F. PURDY.

APPARATUS FOR MIXING AND CONTAINING LIQUIDS.

APPLICATION FILED NOV. 22, 1909.

963,322. Patented July 5, 1910.

Fig. 1.

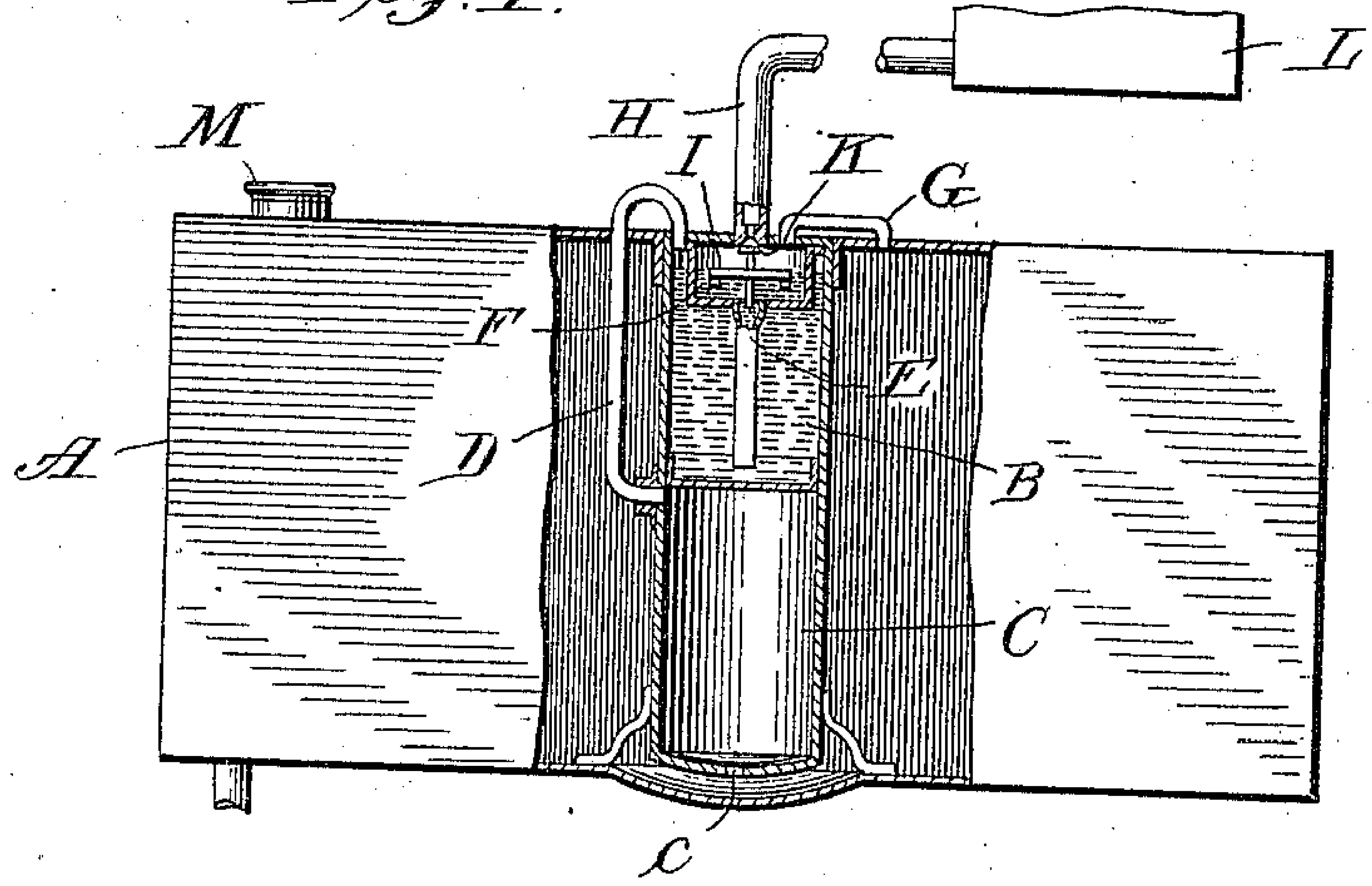


Fig. 2.

