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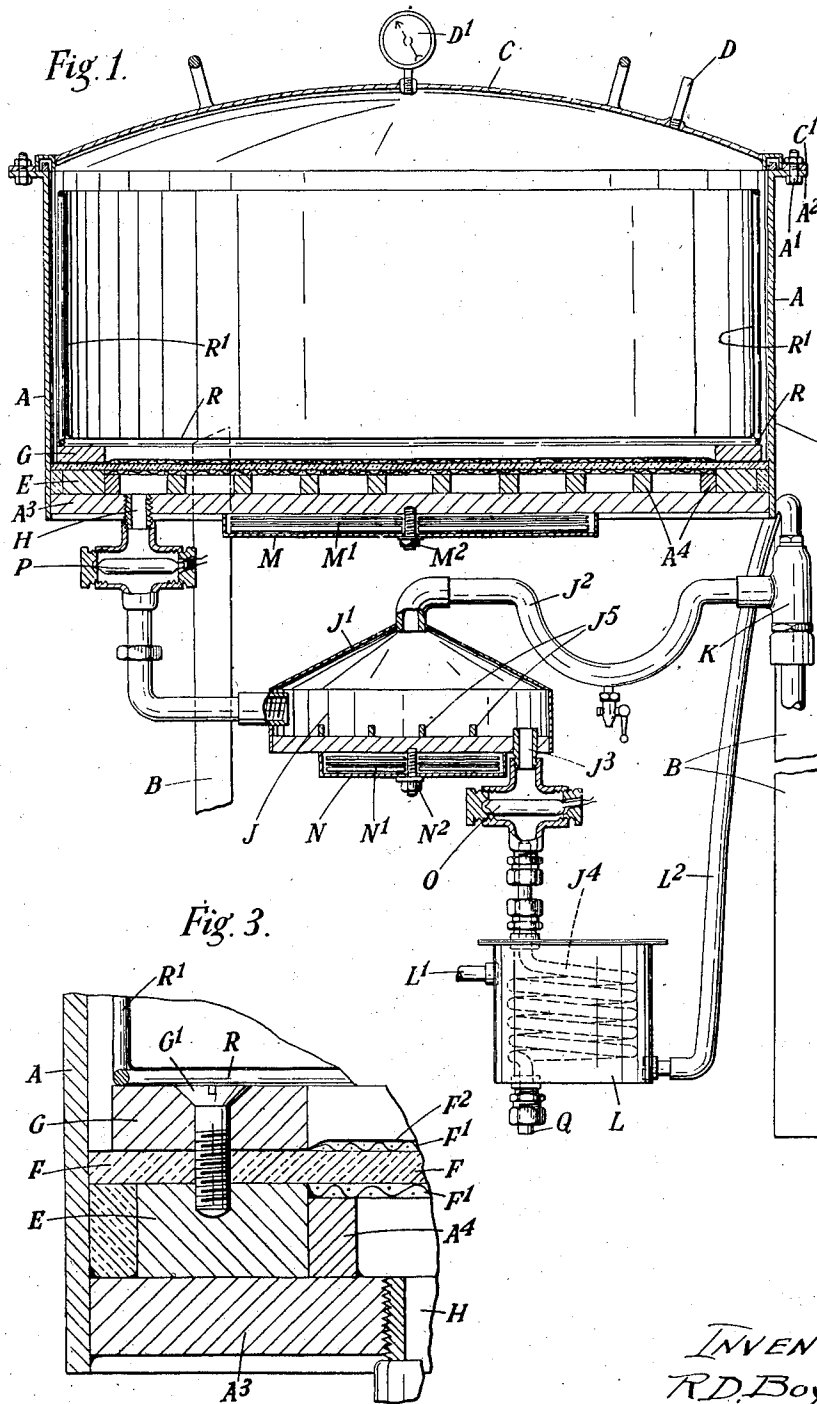
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2,345,697

