Feb. 18, 1930. F. B. MASON 1,747,554

OIL RECTIFIER

Filed Oct. 19, 1928 2 Sheets-Sheet 1

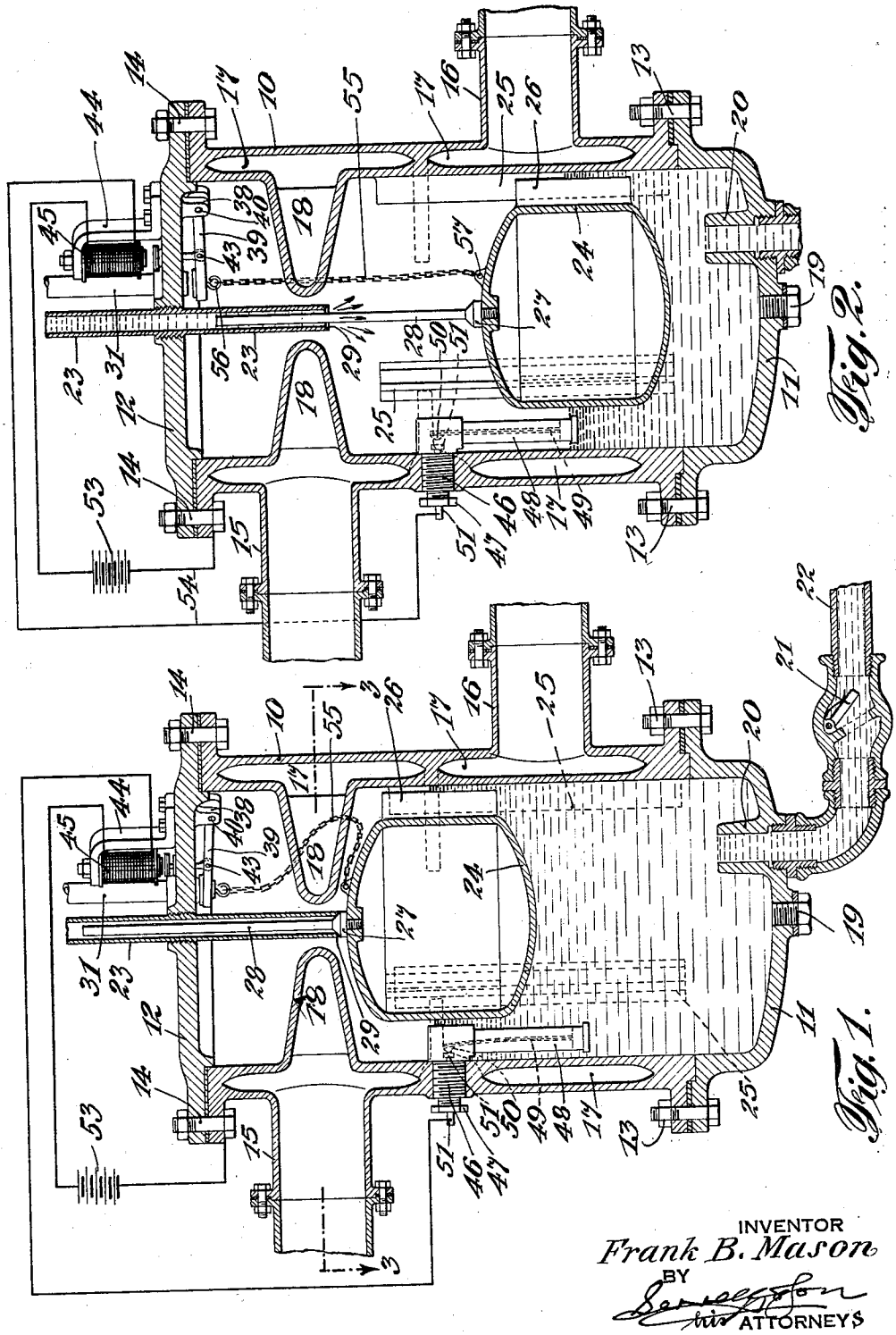

Fig. 2.

Fig. 1.

