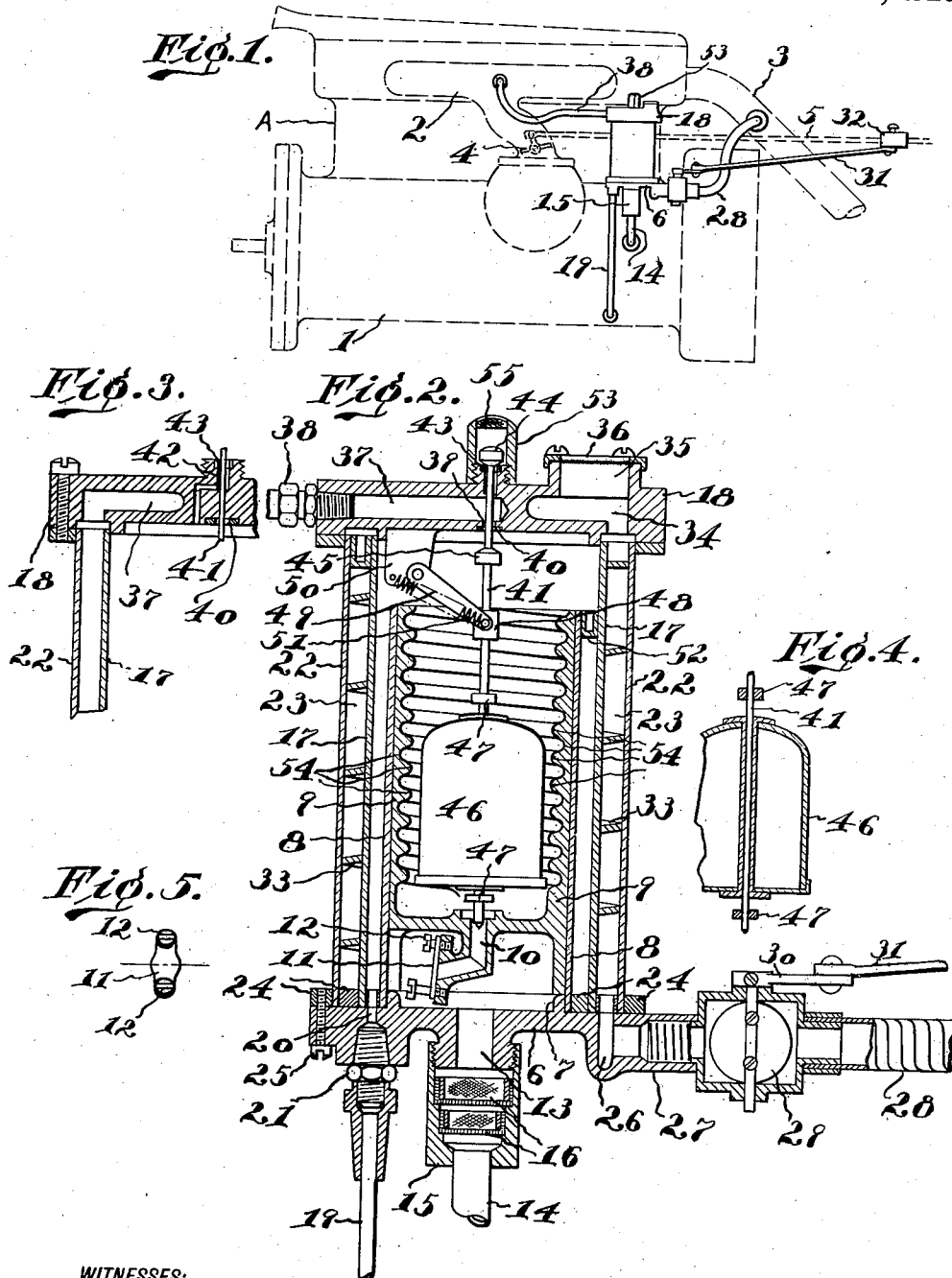


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OIL FILTERING ATTACHMENT FOR INTERNAL COMBUSTION ENGINES.
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To all whom it may concern:

Be it known that I, ROBERT F. BROWN, a citizen of the United States, residing at Detroit, in the county of Wayne, State of Michigan, have invented a new and useful Oil-Filtering Attachment for Internal-Combustion Engines; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

The present invention relates to an oil filtering attachment for internal combustion engines, and has for its object to provide a device of this character which embodies novel features of construction whereby the oil will be automatically withdrawn from the crank case when the engine is running and again returned to the crank case for further use after being filtered, thereby removing grit and impurities from the oil and greatly prolonging the life of the engine.

