said other point at recurring intervals to momentarily operate said pump to effect uniform distribution of fluid from said reservoir during operative periods of said vehicle.

In testimony whereof I affix my signature.

WILLIE GIBSON PHELPS.