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LUBRICATING SYSTEM

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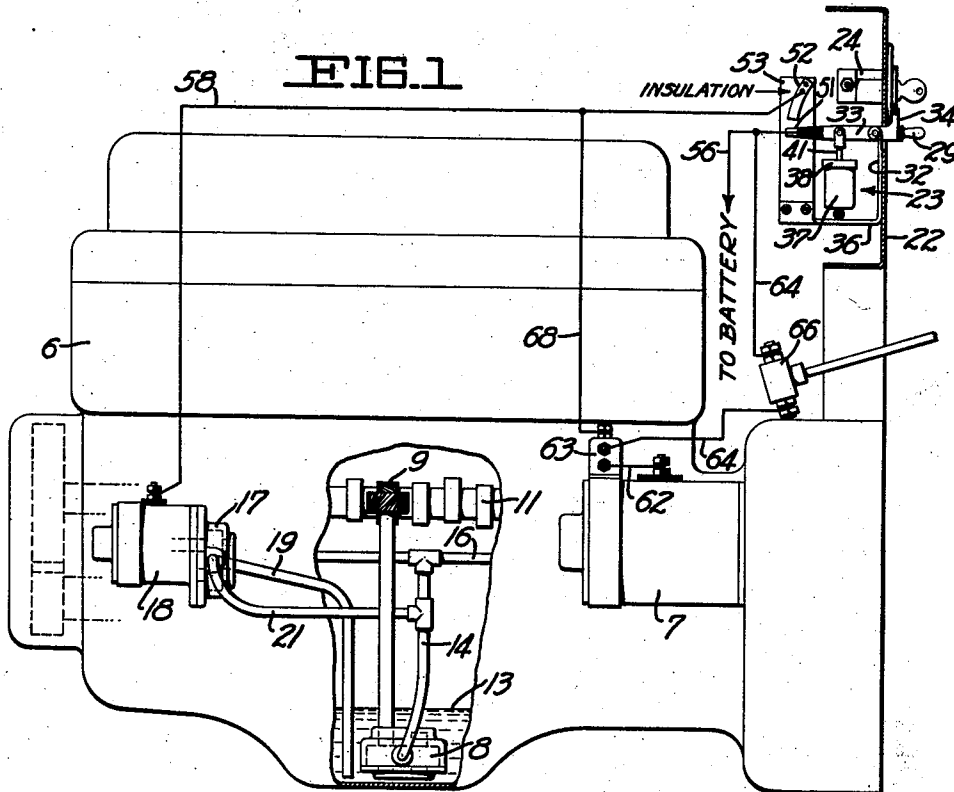


FIG. 4

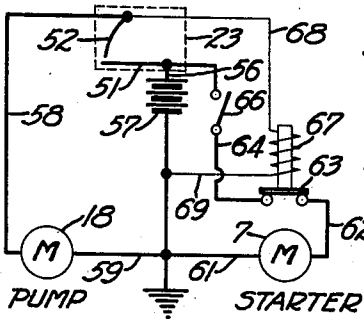


FIG. 2

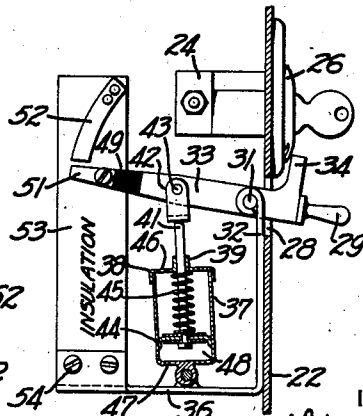
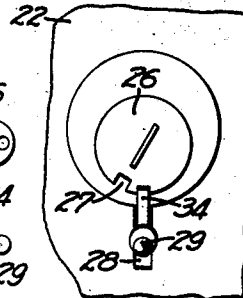


FIG. 3



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LUBRICATING SYSTEM

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6 Claims. (Cl. 123—196)

This invention relates to pressure lubrication systems and has particular reference to the oiling systems of internal combustion motors.

It is an object of the invention to provide a lubricating system for motors which will operate prior to the starting of the motor to insure that all of the bearing surfaces of the latter are properly bathed with oil.

Another object of the invention is to provide a lubricating system of the class described which is interlocked with the starting mechanism of the motor so that it is impossible to start the latter without first operating the lubrication system.

A further object of the invention is to provide an auxiliary lubricating system for motors, and control apparatus therefor which must be operated before the motor can be started and which will render, for a predetermined interval of time, the starting mechanism of the motor incapable of operation.