INVENTOR
Frank B. Mason
BY
Lawrence Brothers
ATTORNEYS

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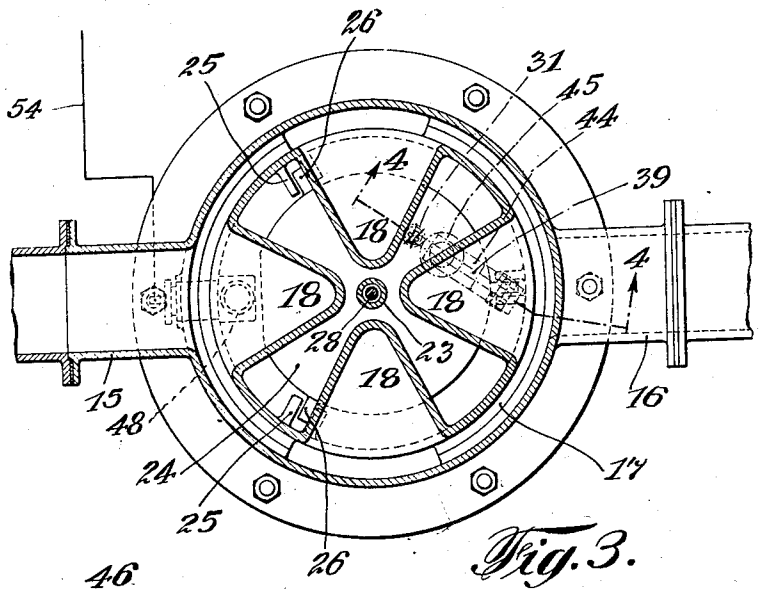

Fig. 3.

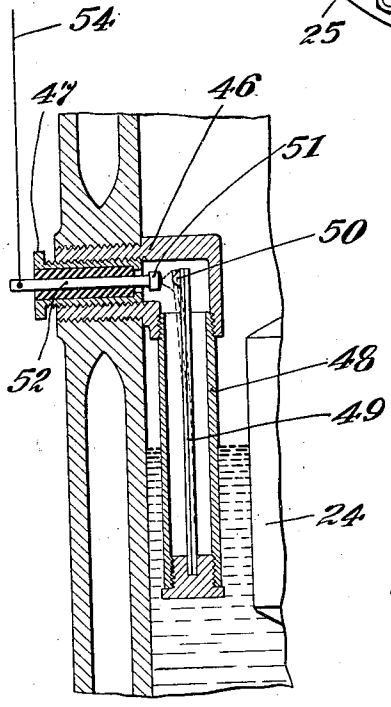

Fig. 5.

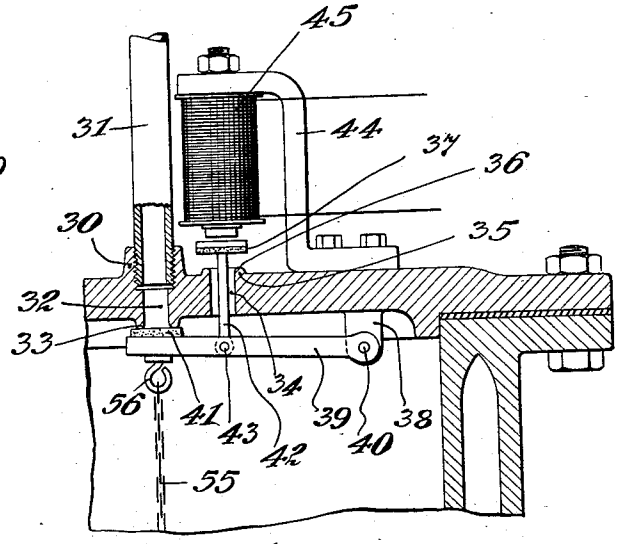

Fig. 4.

INVENTOR
Frank B. Mason
BY
his ATTORNEYS

Patented Feb. 18, 1930 1,747,554

UNITED STATES PATENT OFFICE

FRANK B. MASON, OF NEW PROVIDENCE, NEW JERSEY, ASSIGNOR OF ONE-FOURTH TO FRANK A. URNER, OF SCOTCH PLAINS, NEW JERSEY, ONE-FOURTH TO ELMER A. FORD, OF WESTFIELD, NEW JERSEY, AND ONE-FOURTH TO ARTHUR H. SERRELL, OF NEW YORK, N. Y.

