Oct. 21, 1930. A. M. NIVEN 1,778,910

OIL FILTER

Filed Oct. 8, 1927

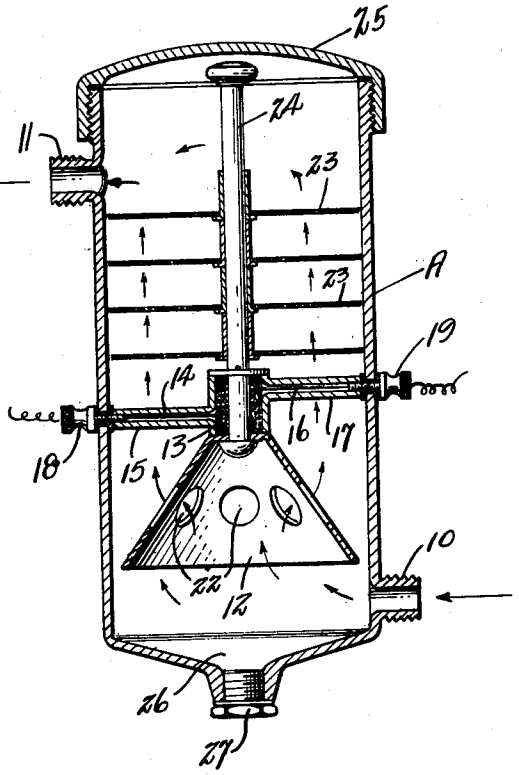


Fig. 1

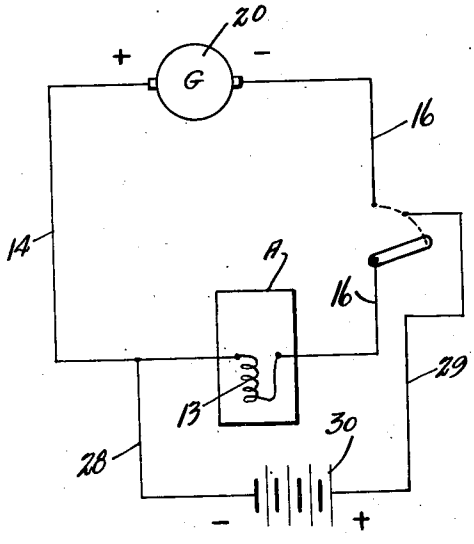


Fig. 3

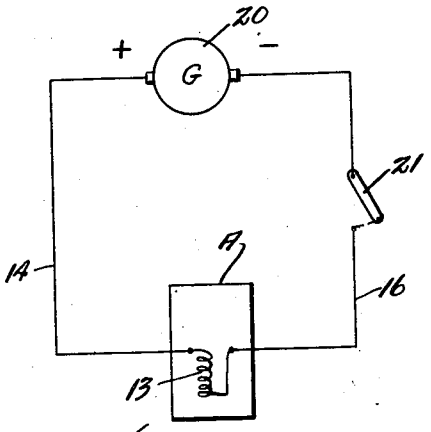


Fig. 2

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UNITED STATES PATENT OFFICE

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OIL FILTER

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This invention relates to oil filters or separators for use particularly in the lubrication systems of motor vehicle internal combustion engines.

One object of my invention resides in the provision of improved means for separating metallic particles from the oil. To this end I have provided an electro-magnet conveniently energized by the generator usually employed in motor vehicles. In one form of my invention I provide a kick-off circuit for effectively repelling the metallic particles from the electro-magnet in cutting out the ignition system. In either instance, since my electro-magnet is energized by the vehicle generator it is apparent that whenever the engine is running the electro-magnet will be energized and when the engine stops the electro-magnet will be de-energized to permit the metallic particles separated from the oil to drop into a convenient collector.

Further features of my invention reside in the novel combination and arrangement of parts more particularly hereinafter described and claimed.

Referring to the drawings in which like reference characters indicate corresponding parts,

Fig. 1 is a sectional view through my oil filter,

Fig. 2 is a wiring diagram for the electro-magnet, and

Fig. 3 is a modified wiring diagram including a kick-off circuit for the electro-magnet.

In the drawings reference character A represents the filter casing having an oil inlet and outlet 10 and 11 respectively. Within casing A and supported thereby is an electro-magnet 12 energized by coils 13, one wire 14 of the circuit connecting the coil passing through supporting arm 15 and the other wire 16 passing through supporting arm 17, the wires 14 and 16 being electrically connected to binding posts 18 and 19 insulated in the walls of the filter A. From the binding posts the wires 14 and 16 may conveniently lead respectively to the terminals of the usual engine generator 20, one of the wires being connected preferably through the usual motor vehicle engine ignition switch 21.

The electro-magnet 12 may be in the nature of a baffle extending substantially across the filter casing, with openings 22 through which the oil may flow as shown by the arrows. However, the oil in flowing past the electro-magnet 12 is brought into such close association therewith so that any metallic particles in the oil will be attracted to the electro-magnet and thus separated from the oil which passes through openings 22 and thence to the outlet.