The invention possesses other objects and features of value, some of which, together with the foregoing will be specifically set forth in the detailed description of the invention which follows. It is to be understood that the invention is not to be limited to the particular species thereof shown and described as various other embodiments thereof may be employed within the scope of the appended claims.

Referring to the drawing:

Figure 1 is a side elevational view of the internal combustion engine and instrument board of a motor vehicle equipped with the lubrication system of my invention, portions of the view being broken away and other portions thereof being shown in section so as to more clearly disclose the construction.

Figure 2 is a view partly in vertical section and partly in side elevation showing the delay switch and its relation to the ignition switch of the motor.

Figure 3 is a fragmental front elevational view of the instrument board showing the ignition switch and the operating handle of the delay switch.

Figure 4 is a schematic wiring diagram showing the electrical connections between the several electrically operated components of the system.

While an internal combustion engine is running the lubricating oil becomes quite hot and possessed of very low viscosity with the result that when the engine is stopped the oil will rapidly drain from all of the bearing surfaces into the sump. If the engine is left idle for a time these bearing surfaces become quite dry and the vis-

cosity of oil which has drained into the sump, upon becoming cooled, has risen to a degree where it will not be quickly raised by the pump to the bearing surfaces when the engine is again started. The bearing surfaces are therefore running dry for a considerable interval of time and consequently overheating and wearing rapidly.

Attempts have been made in the past to correct this condition by providing auxiliary oil pumps, or storage chambers for the oil, which are actuated or emptied simultaneously with the starting of the engine so as to bathe the bearing surfaces until the regular pump can fill the distributing system with oil from the sump. These systems have failed to reduce wear in the motor an appreciable amount for the reason that they derive their power from the starting motor, or the movement of the starter pedal, and therefore do not allow a sufficient length of time before the engine is running for the oil to be circulated to all of the bearing surfaces.

I have provided an improved lubricating system which must be operated for a certain period of time before the motor can be started, thus insuring that each and all of the bearing surfaces are amply supplied with lubricant and reducing the wear incident to starting a dried out motor to a minimum. In detail, the lubricating system of my invention is particularly adapted for use with any type of engine 6 having a starting motor 7 and provided with an oil circulating pump 8 driven through gearing 9 from the camshaft 11, and having a suction orifice, through which oil 13 is drawn from the sump of the motor, and a discharge conduit 14 through which the oil, under pressure is fed into the oil distribution conduit 16 of the motor. An auxiliary oil pump 17, of the gear type, provided with an electric driving motor 18 is secured to the motor and has a suction conduit 19 which terminates below the level of the oil 13 in the sump, and a discharge conduit 21 is connected to the discharge conduit 14 of the regular oil pump 8. It will be seen that the pumps 8 and 17 are connected in parallel and that operation of the pump 17, when the motor and the pump 8 are stopped, will cause oil to be circulated through the oil distribution conduit 16.

On the instrument board 22 I provide a delay switch, generally indicated by the numeral 23, and I interlock this switch with the ignition switch 24 so that the latter switch cannot be turned on to start the motor without first causing the auxiliary oil pump 17 to operate for a predetermined interval of time. I provide the

rotatable barrel 26 of the ignition switch, as is shown in Figure 3, with a notch 27 and in the instrument board, directly below the ignition switch I provide an aperture 28 through which projects the handle 29 of the delay switch. This handle is pivotally mounted, by means of a pin 31, in a bracket 32 secured to the rear of the instrument board and is provided with a rearwardly extending arm 33 and an upwardly extending projection 34, which, when the ignition switch is in its "off" position, enters the notch 27 of the barrel 26 and locks the barrel against rotation until the handle is depressed, as is shown in Figure 2, to remove the projection 34 from the notch 27.