OIL RECTIFIER

Application filed October 19, 1928. Serial No, 313,485.

This invention relates to an apparatus for rectifying oil and is particularly adapted for use on gas engines as commonly employed in motor vehicles for separating the gasoline or other substances volatile at relatively low atmospheres from the lubricating oil as contained in the crank case. I am aware that heretofore numerous devices have been proposed for similar purposes. So far, however, as these have come to my attention, they have been designed to operate continuously. In all instances so far as I am aware the heat of the exhaust gases from the engine have been utilized to raise the temperature of the mixed oil and gasoline sufficiently to effect the volatilization of the gasoline, and hence the separation of the same from the oil. However, by means of a pump or similar device the mixture of the oil and gasoline has been caused to flow continuously from the rectifier, that is, the construction heretofore has been such that when the motor is in operation the flow of the mixture of oil and gasoline through the rectifier has been continuous. Devices of this type operate more or less satisfactorily after the motor has been running sufficiently long to have become heated. It is equally obvious that there will be no separation of the gasoline from the oil until the motor has become heated. It is generally recognized that when the motor is relatively cold there is the greater dilution of the oil and consequently at the time when the rectification of the oil is most needed there is substantially no rectification at all.

In carrying out my invention the heat of the exhaust gases effects the volatilization of the gasoline, and hence the separation of the same from the oil. In this respect, therefore, the apparatus made in accordance with my invention is similar to the type of device or apparatus heretofore devised. In carrying out the invention, however, the rectifier is so constructed and caused to operate that intermittently, and dependent upon the temperature, charges of mixed oil and fuel are delivered to the rectifier and are retained therein until a temperature sufficiently high is reached to effect the volatilization of the gasoline when automatically and by a temperature control the rectified oil is permitted to return to the crank case and a fresh charge of oil diluted with gasoline is admitted to the rectifier and the operation repeated to remove the gasoline from the second charge of mixture. It will therefore be seen that the apparatus operates to rectify the oil and at no time can the rectifier function other than as such.

The rectifier made in accordance with this invention will be hereinafter more particularly described in conjunction with the accompanying drawings in which Figure 1 is a central longitudinal section of the apparatus,

Fig. 2 is a similar view showing the parts in another position,

Fig. 3 is a section on line 3—3, Fig. 1,

Fig. 4 is a sectional elevation on an enlarged scale taken on line 4—4, Fig. 3 and showing the valve construction, and

Fig. 5 is an enlarged longitudinal section showing the thermostatic device.

In carrying out the invention I employ a suitable receptacle. As illustrated this receptacle comprises a body member 10 which conveniently may be cylindrical and is fitted with a base or bottom 11 and a cap or cover 12. The lower end of the body member is flanged as is also the base, and these parts are connected by bolts 13 or otherwise, there being a suitable gasket placed between the flanges to make a tight joint. In like manner the upper end of the body member is flanged, as is also the cover 12 and these parts are connected by bolts 14 and a suitable intervening gasket to make a tight joint, or otherwise. The body member at the upper portion thereof is provided with an inlet connection 15 for the exhaust gases from the motor and the lower portion of the body member with an outlet connection 16 for these gases. The body member is provided with a passage 17 through which these gases flow. Interiorly the body member is also provided with a series of projections indicated at 18 which form part of the passage for the gases and extend in spaced positions toward the center of the receptacle.

The base 11 is fitted with a plug 19 by which the receptacle may be drained when neces-

sary. The base 11 is also fitted with a boss 20 extending into the same. Extending from the boss 20 there is an elbow and connected to the elbow there is a check valve 21 leading from which is a pipe 22 that is the return pipe to the crank case of the motor or other receptacle for reconveying the lubricant thereto.

Passing through the cap or cover 12 is an inlet pipe 23. This pipe leads from the crank case and as illustrated extends centrally through the cover. Within the receptacle I employ a suitable float 24. The float is adapted to rise and fall with the fluid as the same is admitted to and permitted to flow from the receptacle. The interior of the receptacle is preferably provided with suitable guides 25, and there are corresponding guides 26 in the float for directing the upward and downward movement of the float.