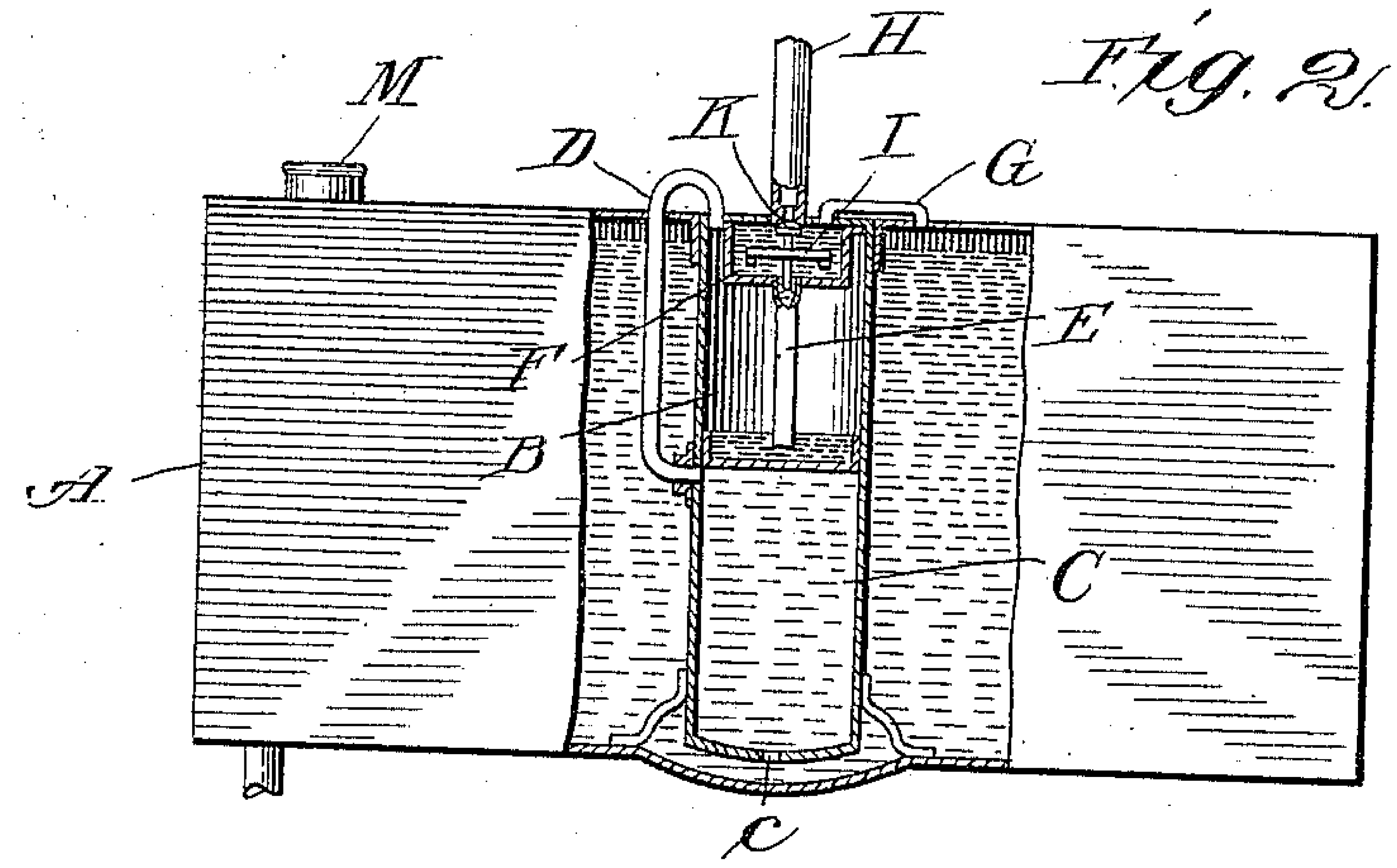