APPARATUS FOR CLEANING OIL

Filed June 20, 1941

2 Sheets-Sheet 1



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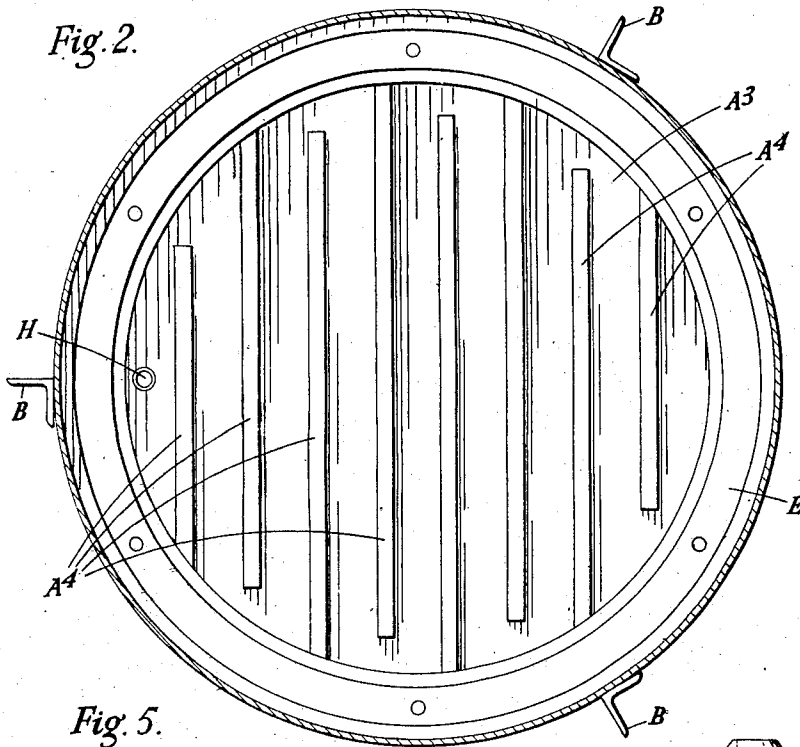
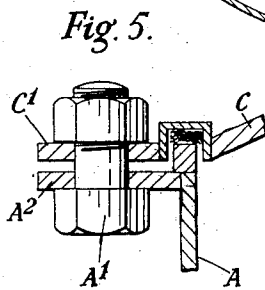
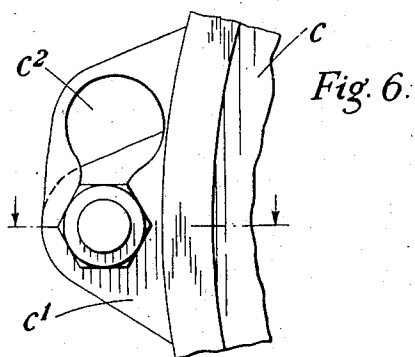
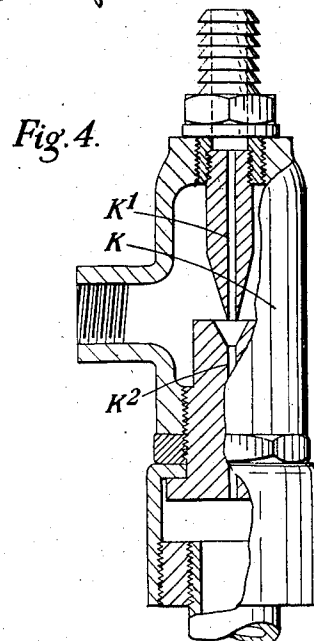
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APPARATUS FOR CLEANING OIL

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UNITED STATES PATENT OFFICE

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APPARATUS FOR CLEANING OIL

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In Great Britain July 5, 1940

6 Claims. (Cl. 210—150.5)

This invention relates to apparatus for cleaning oil—for example used lubricating oil from motor vehicles—of the kind comprising a container for a mixture of oil and an adsorption agent such as fuller's earth and having heating means and a filter through which the oil is drawn off.

In apparatus of the above type the container is sometimes provided with an air-tight cover and the mixture of oil and adsorption material is subjected to air pressure so that the oil is forced through the cleaning powder and through the filter into the lower end of the casing where any volatile matter, such as water, is expelled.

The object of the present invention is to provide an apparatus of the above general type which is of simple and economical construction and as efficient in operation as more complicated apparatus hitherto proposed.

According to this invention the apparatus comprises a container adapted to receive a mixture of oil and an adsorption agent, a filter in the lower end of the container and means for heating the mixture and for subjecting it to air pressure, a sinuous passage for the filtered oil and a separate evaporating chamber into which the oil is passed from the sinuous passage and in which it is maintained in a relatively shallow layer and again subjected to heat under negative pressure so that any vapours are carried away. Preferably this negative pressure is produced by means of an ejector operated by a fine jet of water and the ejector is conveniently connected to a cooling chamber through which the oil is caused to pass before being finally discharged, in this way the same water circuit being used to operate both the cooler and the ejector.

The container is provided with a tray having means by which it can be readily removed from the casing together with the adsorption material and the dirt from the oil. This tray may comprise an annular member having upwardly projecting handles and a base of woven fabric, perforated metal or the like supported upon or immediately above the filter in the base of the container. The filter comprises an annular seating ring in the base of the container having one or more layers of gauze or filtering material thereon normally maintained in position by means of a removable clamping ring and a shallow chamber is formed below the filter in the base of the container provided with ribs or partitions constituting a labyrinth through which the filtered oil is caused to flow in a sinuous course before pass-

ing into the separate evaporating chamber. The base of the main container and that of the evaporating chamber are provided externally with separate heating means preferably in the form of electrical heating elements with or without thermostatic control, and each heating element is conveniently housed in a shallow cylindrical casing connected to its main support in a readily detachable manner.

