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E. D. JONES ET AL

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LUBRICATION OF INTERNAL COMBUSTION ENGINES

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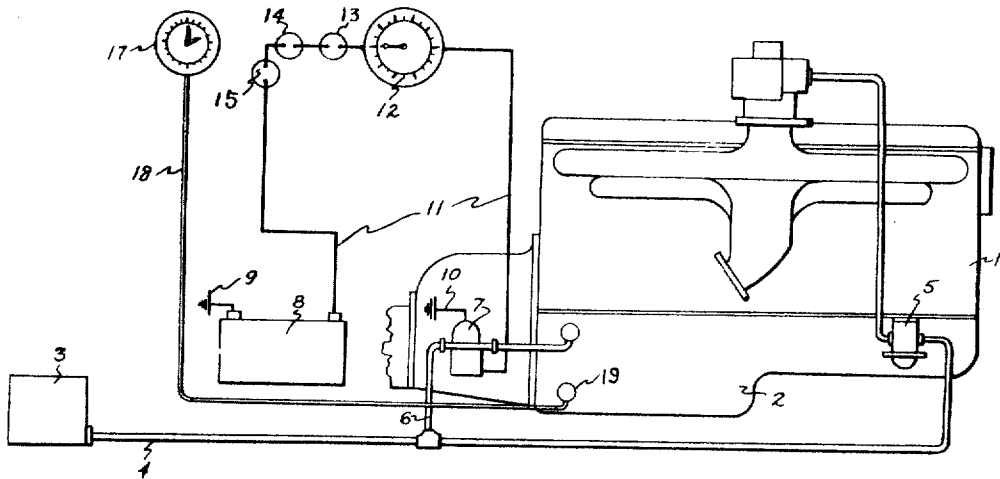


Fig. 1

Fig. 2

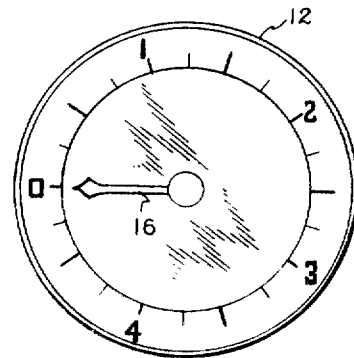
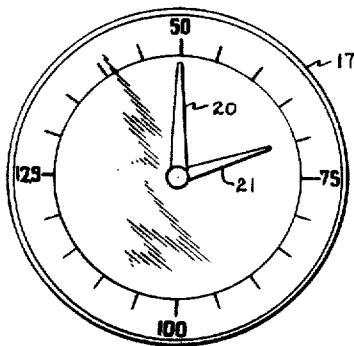


Fig. 3



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LUBRICATION OF INTERNAL COMBUSTION
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5 Claims. (Cl. 123—196)

This invention relates to lubrication of internal combustion engines and particularly to provisions for diluting engine lubricating oil under low temperature conditions to facilitate starting.

Since viscosity of oils varies inversely as their temperatures, it follows that a viscosity well suited to operating temperature of an engine may be undesirably heavy for starting the engine cold. In mild weather, the viscosity at starting or atmospheric temperature is not commonly sufficiently great to be a material detriment, but in cold weather and particularly under conditions of severe cold, consequent undue viscosity tends to seriously interfere with starting.

In the case of Diesel engines, undue lubricant viscosity at starting is especially objectionable since such engines require much greater cranking power and speed than engines using relatively low compression, and hence require good starting lubrication more urgently than other internal combustion types.

The problem above discussed has been mitigated in a crude way by pouring more or less gasoline into the crank case to dilute the lubricant in cold weather, but there has been no assurance that such dilution was neither inadequate nor extreme and no convenient means for accomplishing such dilution.

An object of the invention is to provide a convenient and permanent apparatus for introducing a diluting liquid into an engine crank case, as required.

A further object is to provide for accurately measuring the quantity of liquid employed for dilution.

A further object is to subject the dilution system to a thermostatic control such as will automatically prevent use of the system when the weather is sufficiently moderate to obviate necessity for dilution.

A further object is to provide for an indication of crank case temperature to assist in calculating the amount of diluent employed with proper regard to viscosity of the lubricant.

A further object is to thoroughly safeguard such a dilution system against danger of leakage or tampering, since excessive gasoline in the crank-case involves a serious risk of explosion and fire.

These and various other objects are attained by the construction hereinafter described and illustrated in the accompanying drawing, wherein:

Fig. 1 is a diagrammatic view of the improved system applied to an internal combustion engine which may be considered as illustrative of either an ordinary gasoline or Diesel type of engine.

Fig. 2 is a front view of a time switch for controlling a circuit for energizing a pump.

Fig. 3 is a front view of a temperature indicator employed in the system.

