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K. I. CROSSLEY ET AL

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OIL ENGINE

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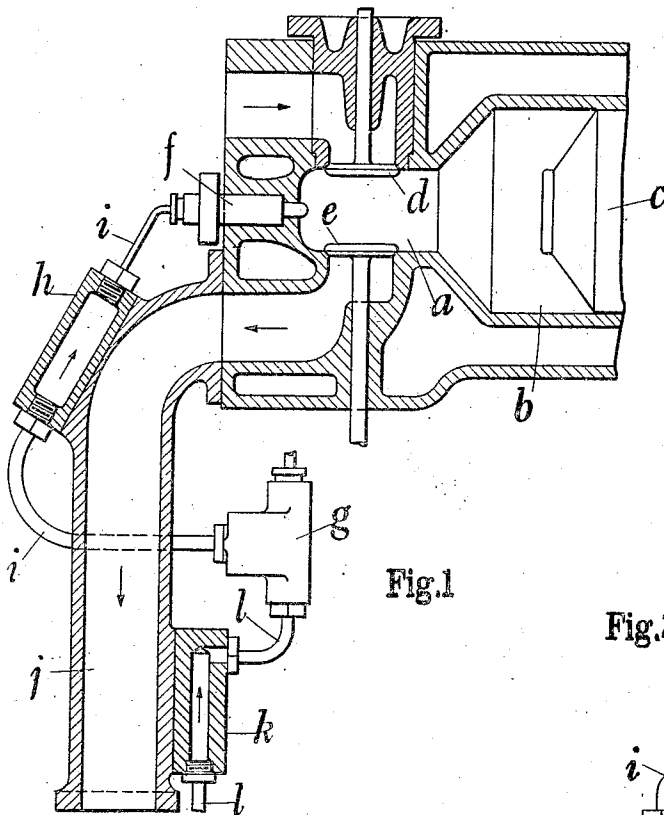


Fig. 1

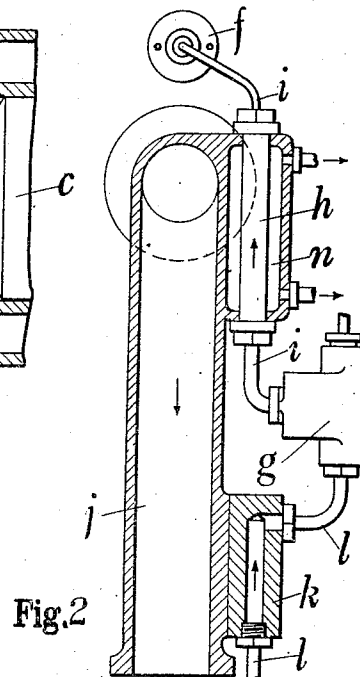


Fig. 2

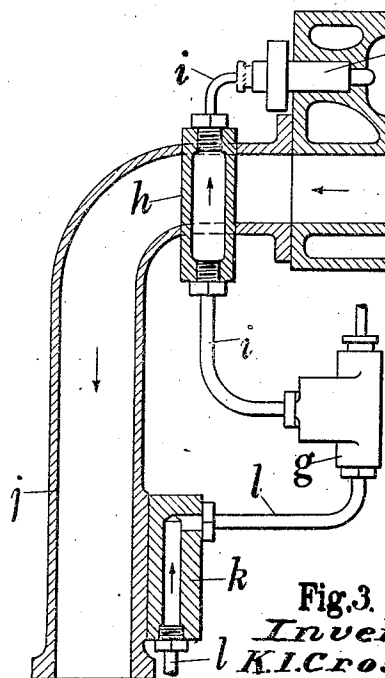


Fig. 3.

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OIL ENGINE.

Application filed June 1, 1925, Serial No. 34,198, and in Great Britain July 5, 1924.

This invention relates to airless injection internal combustion oil engines using heavy oil fuel which is delivered as spray alone, or without admixture of air, into the combustion chamber or chambers by means of an injection pump. With such engines difficulties are experienced, when using viscous oil, in ensuring its efficient atomization or delivery through the usual nozzle or injector into the air charge compressed in the said chamber or chambers, and any considerable preheating of the oil, previous to its entering the pump, to avoid such difficulties, involves disadvantages due to what is known as "air lock", or a liability to vaporization and frothing, causing irregularity in the action of the pump and thus in the deliveries of fuel to the engine.