The upper end of the float is fitted with a valve 27 and extending from which is a stem or rod 28 which passes into and moves within the inlet pipe 23. At the inner end of the inlet pipe there is a valve seat 29 against which when the float is raised the valve 27 is brought to bear to shut off the flow of the incoming liquid to the rectifier receptacle.

On the cover 12 there is a nipple 30 adapted to receive one end of a pipe connection 31 which communicates with the motor in such a manner that the suction strokes of the motor pistons may produce a vacuum within the rectifying chamber. Passing through the nipple 30 and the cover 12 there is a port or passage 32 provided at its inner end with a valve seat 33. In the wall of the cover 12 there is also a port or passage 34 centrally disposed relatively to an outer boss 35 in which there is a valve seat 36 against which a valve 37 is adapted to bear. Interiorly the cover 12 is fitted with a lug 38 in which a lever 39 is pivotally mounted at one end, as indicated at 40. The opposite or free end of this lever 39 carries a valve 41 adapted to bear against the valve seat 33. A link 42 is pivotally connected, as indicated at 43, to the lever 39 and passes through the port 34 and is connected to the valve 37. Suitably mounted on the cover 12 there is a bracket 44 adapted to support an electro-magnet 45. The electro-magnet 45 is adapted to attract the valve 37 in order to lift the same and to thereby open the port 34. The construction of these parts is such that when the valve 37 is raised to its open position the lever 39 is actuated to bring the valve 41 against its seat 33 to thereby close the port or passage 32. Furthermore, the passage 34 operates merely as a vent port, as will be hereinafter more particularly described.

In a suitable position in the wall of the rectifier I employ a sleeve 46 adapted to receive a nut 47 which is adjustable therein. Suitably connected to and carried by the sleeve 46 there is a casing 48 in which is mounted in any suitable manner a thermostatic bar 49. This thermostatic bar is preferably so constructed that it is normally straight but when heated assumes a curve due, as will be understood, to the different ratios of expansion of the metals of which it is formed. At its free end this thermostatic bar is provided with a breaker point 50 cooperating with a breaker point 51 carried by a terminal 52 which is fixed in the adjustable nut 47, the nut being adjustable, as will be apparent, in order to regulate the distance between the breaker points 50 and 51. The electro-magnet 45 and the breaker points 50 and 51, together with the terminal 52 are in a suitable electric circuit, including a battery 53 and the necessary lines 54, these parts being grounded in the frame of the rectifier in a manner which is usual in completing electric circuits.

The float 24 and the lever arm 39 are connected in any suitable manner to cause the float when lowered to swing the lever arm 39 sufficiently far to move the valve 41 from its seat 33 and to cause the valve 37 to bear against its seat 36. As illustrated this may be accomplished by means of a chain 55 which at its upper end is connected to an eye 56 secured in the outer end of the lever arm 39 while at its lower end the chain 55 is connected to an eye 57 suitably attached to the float 24.

In describing the operation of this apparatus it may be assumed that the float 24 is at the lower end of its travel and that the rectified oil has been permitted to return to the crank case. When this condition maintains the valve 41 is open and the valve 37 is closed, the breaker points 50 and 51 are separated and consequently the circuit to the electro-magnet broken and the magnet itself deenergized.

With the valve 41 open there is created a vacuum, or partial vacuum, within the rectifier which, as will be understood, causes the mixture of oil and gas from the crank case to flow by way of the pipe 23 to the interior of the rectifier. As the chamber within the rectifier is being filled with the mixture of oil and fuel the float rises until the valve 27 carried by the float bears against its seat 29 to shut off this flow of the oil and fuel. In the meantime, as will be understood, the mixture of oil and fuel which has entered the rectifier is heated by the exhaust gases passing through the chamber in the walls of the rectifier provided therein for this purpose. This heat effect continues until the mixture has been heated sufficiently to cause the volatilization of the fuel. The thermostatic bar is so constructed and the breaker points so adjusted that when a predetermined temperature of the oil has been reached the thermostatic bar is bent or curved sufficiently to

cause the breaker point 50 to contact with the breaker point 51, thereby closing the circuit to the electro-magnet, energizing the same and attracting its valve armature 37, thereby opening the vent port and closing the valve 41 to the vacuum line.