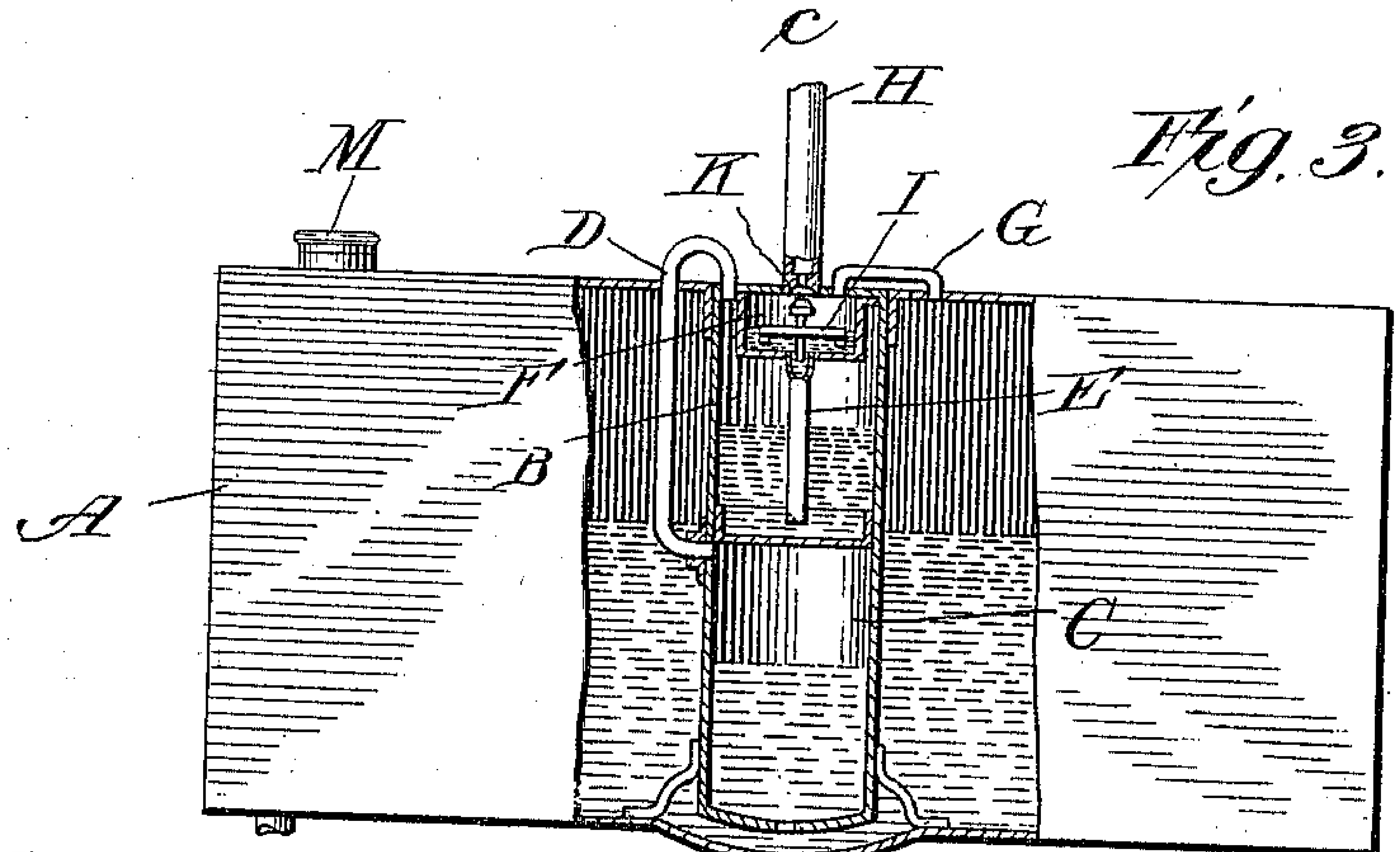