Further objects of the invention are to provide a device of this character which is entirely automatic in its operation, which has a compact arrangement of parts and can be applied without difficulty to any conventional type of internal combustion engine, which is not liable to break or get out of repair, and which will operate in an effective manner to remove all of the grit, water, gasolene, like distillates and other impurities from the oil.

With these and other objects in view, the invention consists in certain novel combinations and arrangements of the parts as will more fully appear as the description proceeds, the novel features thereof being pointed out in the appended claims.

For a full understanding of the invention, reference is to be had to the following description and accompanying drawings, in which:—

Figure 1 is a side elevation of an oil filtering attachment constructed in accordance with the invention, showing the same as applied to an internal combustion engine, the said engine being of the conventional construction and being merely indicated in a diagrammatic manner by dotted lines.

Fig. 2 is an enlarged vertical sectional view through the oil filtering device.

Fig. 3 is a transverse sectional view through one side of the upper head or top of the device, showing the arrangement of the by-pass therein.

Fig. 4 is a detail sectional view of the float, portions being broken away.

Fig. 5 is a detail view of the check valve which controls the return flow of the oil to the crank case of the engine.

Corresponding and like parts are referred to in the following description and indicated in all the views of the drawings by the same reference characters.

For the purpose of illustration the oil filtering attachment is shown by Fig. 1 as mounted upon a conventional type of internal combustion engine A which comprises a crank case 1, an intake manifold 2, an exhaust pipe 3, and a throttle valve 4 which is operated by a rod 5. This is all of the usual and well-known construction, and the engine is only illustrated in a diagrammatic manner, since the attachment can be applied to any conventional type of engine.

Specifically describing the present form or embodiment of the invention, the numeral 6 designates the base or lower head which is formed with an upstanding flange 7 engaging the lower end of an upright tubular shell 8. Fitting snugly within this shell is an overflow oil receptacle 9, the bottom of the receptacle being arranged at an elevation above the head 6 and being provided with a depending discharge neck 10 which is deflected laterally and is provided at the end thereof with an outwardly opening check valve 11. This check valve is in the form of a plate which is arranged at a slight inclination to the vertical and is provided at its upper and lower ends with eyes slidably engaging the smooth shanks of guide screws 12. Owing to the inclination of the valve plate and the end of the discharge neck 10, the valve will normally seat itself and close the opening of the neck by the action of gravity, and any suction from within the oil receptacle will serve to retain the valve securely in a closed position. However, when this suction is removed, any oil which may be within the receptacle 9 will open the check valve and be discharged through the neck 10. This oil will flow through a central opening 13 in the base or lower head 6 and be returned to the crank case 1 of the engine by an oil return pipe 14. This oil return pipe leads from the upper portion of the crank case 1, and is connected to the lower head 6 of the attachment by a coupling member 15 within which a plurality of filtering members such as the

5 screens 16 are arranged. These screens are removably fitted within the coupling member so that they can be taken out and cleaned at any time, and as the oil passes through the screens all grit and impurities will be filtered therefrom.

10 An upright casing 17 surrounds the tubular shell 8 and is held spaced therefrom by channel shaped spacing blocks 52 which are arranged at intervals around the periphery thereof, said casing extending upwardly above the tubular shell and having the upper end thereof closed by the upper head 18. An oil inlet pipe 19 leads from the lower 15 portion of the engine crank case 1 to an opening 20 which extends through the lower head 6 and communicates with the interior of the casing 17 at a point between the said casing and the tubular shell 8. A suitable coupling 21 is provided for connecting the 20 oil inlet pipe 19 to the opening 20. An outer concentric wall 22 surrounds the upright casing 17 in a spaced relation thereto and coöperates therewith to provide a heating 25 chamber 23 through which a portion of the exhaust gases from the engine are circulated. Spacing blocks 52 are shown as interposed between the upper end of the wall 22 and the casing 17. In the present 30 instance the lower ends of the casing 17 and outer wall 22 are shown as engaged by rings 24 which fit upon the lower head 6 and coöperate with the flange 7 to hold the various elements in a properly spaced relation. 35 Suitable fastening means such as the screw 25 may be provided for holding these rings in position.