In so heating the mixture of fuel and oil the fuel and other volatile matters of the oil have been volatilized and pass from the rectifier to the intake of the motor, or otherwise. The valve to the vacuum line then being closed and the vent valve open the pressure within and without the rectifier is equalized and the rectified oil is permitted to return by gravity through the pipe connection 22 to the crank case. Of course, as the oil leaves the rectifier the float descends, thereby moving the valve 27 from its seat 29 and reopening the pipe connection 23. After the float has reached a predetermined position the chain 55, or an equivalent device, is made operative thereby to actuate the lever arm 39 to again shift the valve 41 to its open position, thereby opening the vacuum line through the pipe 31 and returning the valve 37 to its seat and closing the vent port. It is to be noted that the valves 37 and 41 are both adapted to close in the direction of the flow of the fluid through the ports which they control so that both valves will remain seated until positively actuated by the devices described or in any other suitable manner. As the atmospheric air enters the upper portion of the rectifier when the air vent is open it lowers the temperature, causing the thermostatic bar 49 to resume its normal straight line position, thereby opening the circuit at the breaker points 50 and 51 and releasing the vent valve 37, whereupon the lever arm 39 is operated to close the vent valve and open the valve to the vacuum line, as hereinbefore stated. It will be understood that if necessary the incoming atmospheric air may be directed to the thermostatic device and that the parts may be so arranged that the weight of the float is insufficient to operate the lever arm until the circuit has been broken, as aforesaid, or in addition to opening the circuit at the breaker points additional means for this purpose may be employed not only to relieve the float of undue service in actuating the lever arm but also to permit the relatively cool incoming mixture of fuel and oil to assist in reducing the temperature in the upper portion of the rectifier to thereby insure the thermostatic device returning more quickly to its initial position. The parts of the apparatus, of course, are then ready to repeat the cycle of operations as hereinbefore described. For example, the circuit to the electro-magnet may be broken at a predetermined point in the descent of the float in addition to being opened at the breaker points, whereby, it will be understood, it would not be necessary for the electro-magnet to be released before the float would operate the lever arm for shifting the valves without moving the valve 37 against the attraction of the electro-magnet.

The apparatus as hereinbefore described is particularly adapted for use in connection with gas engines commonly employed in motor vehicles to separate the relatively volatile gasoline from the less volatile lubricating oil, although, as will be understood, the apparatus is not limited in use to this purpose inasmuch as it may be employed to separate the more volatile constituents from any liquid, as may be desired.

From the foregoing description it will be understood that the apparatus made in accordance with this invention is one that operates intermittently and only at such times as the temperature is sufficiently high to vaporize the gasoline or other constituents which vaporize at relatively low temperatures and it follows, therefore, that the apparatus is one in the use of which the intended purposes will be accomplished at all times. It is furthermore to be understood that the invention is not limited to the precise construction as illustrated and described inasmuch as various changes may be made to accomplish the same results by equivalent means without departing from the nature and spirit of the invention.

I claim as my invention:

1. In an oil rectifier, a receptacle, an oil mixture line leading into the receptacle, an oil return line leading from the receptacle, a vacuum line leading into the receptacle, a float within the receptacle, means operated thermostatically for closing the valve in the vacuum line, and means operated by the float for opening the valve in the vacuum line.

2. In an oil rectifier, a receptacle, an oil mixture line leading into the receptacle, an oil return line leading from the receptacle, a vacuum line leading into the receptacle, a float within the receptacle, a valve in the vacuum line, the receptacle being provided with a vent, a vent valve, means operated thermostatically for opening the vent valve and closing the vacuum line valve, and means operated by the float for opening the vacuum line valve and closing the vent valve.

3. In an oil rectifier, a receptacle having a passage for hot gases around the same, an oil mixture line leading into the receptacle, an oil line leading from the receptacle, a vacuum line leading into the receptacle, a float within the receptacle, means carried by the float for closing the oil mixture line, means operated thermostatically for closing the vacuum line, and means operated by the float for opening the vacuum line whereby an oil mixture may be admitted to the receptacle to a predetermined level and maintained therein until heated sufficiently to vaporize the volatile constituents in the oil mixture, the oil being then drained therefrom, the vacuum line reopened and the receptacle refilled.