10 The evaporating chamber is conveniently provided with a conical cover, the upper end of which communicates with the ejector by which any fumes are withdrawn. The oil discharge pipe extends above the base of this chamber so that a shallow layer of predetermined depth is maintained which prevents the oil from passing into the cooling chamber before it has been adequately heated. If desired this chamber too may obtain a labyrinth through which the oil is forced to pass before it reaches the discharge pipe. The thermostat, when such is provided, prevents overheating of the oil and it will be seen that the entire apparatus is wholly without pumps or other moving parts which are costly to make and liable to get out of order.

25 One construction of apparatus according to this invention is shown by way of example in the accompanying drawings in which—

30 Figure 1 is a sectional side elevation,

Figure 2 shows the bottom of the container in plan, with the filter removed,

Figure 3 is a detail showing in section on an enlarged scale the filter and its clamping and supporting rings,

35 Figure 4 shows the ejector in sectional side elevation,

Figure 5 is a sectional side elevation of one of the cover bolts, and

40 Figure 6 is a plan of the detail shown in Figure 5.

The apparatus comprises a container A of cylindrical shape formed from mild steel and supported upon legs or standards B (shown only diagrammatically) of a convenient height to enable a drum of standard size, suitable to the capacity of the container to be placed below the discharge pipe. The container A is provided with a domed cover C by which it can be closed in an air-tight manner. In the example shown, projecting lugs C¹ on the cover having keyhole slots C² engage studs A¹ secured to brackets or a ring A² on the side wall of the container. The upper surface of the lugs C¹ may be inclined so that by rotating the cover the lugs will either disengage the studs or clamp the cover in place

on the container. The cover carries an inlet valve D for air under pressure and a pressure gauge D¹ with a suitable release valve.

Welded to the base within the container is an annular ring E forming a seating for a filter comprising an asbestos pad F held between two layers of wire gauze F¹ with one or more layers of linen or woven fabric F² above it. These filtering layers are held in place on the annular seating E by means of a readily removable clamping ring G which is secured in place by studs or screws G¹. The shallow space between the base A³ of the container and the filter F is provided with transverse ribs or bars A⁴ forming a labyrinth through which the filtered oil must pass before escaping through an outlet pipe H into the evaporating chamber below the base of the main container A. This evaporating chamber comprises a shallow cylindrical tray J provided with a conical cover J¹ and a pipe J² establishes communication between the apex of the cover and an ejector K operated by a stream of water. The base of the chamber J has a labyrinth formed by transverse bars J⁵ similar to the bars A⁴.

The evaporating chamber J is provided with a discharge pipe J³ which includes a coil J⁴ enclosed within a cooling chamber L and leading to the delivery pipe Q. The water circuit which operates the ejector K, first passes through the cooling chamber L which it enters at L¹ and leaves by a flexible pipe L².

Mounted on the under side of the base A³ of the main container is a shallow cylindrical housing M containing an electrical heating element M¹, and a similar smaller housing N is provided on the base of the evaporating chamber J for a second heating element N¹. This second element is controlled by a thermostat O interposed between the outlet J³ and the cooling chamber L and a similar thermostat P is provided in the outlet pipe H from the main container which controls the main heating element M¹ in accordance with the temperature of the oil passing to the evaporator.

The container is provided with a removable tray or frame R comprising an annular member, for example a stout wire ring, over which is strained and suitably secured a sheet of fabric such as linen or the like. This frame is adapted to rest upon the filter clamping ring G and is provided with two upwardly extending handles R¹ which may be integral with the circular frame. The fabric (not shown) may be stitched to the ring R or it may be detachably secured to the ring in any suitable manner which enables it to be readily replaced, for example, by the use of an inner clamping ring or strainer and the edge of the fabric preferably extends a short distance beyond the ring so that it forms a flexible seal between the circular frame R and the inner wall of the container A. The ring with its fabric forms a tray and this facilitates the removal of the dirt and adsorption material after the oil has passed through the filter, as it holds the dirt which the oil originally contained and the bulk of the clay or adsorption material.