40 An opening 26 is formed in the lower head 6 and establishes communication between the heating chamber 23 and a laterally extending neck 27 through which the exhaust gases enter the heating chamber. A pipe 28, which is preferably flexible, leads from the exhaust pipe 3 of the engine to the neck 27, and a valve 29 is interposed in 45 this pipe for the purpose of controlling the flow of the exhaust gases. This valve 29 is mounted to be moved in synchronism with the throttle valve 4 of the engine, so that 50 when the engine is idling or running slowly exhaust gas of approximately the same temperature will pass through to the heating chamber, as when the engine is running at high speeds. For this purpose the valve 29 55 is shown as provided with a crank arm 30 which is connected by a link 31 to a sleeve 32 on the operating rod 5 for the throttle valve. This is one construction by means of which this result can be obtained, 60 although it will be obvious that a thermostatic control for the valve 29 would accomplish the same result. A spiral baffle member 33 is arranged within the heating chamber 23 and surrounds the main casing 65 17 so that the exhaust gases entering the

heating chamber will be caused to circulate and travel around the heating chamber in a spiral path. The upper end of the heating chamber 23 communicates with an analogous chamber 34 in the upper head 18, 70 and the said upper head is formed with an outlet opening 35 across which a screen 36 or similar member may be stretched.

The upper head 18 is formed with a passage 37 extending inwardly from one side 75 thereof and having the outer end thereof connected by a pipe 38 to the intake manifold 2 of the engine. The inner end of the passage 37 communicates with the chamber within the casing 17 through a port 39 which 80 has the lower end thereof counter-bored to provide a valve seat 40. An upright valve stem 41 which is axially disposed within the casing 17 and oil receptacle 9 extends upwardly through the head 18 and passes 85 through the port 39. This stem also extends through the upper end of a by-pass 42 (see Fig. 3) which is formed in the head and leads from the top of the head through the bottom thereof. A valve seat 43 is provided at the upper end of the by-pass 42. 90 The stem 41 is provided with an upper valve 44 adapted to engage the upper valve seat 43 and close the by-pass 42 when the stem is moved downwardly, and also with a lower 95 valve 45 adapted to engage the valve seat 40 and close the port 39 when the valve stem is moved upwardly. With this construction it will be obvious that when the upper valve 44 is closed the lower valve 45 will be open 100 and the casing 17 will be in communication with the intake manifold 2 of the engine, with the result that a partial vacuum will be produced therein. On the contrary, 105 when the lower valve 45 is moved upwardly into a closed position the upper valve 44 will be opened and the casing 17 thereby placed in communication with the outer atmosphere through the by-pass 42, with the result that the partial vacuum previously existing with- 110 in the casing will be relieved.

The lower end of the valve stem 41 extends into the oil receptacle 9 and has a float 46 slidably mounted thereon. The vertical 115 movements of the float on the valve stem are limited by stops 47, so that the float has a limited movement independently of the valve stem, although after the float engages one of the stops a continued movement thereof will bring about a corresponding 120 movement of the valve stem. It is preferable to provide for a quick shifting of the position of the valves 44 and 45, and for this purpose a collar 48 on the valve stem is shown as loosely engaged by a snap lever 125 49. This lever is pivotally mounted upon a wing 50 which projects downwardly from the upper head 18, and a tension spring 51 connects the swinging end of the snap lever to the wing 50, said tension spring being 130

arranged in such a manner that as the valves are shifted back and forth it will swing on opposite sides of a dead center position with respect to the snap lever. In shifting the valves the valve stem 41 will thus be slowly moved by the action of the float 46 until the tension spring 51 has been moved just beyond a dead center position with respect to the snap lever 49. The action of the spring snap lever will then cause a quick movement of the valves and valve stem independently of the float.