4. In an oil rectifier, a receptacle having a surrounding passage for hot gases, an oil mixture line leading into the receptacle, an oil line leading from the receptacle, a vacuum line also leading into the receptacle, a float within the receptacle, means carried by the float for opening and closing the oil mixture line, means operated thermostatically for closing the vacuum line, and means operated by the float for opening the vacuum line.

5. In an oil rectifier, a receptacle having a passage for hot gases around the same, an oil mixture line leading into the receptacle, an oil line leading from the receptacle, a vacuum line leading into the receptacle, a vent leading into the receptacle, a float within the receptacle, means carried by the float for opening and closing the oil mixture line, means operated thermostatically for closing the vacuum line and opening the vent, and means operated by the float for opening the vacuum line.

6. In an oil rectifier, a receptacle having a passage for hot gases in the walls thereof, an oil mixture line leading to the receptacle, on oil line leading from the receptacle, a vacuum line leading into the receptacle, a float within the receptacle, a stem carried by the float and operating in the oil mixture inlet line, a valve on the said stem adapted to seat against the inner end of the oil mixture line to open and close the same, means operated thermostatically for closing the vacuum line, and means operated by the float for opening the vacuum line.

7. In an oil rectifier, a receptacle, an oil inlet line leading into the receptacle, an oil return line leading from the receptacle, a vacuum line leading into the receptacle, the receptacle being also provided with a vent, a float within the receptacle, a valve in the vacuum line, a valve for the said vent, means operated thermostatically for opening the vent valve and closing the vacuum line valve, and means operated by the float for opening the vacuum line valve.

8. In an oil rectifier, a receptacle, an oil inlet line leading into the receptacle, an oil return line leading from the receptacle, a vacuum line leading into the receptacle, the receptacle also being provided with a vent, a float within the receptacle, means carried by the float for opening and closing the oil inlet line, a valve in the vacuum line, a valve for the vent, and means operated thermostatically for simultaneously opening the vent valve and closing the valve in the vacuum line, and means operated by the float for opening the valve in the vacuum line.

9. In an oil rectifier, a receptacle, an oil inlet line leading into the receptacle, an oil return line leading from the receptacle, a vacuum line leading into the receptacle, the receptacle being also provided with a vent, a float within the receptacle, a valve for the vacuum line within the receptacle, a valve for the vent exterior of the receptacle, means operated thermostatically for simultaneously opening the vent valve and closing the vacuum line valve, and means operated by the float for simultaneously opening the vacuum valve and closing the vent valve.

10. In an oil rectifier, a receptacle having a passage in the walls thereof for heated gases, an oil line leading into the receptacle, an oil return line leading from the receptacle, a float within the receptacle, means carried by the float for opening and closing the oil line leading into the receptacle, a vacuum line leading into the receptacle, the receptacle also being provided with a vent, a valve in the vacuum line, a vent valve, means for connecting the said valves, an electro-magnet for actuating the vent valve, means operated thermostatically for closing a circuit to the said electromagnet to simultaneously actuate the said valves to open the vent valve and close the valve in the vacuum line, and means operated by the float for simultaneously actuating the said valves to open the valve in the vacuum line and close the vent valve

11. In an oil rectifier, a receptacle comprising a body in the walls of which there is a passage for hot gases, and means forming part of the upper portions of the walls of the passage for providing a greater heating surface than in the lower portions thereof.

12. In an oil rectifier, a receptacle comprising a body having a wall in which there is a passage for hot gases, an inlet connection for the gases at the upper end of the receptacle, an outlet connection for the gases at the lower end of the receptacle, and a plurality of projections forming part of the walls forming the upper portions of the said passage for providing a greater heating surface at the upper portions of the passage which lie above the normal oil level than those portions of the wall of the passage in the lower portions thereof which completely surround the oil at a predetermined level in the receptacle.

Signed by me this 16th day of October, 1928.

FRANK B. MASON.