Pivotally mounted on a horizontal extension 36 of the bracket 32 is a cylinder 37 provided with a cap 38 having a centrally bored hub 39 through which slidably passes a piston rod 41, pivotally secured by the clevis 42 and the pin 43 to the arm 33, fitted within the cylinder with a leather piston 44. A coil spring 45 surrounds the piston rod within the cylinder and is confined between the cap 38 and the piston 44 so as to urge the latter toward the bottom of the cylinder. The cap 38 is provided with a relatively large aperture 46 through which air may enter the cylinder above the piston and the bottom of the cylinder is provided with a minute aperture 47 through which air may slowly escape from the chamber 48 below the piston. It will be seen that when the handle 29 is pushed downwardly the rod 41 and the piston will move axially upwardly in the cylinder 37 creating a vacuum in the chamber 48 and, due to the inability of air to enter the chamber through the small aperture 47 fast enough, air from above the piston will flow past the edge of the piston into the chamber. The spring 45 will of course be compressed as the piston 44 is raised. When the handle 29 is released the spring 45 will urge the piston toward the bottom of the cylinder and the rate at which the piston moves downwardly is governed by the size of the aperture 47 which allows the air compressed in the chamber 48 to escape. Thus it will be seen that the smaller the aperture 47 the longer it will require for the handle 29 to return to its normal position after being depressed. The outer end of the arm 33 is provided with an insulator 49 carrying a contactor 51 which is adapted to move into contact with an arcuate switch element 52 mounted on an insulator 53 attached to the bracket extension 36 by screws 54.

As will be seen in the wiring diagram of Figure 4 the contactor 51 is connected by a lead 56 with the positive terminal of the vehicle battery 57, the switch element 52 is connected by the lead 58 with the pump motor 18, and both the negative terminal of the battery and the lead 59 from the pump motor are grounded. The starter motor 7 has one lead 61 grounded and connected in the other lead 62 of the starter is a relay switch 63, connected by a lead 64, which may be closed or interrupted by the regular starter switch 66, with the positive terminal of the battery 57. The coil 67 of the relay is connected in parallel with the pump motor 18 by the lead 68, which connects with the switch element 52, and by the lead 69 which is grounded.

When the ignition switch 24 is in its "off" position the projection 34 of the handle 29 rests in the notch 27 of the lock barrel and prevents starting of the motor 7. When it is desired to start the motor the handle 29 must be pushed

downwardly thereby causing the projection to swing outwardly from the notch, the arm 33 to swing upwardly to bring the contactor 51 into contact with the switch element 52, and the piston 44 to be moved upwardly in the cylinder 37. As soon as the contactor 51 and the switch element 52 touch each other circuits are established from the battery 57 through the lead 58 to the pump motor 18 and thence to ground through the lead 59, and also from the battery through the lead 68 to the relay winding 67 and thence to ground via the lead 69. Thus the motor 18 is energized which will drive the pump 17 to force oil from the engine sump into the distribution conduit, and the relay 63 is opened breaking the circuit to the starting motor 7 so that the latter motor cannot be energized while the motor 18 is running. When the handle 29 is released the bleeding of air from the cylinder chamber 48, as was described above, will cause the arm 33 to slowly move to separate the contactor 51 and the switch element 52. The ignition switch 24 in the meantime may be turned on. As soon as the contact between the elements 51-52 is broken, which should not be sooner than about 15 seconds after the contact was established, so as to allow ample time for the pump 17 to flood the lubrication system with oil, the motor 18 will stop and the winding 67 of the relay, being de-energized, will allow the relay to close and re-establish the starter circuit which will, if the vehicle is equipped with a starter operable simultaneously with the closing of the ignition circuit, automatically start the motor, or, if the vehicle is equipped with a separately operated starter enable the operator to start the engine by closing the starter switch 66. While the engine is running the parts of the delay switch will remain in the positions in which they are shown in Figure 2 with the outer end of the projection 34 pressing against the face of the lock barrel 26 under the influence of the spring 45. When the ignition key is turned to shut off the engine the notch 27 of the lock barrel will be brought into registry with the projection 34 the latter thereupon moving into the notch and locking the barrel against being rotated to again start the engine until the handle 29 is again depressed to start the auxiliary oil pump to start the cycle of operations described above.

In the drawing the starter 7 has been shown as being controlled by a manually operated switch 66. It will, of course, be understood that this was chosen merely for purposes of illustration as the system of my invention may be applied, without departing from the spirit of the invention, to the modern types of vehicles wherein the operation of the starter is controlled solely by turning on the ignition switch 24.

From the foregoing description of my invention it will be seen that I have provided an auxiliary lubricating system for engines which insures that all of the bearing surfaces of the engine are properly oiled prior to starting, which makes it impossible to start the engine without first instituting a flow of lubricant to all of the bearing surfaces, and which, by requiring that the oil be circulated for an invariable interval of time before the engine is started, contributes toward a material extension of the useful life of the engine.

I claim:

1. The combination with an engine having a starting mechanism and a pressure lubrication system through which lubricant flows when said engine is operating, of means for instituting and

for maintaining during a predetermined interval of time a disruptable flow of lubricant through said system when said engine is inactive, and means for rendering said engine starting mechanism inactive during institution of said flow, while said instituted flow of lubricant is passing through said system until said flow is disrupted.