Fig. 3.



Witnesses:
Harry S. Gaither
[illegible]

Inventor:
Frederick Purdy
by Chamberlin and Freudenreich
Att'y

UNITED STATES PATENT OFFICE.

FREDERICK PURDY, OF KENOSHA, WISCONSIN, ASSIGNOR TO THOMAS B. JEFFERY, OF KENOSHA, WISCONSIN; KATE E. JEFFERY, CHARLES T. JEFFERY, AND HAROLD W. JEFFERY EXECUTORS OF SAID THOMAS B. JEFFERY, DECEASED.

APPARATUS FOR MIXING AND CONTAINING LIQUIDS.

963,322. Specification of Letters Patent. Patented July 5, 1910.

Application filed November 22, 1909. Serial No. 529,258.

To all whom it may concern:

Be it known that I, Frederick Purdy, a citizen of the United States, residing at Kenosha, county of Kenosha, State of Wisconsin, have invented a certain new and useful Improvement in Apparatus for Mixing and Containing Liquids, and declare the following to be a full, clear, and exact description of the same, such as will enable others skilled in the art to which it pertains to make and use the same, reference being had to the accompanying drawings, which form a part of this specification.

One of the most convenient and effective methods of lubricating internal combustion engines is to supply the lubricant mixed with the fuel, the lubricant being separated in the combustion chamber by fractional distillation and being spread upon the cylinder walls. It is, of course, desirable that the lubricant be supplied in proper quantities so that it will efficiently lubricate the working parts without, however, being supplied in unnecessarily large amounts. The mixture may, of course, be made by measuring out the proper quantities of each constituent and adding them together, but this requires care on the part of the user and may often result in a deficiency or an excess of the lubricant.

The object of my invention is to provide a simple and novel means whereby the proper proportion between the lubricant and the fuel may be effected automatically and without requiring especial attention on the part of the user.

The various features of novelty whereby my invention is characterized will hereinafter be pointed out with particularity in the claims; but, for a full understanding of my invention and of its objects and advantages, reference may be had to the following detailed description taken in connection with the accompanying drawing, wherein:

Figure 1 is a view partly in side elevation and partly in section of one form of apparatus for carrying out my invention, the condition being that wherein the lubricant has been supplied and before the introduction of the fuel; Fig. 2 is a view similar to Fig. 1, showing the condition after the fuel has been supplied; and Fig. 3 is a view similar to Figs. 1 and 2, showing the condition after a portion of the fuel has been withdrawn.

In accordance with my invention I have provided a reservoir for receiving liquid fuel, such as gasolene, and a reservoir for receiving lubricating oil, together with means associated with these reservoirs whereby the oil is automatically caused to flow into the fuel reservoir as the fuel is poured into the latter; the parts being so proportioned and arranged that the flow of oil progresses as the filling of the fuel reservoir continues and ceases with the interruption of the flow of the fuel.

Various constructions and arrangements of the parts may be employed to produce the transfer of the lubricant at the desired rate, but I prefer to make use of some medium which shall be acted upon by the gasolene and which in turn acts upon the oil so that the introduction of any amount of gasolene causes this medium to displace and force into the gasolene a quantity of oil which bears a predetermined relation to the quantity of gasolene. This may conveniently be accomplished by providing a closed chamber which communicates at its lower end with the bottom of the gasolene reservoir so that gasolene can flow into this chamber only from the bottom, there being between this chamber and the oil reservoir a suitable pressure-transmitting agent which, as the gasolene in the main reservoir rises, is acted upon by the rising gasolene in the closed chamber and displaces more and more of the oil in the oil reservoir as the gasolene reservoir becomes filled, until, when the gasolene reservoir is full, the desired quantity of oil has been discharged into the gasolene. It will, of course, be understood that various pressure-transmitting agencies may be utilized. One of the simplest of these agencies and one which reduces the apparatus to a simple form is air which may be confined in the closed chamber and forced out of the top thereof as the gasolene rises therein, this air acting upon the upper surface of the oil and in turn displacing the oil. I have illustrated an apparatus wherein the pressure-transmitting agent is confined air and shall limit the detailed description to this particular form of my invention, it being understood, however, that I desire to cover broadly any pressure-transmitting device which will answer this purpose.

Referring to the drawing, A represents a main reservoir for containing gasolene.

B is an auxiliary reservoir for oil.