The weight of the float 46 will normally tend to move the valve stem 41 downwardly until the upper valve 44 is closed and the lower valve 45 opened. If the engine is started the partial vacuum within the intake manifold 2 will then produce a corresponding partial vacuum within the casing 17, with the result that oil will be drawn into the casing through the pipe 19 from the bottom of the crank case of the engine. This oil will overflow into the oil receptacle 9, and the inner wall of the receptacle is preferably formed with a spiral rib 54 so that the oil overflowing into the receptacle will circulate around in the spiral channel provided by the rib, thereby reaching the bottom of the tank without being unnecessarily agitated, and allowing additional surface of the oil to be exposed to the hot air which will collect in the inner chamber and help to vaporize the water and lighter distillates mixed with the oil. The partial vacuum within the casing will hold the check valve 11 tightly seated, so that the oil will accumulate within the receptacle 9 and cause the float 46 to move upwardly. The float will rise independently of the valve stem 41 until it engages the upper stop 47. The valve stem 41 will then be moved upwardly with the float, and as soon as the tension spring 51 has been shifted to the other side of a dead center position the position of the valves 44 and 45 will be quickly reversed with a snap movement. The vacuum port 39 is then closed and the by-pass 42 opened with the result that the partial vacuum within the casing is relieved. The weight of the oil will then cause the check valve 11 to open and the oil will be discharged through the neck 10.

As the oil rises in the narrow annular space between the shell 8 and the casing 17 it is heated by the exhaust gases circulating through the space between the casing 17 and the outer wall 22 and caused to boil. Owing to the fact that a partial vacuum is maintained within the chamber the oil will boil at a comparatively low temperature and there will be no danger of the oil being heated beyond the flash point or to such an extent as to destroy or detract from the lubricating qualities thereof. This boiling of the oil will cause any water, gasoline, or like

distillates which may have been mixed with the oil to be vaporized, and the vapors will pass into the intake manifold of the engine and form a part of the explosive charges. As the oil overflows into the receptacle 9 and circulates downwardly in the spiral channel provided by the rib 54 thereof a large surface of the oil will be exposed so that any gasoline or water which may have been mixed with the oil will be thoroughly vaporized and removed, thereby purifying the oil and improving the lubricating qualities thereof. The heating of the chamber is automatically controlled, as previously explained, so that a substantially uniform temperature is maintained and there is no danger of the oil being overheated. Any water or like distillates will be effectively removed from the oil and burned up in the combustion chambers of the engine without injury thereto. This is all accomplished in a simple manner, and the oil purified as well as relieved of any grit or solid particles which may be carried in suspension.

This oil, after being purified and filtered by the filter elements or screens 16, will be returned to the crank case 1 of the engine through the pipe 14. As the oil is discharged from the receptacle 9, the float 46 will drop independently of the valve stem 41 until it is brought into engagement with the lower stop 47. A further movement of the float will then throw the valve stem 41 downwardly, and as soon as the tension spring 51 is shifted to a position beyond a dead center line with respect to the snap lever 49, the position of the valves 44 and 45 will be again reversed. This will result in closing the by-pass 42 and again opening the vacuum port 39. A partial vacuum will then be again produced in the casing and a further supply of oil drawn into the casing and permitted to overflow into the receptacle. A cage 53 is detachably applied to the upper head 18 and incloses the upper valve 44. This cage protects the valve against injury, and is provided with a screen 55 which excludes dust and dirt from the air entering the device through the by-pass 42. This cycle of operations is repeated continuously while the engine is in operation, and the heating of the device is controlled automatically to maintain a uniform temperature within the chamber at all engine speeds. All of the grit and solid particles will be effectively removed from the oil by the action of the filter elements or screens 16, and any gasoline, water or light distillates will be vaporized and separated from the oil. Greater efficiency will thus be obtained and the life of the engine prolonged.

Having thus described the invention, what I claim as new and desire to secure by Letters Patent, is:—

1. A lubricating oil filtering attachment

for internal combustion engines, including a casing inclosing a chamber, oil supply and return pipes leading from the casing to the crank case of the engine, means actuated by the operation of the engine for automatically producing a circulation of oil through the pipes and casing, means for heating the walls of the casing, and an overflow oil receptacle arranged within the casing with the sides thereof in a spaced relation to the heated side walls of the casing, the oil supply pipe leading to the said space so that the oil is brought into intimate contact with the heated side walls of the casing and brought substantially to the boiling point to remove water and like distillates therefrom before overflowing into the receptacle.