In these views, the reference character 1 designates an internal combustion engine whereof the crank case 2 constitutes a reservoir for lubricating oil as is common practice. For supplying gasoline or some diluting liquid to said engine there is provided the usual fuel tank 3 from which a supply line 4 leads to the engine and includes the usual pump 5, particularly indispensable in Diesel engines. From the line 4 branches a pipe connection 6 to the crank case and in such connection is interposed an electrically driven pump 7 of a type quite positively obstructing flow when idle. Further said pump is of a type to effect a very steady flow at a quite gradual rate as for example 20 fluid ounces per minute. Any small valved reciprocatory pump would serve the purpose as for example that marketed under the name "Autopulse."

The motor energizing the pump 7 derives current from the engine battery 8, corresponding terminals of the battery and motor being grounded as indicated respectively at 9 and 10. The other battery and motor terminals are connected by a conductor 11 controlled by switches 12, 13, 14 and 15.

The switch 12 is of the semi-automatic type known as a time switch and serves to effect closure of the circuit for a selective short time period. Thus said switch comprises a rotary pointer 16 travelling a dial graduated in suitable time units and adapted to close the circuit when set at any point other than zero and to open the circuit on expiration of the time indicated by such setting. As illustrated (Fig. 2), said dial is graduated for a maximum flow of five minutes, it being understood however that a considerably shorter flow period will ordinarily suffice. The switch 13 is thermostatic, being adapted to automatically break the circuit when the weather is sufficiently mild to render dilution of the lubricant superfluous. The temperature at which the switch 13 is adapted to take effect depends primarily on the type and characteristics of the engine to which the dilution system is applied and further depends on the degree of viscosity of the lubricant. The switches 14 and 15 are both safety switches such as are commonly used to control an ignition circuit of a motor vehicle. Provision of these two switches serves to thoroughly safeguard the system against tampering. Ignition circuit "not shown" will be controlled additionally by one of these two switches.

Since the four described switches are well known as regards their operating mechanism a diagrammatic showing thereof suffices.

Since the diluent employed will be much more volatile than the lubricant, it will largely be evaporated in the course of a day's run of the engine, the amount of evaporation depending on the temperature at which the engine is operated. If the maximum crank case temperature attained in course of a day's run is known, this may serve as basis of an approximation as to diluent evaporation and will assist the operator in determining proper quantity of diluent to add on completion of the day's run. It is desirable to add diluent before the engine has cooled since it will form a homogeneous mixture with warm oil but not with oil at low starting temperature.

For indicating the maximum temperature attained in a day's run there is provided an indicator 17 connected by a tube 18 to a pressurestat 19 permanently inserted in the crank case and subject to the lubricant temperature. The indicator 17 has a pointer 20 which is shifted proportionately to the pressure transmitted through the tube, such pressure being determined by crank case temperature. Since the pointer 20 responds only to increasing pressure, it serves to indicate the maximum temperature attained in a day's run. Said pointer may, however, be reset at its zero position preliminary to each day's run. Preferably the indicator 17 is equipped with a second pointer 21 adapted to advance or recede to indicate instantaneous crank case temperatures. The instrument described is of standard type and hence the diagrammatic showing thereof afforded by the drawing suffices.

The described dilution system provides for an accurate and adequate dilution of crank case lubricant when needed, without wasteful excess and eliminates the considerable risk entailed by excessive dilution. Said system may be advantageously applied to any vehicle driven by an internal combustion engine and required to operate under atmospheric temperature conditions in entailing starting difficulties due to excessive viscosity of the lubricant.

What we claim is:

1. In a lubricant dilution system for internal combustion engines, the combination with the lubricant-receiving crank case of an internal combustion engine, of a tank holding a diluting liquid, a delivery line leading from said tank to the crank case, a pump inducing flow in said line, and control means for the pump for predetermining a selective period of operation of the pump, including an adjustable element for accurately setting the selected period, said pump positively prohibiting flow when idle.

2. In a lubricant dilution system for internal combustion engines, as set forth in claim 1, thermostatic means for rendering said control means ineffective at temperatures in excess of a predetermined range.

3. In a lubricant dilution system for internal combustion engines, the combination with the lubricant-receiving crank case of an internal combustion engine, of a tank holding a diluting liquid, a delivery line leading from said tank to the crank case, an electrically-driven pump for inducing flow in said line, a circuit controlling said pump, and a time switch controlling said circuit, adapted to open upon a predetermined time lapse, said pump positively prohibiting flow when idle.

4. In a lubricant dilution system for internal combustion engines, as set forth in claim 3, a thermostatic switch controlling said circuit and adapted to open at a predetermined temperature.

5. In a lubricant dilution system for internal combustion engines, the combination with the lubricant-receiving crank case of an internal combustion engine, of a tank holding a diluting liquid, a delivery line from said tank to the crank case, an electrical device controlling the flow in said line, a circuit for said electrical device, and a time switch controlling said electrical device, adapted to open upon a predetermined time lapse, said electrical device positively prohibiting flow in said delivery line when deenergized.

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