The operation of the apparatus is as follows. The used oil is mixed with fuller's earth or finely divided clay in the proportion of approximately one pound of clay to a gallon of used oil. This mixture is then inserted in the container A after the tray R has been placed in position. The cover C is then applied to the container and a source of compressed air is in-

troduced through the valve D. Simultaneously the heating elements M and N are switched on so that under the combined influence of the air pressure, which may be approximately thirty pounds to the square inch, and the heat from the main heating element M, the viscosity of the oil is so lowered that it passes through the filter F.

A thin layer of clay is deposited on the asbestos or like pad F constituting the main filter, while the rest of the clay mixed with the dirt is deposited on the fabric forming the bottom of the removable tray. The filtered oil then passes through the labyrinth formed by the bars A⁴ to the outlet pipe H and thence into the evaporating chamber J. Here it is further heated by the element N so as to give up any water it may contain in the form of steam and any other fumes or vapours, and these vapours are carried away by means of the ejector K operated by the current of water passing through the jets K¹, K² across the end of the vapour-releasing pipe J². In this way negative pressure is created in the evaporating chamber J.

Meanwhile the oil in the lower portion of the evaporating chamber J is spread out in a relatively shallow layer which is maintained at the desired level by the upwardly projecting discharge pipe J³ and the temperature of the oil as it passes through the labyrinth is maintained at the required temperature by means of the thermostat O. Finally the coiled part J⁴ of the discharge pipe J³ is led through the cooling chamber L so that by the time the oil is actually delivered through the pipe Q it is at a temperature at which it is free from the offensive properties inseparable from hot oil, so that it can easily be handled without ill-effects to the operator. The water which flows through the cooling chamber L is also used to operate the jets K¹, K² of the ejector and it will thus be seen that the whole apparatus is of simple construction and without moving parts which are liable to wear.

The shallow cylindrical housing M in which the main heating element is mounted is secured to the base of the container by means of a single central fixing stud M² hence it is a simple matter to examine or replace the heating element and a similar stud N² secures the smaller housing N.

The apparatus is of light construction and can be moved without difficulty so that it is particularly suitable for use in dealing with relatively small quantities of oil, but obviously the constructional details are capable of variation without departing from the invention. Thus the means adopted to secure the cover may be so arranged that only one clamping device need be actuated, the particular type of thermostat employed can be changed and other heating means may be used if desired.

What I claim as my invention and desire to secure by Letters Patent is:

1. Apparatus for cleaning oil comprising a container adapted to receive a mixture of oil and an adsorption agent, a filter in the lower part of the container, means for heating the mixture in the container and for subjecting it to air pressure, a sinuous passage for the oil which has passed through the filter, a separate evaporating chamber into which the filtered oil is admitted after flowing through the sinuous passage, means for heating the oil in the evaporating chamber, an ejector having its suction

end connected to said evaporating chamber, an oil discharge conduit leading from said evaporating chamber, a chamber through which said oil discharge conduit passes, means for supplying water to said second chamber, means of communication between the said second chamber and said ejector for passage of water through the said second chamber in heat exchange relation with the oil discharge conduit, and then through the ejector to create suction in the said means of communication whereby a single water circuit will cool the evaporator oil and remove the fumes from the evaporating chamber.

2. Apparatus for cleaning oil comprising a container adapted to receive a mixture of oil and an adsorption agent, a filter in the lower part of the container, means for heating the mixture in the container and for subjecting it to air pressure, a sinuous passage formed in the container below the filter, a separate evaporating chamber into which the filtered oil is admitted after flowing through the sinuous passage, means for maintaining the oil at a predetermined level in the chamber, means for heating the oil in the chamber, an ejector having its suction end connected to said evaporating chamber, an oil discharge conduit leading from said evaporating chamber, a chamber through which said oil discharge conduit passes, means for supplying water to said second chamber, means of communication between the said second chamber and said ejector for passage of water through the said second chamber in heat

exchange relation with the oil discharge conduit, and then through the ejector to create suction in the said means of communication whereby a single water circuit will cool the evaporator oil and remove the fumes from the evaporating chamber.

3. Apparatus for cleaning oil as claimed in claim 1, in which the means for heating the oil in the container and in the separate evaporating chamber each comprise an electrical heating element.

4. Apparatus for cleaning oil as claimed in claim 2 in which the main container and evaporating chamber are provided with separate electrical heating means, each housed in a shallow cylindrical casing detachably connected to the base of the container and chamber respectively.

5. Apparatus for cleaning oil as claimed in claim 1, in which the filter comprises an annular seating in the base of the container, one or more layers of filtering material supported upon said annular seating, and a clamping ring by which said layers are maintained in position.

6. Apparatus for cleaning oil as claimed in claim 1, in which the filter is spaced above the bottom of the container leaving a space, transverse ribs in said space so that the oil is forced to follow a sinuous course in a relatively shallow layer before being admitted to the evaporating chamber.

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