2. A lubricating oil filtering attachment for internal combustion engines, including a casing inclosing a chamber, oil supply and return pipes leading from the casing to the crank case of the engine, means actuated by the operation of the engine for automatically producing a circulation of oil through the pipes and casing, means for heating the walls of the casing, and an overflow oil receptacle arranged within the casing with the sides thereof in a spaced relation to the heated side walls of the casing, the oil supply pipe leading to the said space and the oil being brought into intimate contact with the heated walls of the casing and heated to substantially the boiling point before overflowing into the receptacle, the inner overflow walls of the receptacle being ribbed to provide a tortuous path for the oil as it flows down into the receptacle.

3. A lubricating oil filtering attachment for internal combustion engines, including a casing inclosing a chamber, oil supply and return pipes leading from the casing to the crank case of the engine, means actuated by the operation of the engine for automatically producing a circulation of oil through the pipes and casing and including a pipe leading from the casing to the intake manifold of the engine, means for heating the walls of the casing by the exhaust from the engine, and means for bringing a comparatively thin strata of the oil into intimate contact with the heated walls of the casing as the oil is circulated through the casing, the oil being thereby heated to substantially the boiling point so that water and like distillates will be removed therefrom, the vapors of the water and like distillates reaching the intake manifold through the before-mentioned pipe.

4. An oil filtering attachment for internal combustion engines, including a casing inclosing a chamber, oil supply and return pipes leading from the casing to the crank case of the engine, filtering means interposed in the path of the oil, valve controlled means for alternately placing the

chamber in communication with the intake manifold and the atmosphere, a valve stem controlling the said valve means, a float arranged within the chamber and mounted upon the valve stem to have a limited amount of play thereon, the movements of the valve stem serving to reverse the valves and alternately produce and relieve a partial vacuum in the chamber, and a check valve controlling the discharge of oil from the chamber, said check valve being mounted to remain seated when there is a partial vacuum within the chamber and to open under the pressure of the oil at other times.

5. An oil filtering attachment for internal combustion engines, including a casing inclosing a chamber, oil supply and return pipes leading from the casing to the crank case of the engine, filtering means interposed in the path of the oil, a pipe leading from the intake manifold of the engine to the chamber, valves for alternately placing the chamber in communication with the intake manifold and the atmosphere, a stem carrying the said valves, a float arranged within the chamber and mounted upon the stem to have a limited sliding movement thereon, snap means for obtaining a quick movement of the stem after an initial movement thereof by the float to shift the position of the valves, and a check valve controlling the discharge of oil from the chamber, said check valve being mounted to remain closed while there is a partial vacuum within the chamber and to open under the pressure of the oil at other times.

6. An oil filtering attachment for internal combustion engines, including a casing inclosing a chamber, oil supply and return pipes leading from the casing to the crank case of the engine, filtering means interposed in the path of the oil, a pipe leading from the intake manifold of the engine to the chamber, valves for alternately placing the chamber in communication with the intake manifold and the atmosphere, a stem carrying the said valves, a float slidable upon the stem and arranged within the chamber, stops upon the stem for limiting the sliding movement of the float thereof, a spring actuated snap lever connected to the stem for quickly shifting the position of the valves after the stem has been initially moved by the float, said valves operating to alternately produce and relieve a partial vacuum within the chamber, and a check valve controlling the discharge of oil from the chamber and mounted to be held steady while there is a partial vacuum in the chamber and to open under the pressure of the oil at other times.

7. An oil filtering attachment for internal combustion engines, including a casing inclosing a chamber, oil supply and return pipes leading from the casing to the crank

case of the engine, filtering means interposed in the path of the oil, an overflow oil receptacle arranged within the chamber and provided with a discharge opening, valve controlled means for alternately placing the chamber in communication with the intake manifold of the engine and the atmosphere, means controlled by the level of the oil within the oil receptacle to shift the position of the valves and alternately produce and relieve a partial vacuum within the chamber, and a check valve controlling the discharge opening of the overflow oil receptacle, said check valve being mounted to remain seated while there is a partial vacuum within the chamber and to open under the pressure of the oil therein at other times.