2. The combination with an engine having a starting mechanism and a pressure lubrication system through which lubricant flows when said engine is operating, of means for instituting and for maintaining during a predetermined interval of time a disruptable flow of lubricant through said system when said engine is inactive, means for disrupting said flow, and means for rendering said engine starting mechanism inactive during institution of said flow for said predetermined interval of time while said instituted flow of lubricant is passing through said system, and until said flow is disrupted at the end of said interval of time.

3. The combination with an engine having an electric starter, an ignition switch having a rotatable barrel provided with a notch, and an oil distribution system including a pump connected to be driven by said engine for circulating oil through said oil distribution system, of an auxiliary oil pump connected in said oil distribution system for circulating oil therethrough when said engine and the pump driven thereby are inactive, an electric motor connected with said auxiliary pump for driving the latter, a control switch for said auxiliary pump motor comprising a fixed bracket positioned adjacent said ignition switch, a lever pivoted on said bracket having an operating handle provided with an extension engageable in the notch of said ignition switch barrel to lock said barrel against rotation, a contactor carried by and insulated from said lever, a contact carried by and insulated from said bracket and engageable by said contactor, a conductor connecting said contact and said auxiliary pump motor, a source of electric current, a conductor connecting said contactor with said source of current whereby when said contactor and contact are engaged current will flow to said pump motor, a conductor connecting said source of current with said electric starter, a relay in said latter conductor for interrupting the flow of current to said starter, an energizing coil in said relay, a conductor connecting said energizing coil with said contact whereby said relay will be opened upon energization of said auxiliary pump motor, a cylinder pivotally mounted on said bracket, said cylinder having a vent opening therein, a piston slidably mounted in said cylinder to provide a closed chamber from which air may escape through said vent opening, a piston rod secured to said piston and pivotally attached to said lever, and resilient means for urging said piston along said cylinder to compress the air in said chamber, to urge said contactor out of engagement with said contact, and to urge said extension of the lever operating handle into engagement with the notch of said ignition switch barrel.

4. The combination with an engine having a starting mechanism provided with energization means, an ignition circuit switch, and a pressure lubrication system through which lubricant flows when said engine is operating, of pressure means,

having a control element, for instituting and for maintaining during a predetermined interval of time a disruptable flow of lubricant through said system when said engine is inactive, and means interlocking said starting mechanism energization means, said pressure means control element and said ignition circuit switch for rendering said ignition switch inoperative prior to the operation of said latter control element, and for rendering said engine starting mechanism inoperative during the interval of time that said instituted flow of lubricant is passing through said system and until disruption of said flow of lubricant at the end of said time interval.

5. The combination with an engine having a starting mechanism provided with energization means, an ignition circuit switch, and a lubricating oil distribution system through which oil may be circulated by a pressure pump driven by said engine when the latter is operating, of an auxiliary oil pump connected in said oil distribution system for circulating oil therethrough when said engine and the pump driven thereby are inactive, an electric motor connected to drive said auxiliary oil pump, a source of electric current for energizing said electric motor and for energizing the motor ignition circuit through said ignition switch, a motor switch for controlling the flow of current from said source to said electric motor, a locking element operatively connected with said electric motor switch and engageable with said ignition switch for locking the latter switch against operation prior to operation of the electric motor switch, and control means for said starting mechanism energization means responsive to current flow to said auxiliary oil pump motor for rendering said starting mechanism inactive during operation of said auxiliary oil pump.

6. The combination with an engine having a starting mechanism provided with energization means, an ignition circuit switch, and a lubricating oil distribution system through which oil may be circulated by a pressure pump driven by said engine when the latter is operating, of an auxiliary oil pump connected in said oil distribution system for circulating oil therethrough when said engine and the pump driven thereby are inactive, an electric motor connected to drive said auxiliary oil pump, a source of electric current for energizing said electric motor and for energizing the motor ignition circuit through said ignition switch, a motor switch for controlling the flow of current from said source to said electric motor, a locking element operatively connected with said electric motor switch and engageable with said ignition switch for locking the latter switch against operation prior to operation of the electric motor switch, means for closing said electric motor switch to supply said electric motor with current from said source, means for urging said electric motor switch toward open position after the latter switch has been closed, means for yieldingly resisting the opening of said electric motor switch, and control means for said starting mechanism energization means responsive to current flow to said auxiliary oil pump motor for rendering said starting mechanism inactive during operation of said auxiliary oil pump.