I have also provided filter screens 23 or other filtering elements which serve to remove dirt and other foreign particles from the oil other than the metallic substances capable of attraction by the electro-magnet 12. These filtering elements 23 may be supported by the stem 24, together with the electro-magnet 12, coil 13 and arms 15, 17 whereby upon disconnection of the binding posts 18, 19, with arms 15, 17 these parts may be removed as a unit from the casing A, a cover 25 being provided for this purpose. The arms 15, 17 further serve to removably support this unit from and within the casing.

A sump or collector 26 catches the foreign metallic particles released from the electro-magnet when the latter is de-energized, such particles being removed from the casing A by a clean-out plug 27.

In operation, upon closing the ignition switch 21 in starting the engine the generator 20 will energize the electro-magnet 12 by reason of the coil 13. The oil forced through the casing A by suitable connection with the usual pressure feed system will be rid of the metallic particles including iron and steel particles which will be attracted to the electro-magnet. Whenever the engine is in operation the electro-magnet will thus be energized and in cutting out the ignition switch 21 to shut off the engine, the electro-magnet will be de-energized, the metallic particles accumulated on the electro-magnet falling to the sump 26. Thus the electro-magnet will at all times operate efficiently and no great amount of metallic particles will be collected by the electro-magnet be-

fore release of the particles to the sump. The sump 12 is sufficiently removed from the electro-magnet so that the gap therebetween will not permit attraction of the particles in the sump to the electro-magnet. Furthermore by periodically releasing the metallic particles from the electro-magnet the possibility of such particles being carried past the electro-magnet is materially reduced as compared with any substantial accumulation which might otherwise be permitted to accumulate on the electro-magnet.

Referring to Fig. 3 I have added a kick-off circuit 28, 29 conveniently energized by the usual vehicle storage battery 30 whereby as the switch 21 is moved from closed to open position, the switch momentarily energizes the kick-off circuit causing the reverse current to flow through the coil 13. This has the effect of positively repelling the particles accumulated from the electro-magnet whenever the ignition switch is opened. Thus any tendency of the metallic particles to adhere to the electro-magnet after de-energizing the electro-magnet will be effectively overcome.

It will be understood that in addition to the functions above outlined for the switch 21, generator 20, and battery 30, these parts may perform their usual functions as is well known in the art. I have described my invention in connection with these well known parts since it may be conveniently combined therewith and since such a combination permits conveniently attaining the objects of my invention.

What I claim as my invention is:

1. A device for separating metallic particles from oiling systems of internal combustion engines comprising an electro-magnet, a switch, means controlled by a closing movement of the switch for electrically energizing the electro-magnet, and means controlled by an opening movement of the switch for causing a reverse current of electricity to act upon the electro-magnet.

2. An oil filter for internal combustion engine oiling systems, comprising a casing, oil inlet and outlet means for the casing, an electro-magnet within the casing for separating metallic particles from the oil passing through the casing, an engine ignition switch, and means controlled by the switch for energizing and de-energizing the electro-magnet, said means including a kick-off circuit for the electro-magnet.

3. An oil filter for internal combustion engine oiling systems comprising a casing, oil inlet and outlet means for the casing, an electro-magnet within the casing for separating metallic particles from the oil passing through the casing, an engine generator and ignition switch, means controlled by the switch for energizing the electro-magnet from the generator, a kick-off circuit for the electro-magnet, and means responsive to opening the switch for energizing the kick-off circuit.

4. A device for separating metallic particles from oiling systems of internal combustion engines comprising an electro-magnet, a source of electric energy, and means responsive to starting and stopping the engine for respectively energizing and de-energizing the electro-magnet, said means including a kick-off circuit for the electro-magnet.

5. A device for separating metallic particles from oiling systems of internal combustion engines comprising an electro-magnet, an engine generator, an ignition switch, and an electric circuit including the electro-magnet, generator and switch, the latter controlling the generator and electro-magnet, a storage battery, and a kick-off circuit including the switch, storage battery, and electro-magnet.

6. A device for separating metallic particles from oiling systems of internal combustion engines comprising an electro-magnet, a source of electric energy, a switch controlling the energizing of the electro-magnet from the said source of electric energy, and means controlled by an opening movement of the switch for causing a reverse current of electricity to act upon the electro-magnet.

7. An oil filter for internal combustion engine oiling systems comprising a casing, oil inlet and outlet means for the casing, an electro-magnet within the casing for separating metallic particles from the oil passing through the casing, and means within the casing intermediate the electro-magnet and oil casing outlet for removing non-metallic foreign matter from the oil.

8. An oil filter comprising a casing, an electro-magnet including a coil, an arm extending from the coil toward the inner wall of the casing, an electric wire connecting the coil and carried by the arm, and means removably supporting the arm on the casing.

9. An oil filter for internal combustion engine oiling systems comprising a casing, an electro-magnet, and a coil for energizing the electro-magnet, said electro-magnet and coil being housed within the casing and removable therefrom as a unit.

In witness whereof, I hereunto subscribe my name this 6th day of October, A. D. 1927.

ARCHIE MACPHAIL NIVEN.