8. An oil filtering attachment for internal combustion engines, including a casing inclosing a chamber, oil supply and return pipes leading from the casing to the crank case of the engine, filtering means interposed in the path of the oil, an overflow oil receptacle arranged within the chamber and provided at the bottom thereof with a discharge neck, valves for alternately placing the chamber in communication with the intake manifold of the engine and the atmosphere, a float arranged within the oil receptacle, means actuated by the float for automatically reversing the position of the valves to alternately produce and relieve a partial vacuum in the chamber, and a check valve controlling the discharge neck of the receptacle and mounted to remain seated while there is a partial vacuum within the chamber and to open under the pressure of the oil at other times.

9. An oil filtering attachment for internal combustion engines, including a casing inclosing a chamber, oil supply and return pipes leading from the casing to the crank case of the engine, filtering means interposed in the path of the oil, an overflow oil receptacle arranged within the chamber and having the interior walls thereof constructed to provide a tortuous path for the oil as it overflows into the receptacle, valves for alternately placing the chamber in communication with the intake manifold of the engine and the atmosphere, means controlled by the level of the oil within the casing for automatically reversing the position of the valves and alternately producing and relieving a partial vacuum within the chamber, and a check valve controlling the discharge from the receptacle and arranged to remain closed while there is a partial vacuum within the receptacle and to open under the pressure of the oil at other times.

10. An oil filtering attachment for internal combustion engines, including a casing inclosing a chamber, oil supply and return pipes leading from the casing to the crank

case of the engine, filtering means interposed in the path of the oil, means actuated by the operation of the engine for automatically producing a circulation of oil through the pipes and casing, heating means for the casing, and means for automatically controlling the heating means according to the speed of the engine.

11. An oil filtering attachment for internal combustion engines, including a casing inclosing a chamber, oil supply and return pipes leading from the casing to the crank case of the engine, filtering means interposed in the path of the oil, means operated automatically by the engine for causing a circulation of oil through the pipes and chamber, heating means for the chamber including a passage through which exhaust gases from the engine are circulated, and means for automatically controlling the circulation of the exhaust gases according to the speed of the engine.

12. An oil filtering attachment for internal combustion engines, including a casing inclosing a chamber, oil supply and return pipes leading from the casing to the crank case of the engine, filtering means interposed in the path of the oil, means actuated by the engine for automatically producing a circulation of oil through the pipes and chamber, heating means for the chamber including a passage through which exhaust gases from the engine are permitted to circulate, a valve for controlling the circulation of exhaust gases through the passage, and means for causing the valve to be moved simultaneously with the throttle valve of the engine so that the heating of the chamber will be governed by the speed of the engine.

13. An oil filtering attachment for internal combustion engines, including a casing inclosing a chamber, oil supply and return pipes leading from the casing to the crank case of the engine, filtering means interposed in the path of the oil, means controlled by the level of oil within the chamber for alternately producing and relieving a partial vacuum within the chamber and intermittently circulating the oil through the pipes and chamber while the engine is in operation.

14. An oil filtering attachment for internal combustion engines, including a casing inclosing a chamber, oil supply and return pipes leading from the casing to the crank case of the engine, heating means for the casing, an overflow oil receptacle arranged within the casing in a spaced relation thereto, and means actuated by the operation of the engine for automatically producing a circulation of oil through the pipes, casing and oil receptacle, the oil being caused to boil as it rises in the chamber between the casing and the receptacle preparatory to

overflowing into the receptacle, and any water or like distillates being thereby vaporized and removed from the oil.

15. An oil filtering attachment for internal combustion engines, including a casing inclosing a chamber, oil supply and return pipes leading from the casing to the crank case of the engine, means for heating the chamber, an overflow oil receptacle arranged
10 within the chamber and having the inner walls thereof constructed to provide a tortuous path for the oil, and means actuated

by the operation of the engine for automatically producing a circulation of oil through the pipes, casing, and overflow receptacle, 15 the oil being heated to the boiling point as it rises in the chamber preparatory to overflowing into the receptacle, and any water or like distillates being thereby vaporized and removed therefrom. 20

In testimony whereof I have signed my name to this specification.

ROBERT F. BROWN.