The object of this invention is to provide for the more effective atomization of the oil whilst maintaining regularity in the deliveries of same to the engine.

The invention comprises improved means as hereinafter set forth for the heating of the oil in two stages, (1) before it enters the fuel pump so as to cause it to flow freely through the pipes and the pump and (2) after its passage through the pump and prior to its entering the atomizer.

Referring to the accompanying sheet of explanatory drawings:—

Figure 1 is a sectional elevation giving a diagrammatic illustration of one manner of applying our invention and Figures 2 and 3 sectional elevations illustrating two further arrangements for carrying out our invention.

The same reference letters in the different views indicate the same or similar parts.

Referring to Figure 1, the combustion chamber *a* which communicates with cylinder *b* having the piston *c* therein, is fitted in the ordinary manner with the air valve *d*, exhaust valve *e* and oil atomizer *f*. The oil is supplied to the said atomizer *f* by the usual pump *g*.

The final preheating of the oil for the purpose aforesaid is effected by means of the heating vessel *h* which forms part of the delivery pipe or conduit *i* between the delivery side of the pump *g* and the atomizer *f*. The said heating vessel *h* is mounted on the exterior of the exhaust pipe *j* and thus receives heat therefrom. The means for the attachment of the said vessel *h* to the said

exhaust pipe *j* may be such as will permit of ready adjustment of the position of the vessel, so that the extent of its contact with the pipe may be varied or so that it may be moved towards or away from the pipe for variation of the heating effect.

In the example shown at Figure 1, a preliminary oil heater *k* is also provided in association with the suction pipe *l* of the pump *g* and also attached to the exhaust pipe *j*. Thus there will be a primary heating of the oil between the fuel tank and the fuel pump to a temperature sufficient to cause it to flow freely through the suction pipes or passages but insufficient to cause vapour to be formed in such pipes or passages which might result in "air lock", and a secondary heating of the oil between the fuel pump and the oil sprayer or atomizer to a higher temperature. For example, the primary heating at the pump suction side might be to 100° F., and the secondary heating at the pump delivery side to 200° F. Or the primary heating may be to a temperature below the flash point of the oil and the secondary heating to a temperature above the flash point. Or the primary heating may give the oil a viscosity of from say 30 to 750 seconds and the secondary heating may give the oil on the delivery side of the pump a viscosity of from 30 to 150 seconds according to a Redwood No. viscometer. The exact amount of primary and secondary heating depends on the quality of the fuel oil used.

In the arrangement shown in Figure 2, the oil delivered by the pump through the heating vessel *h* passes through a jacket *n* containing either oil or water heated from the exhaust pipe *j*. Where hot water is used, this can if desired, be obtained from the engine cylinder jacket.

In the Figure 3 arrangement, the fuel passes through a heater *h* which passes through or across and is heated by the exhaust pipe *j*. The heater is also heated by direct contact with the exhaust gases.

The form and arrangement of the heater may be varied to suit varying services or requirements.

We claim:—

1. In oil fuel internal combustion engines of the type aforesaid, the combination with the exhaust pipe, the fuel atomizer, fuel pump, the suction conduit and the delivery

conduit of said pump, of a pair of fuel heaters exteriorly mounted upon said exhaust pipe, one of said heaters having inlets and outlets connected with said suction conduit
5 and the other having inlets and outlets connected with said delivery conduit.

2. In oil fuel internal combustion engines of the type aforesaid, the combination with the exhaust pipe, the fuel atomizer, the fuel
10 pump, the suction conduit and the delivery conduit of said pump, of a pair of vessels mounted upon and receiving heat from said exhaust pipe, one of said vessels having inlets and outlets connected with said suction
15 conduit and the other having inlets and outlets connected with said delivery conduit.

3. In oil fuel internal combustion engines of the type aforesaid, the combination with the exhaust pipe, the fuel atomizer, the fuel
20 pump, the suction conduit and the delivery conduit of said pump, of a pair of vessels mounted upon said exhaust pipe and receiving heat therefrom, one of said vessels having inlets and outlets connected with said
25 suction conduit and the other having inlets and outlets connected with said delivery conduit and also having a part of its exterior in contact with a heating fluid.

In testimony whereof we have signed our names to this specification.

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