C is a closed chamber which opens into the main reservoir adjacent to the bottom thereof through an opening *c*. The oil reservoir is entirely closed and communicates with the chamber C through a conduit D which extends from the top of the oil reservoir to the top of the chamber. There is also an overflow or discharge conduit leading from the interior of the oil reservoir to a point adjacent to the top thereof and thence into the gasolene reservoir. In the drawing I have illustrated this conduit as made of several parts, one of them being a tube E which is in open communication at its lower end with the interior of the oil reservoir at a considerable distance below the top of this reservoir. At its upper end the tube E opens into a float chamber F, and from the top of the float chamber there is a pipe G which leads into the top of the gasolene reservoir. In the arrangement shown, the oil reservoir is located directly above the closed chamber, but this is not essential because these two members may be located in any desired relation to each other, so long as the upper ends are connected together by means of a conduit. Furthermore, the size and shape of the auxiliary reservoir may be varied as desired and the pipe E may be located anywhere, so long as it communicates with the interior of the oil reservoir at a predetermined point below the top. Leading into the float chamber is an oil supply pipe H.

I is a float arranged within the float chamber and provided with a valve K which is adapted in one position of the float to close the lower end of the supply pipe and prevent the flow of oil into the reservoir. This float is so constructed that it does not interfere with the free passage of the oil into and out of the pipe E in any position of the float.

Assuming that the reservoirs are both empty and that the supply pipe is connected with a source of supply of oil such as a tank L, oil will flow from the pipe into the float chamber and thence through the pipe E into the oil reservoir. As the oil flows into the reservoir, the air therein will be forced out through the conduit D and through the chamber C. The oil will continue to flow until the oil reservoir is full and until the oil has reached a level in the float chamber which will cause the valve to be closed and the supply to be stopped. This is the condition indicated in Fig. 1. Assuming now that, while the parts are in this condition, gasolene is poured into the main reservoir through the inlet M: as soon as there is an appreciable quantity of gasolene present it will begin to flow into the closed chamber through the opening *c*. As the level of the gasolene rises in the main reservoir, that in the closed chamber also rises, the air in the chamber being forced upwardly through the conduit and into the upper end of the oil reservoir. Since the air cannot escape, but remains confined within the chamber and the oil reservoir, it begins to push down on the oil and forces it upward through the tube E, through the float chamber, and thence through the discharge conduit G into the main reservoir. If the upper end of the closed chamber were in communication with the atmosphere, the gasolene would rise in this chamber just as fast as it did in the main reservoir; but, since the air is confined and cannot escape, it serves as a pressure-transmitting agent between the gasolene in the closed chamber and the oil and, as soon as it begins to force the oil out of the reservoir, it is compelled to support a column of oil equal in length to the distance between the overflow pipe G and the upper surface of the oil in the reservoir. Although this column of oil is supported directly by the air, it will be seen that the ultimate pressure comes upon the gasolene in the closed chamber and that therefore there must be a difference in level between the gasolene on the inside of the chamber and on the outside thereof equal in height to the sustained column of oil, (assuming that the oil and the gasolene have approximately the same densities). It will therefore be seen that the level within the closed chamber will gradually rise as the reservoir is being filled, but more slowly than in the main reservoir itself until, when the main reservoir is entirely full, the height of the oil column above the level of the oil in the oil reservoir, plus the height of the gasolene column in the closed chamber are approximately equal to the height of the main reservoir. During all this time, since the float chamber is filled with oil, the valve will remain closed so that no addition to the oil supply is received, the displaced oil being discharged into the main reservoir. It will be seen that the amount of oil which is discharged into the main reservoir bears a definite relation to the amount of gasolene which enters the closed chamber. If the pressure-transmitting agent were unyielding, then the amount of oil which had been discharged at any given time would be exactly equal to the amount of gasolene which had entered the closed chamber up to that time; but, since the air is compressible, the volume of the oil which is transferred will always be somewhat less than the volume of the gasolene, bearing a definite relation thereto so that, by properly proportioning the closed chamber, any desired proportion between the oil and the gasolene in the main reservoir may be secured.

In Fig. 2 the condition illustrated is that wherein the main reservoir has been completely filled, the desired charge of oil having been transferred to the main reservoir. As soon as withdrawal of gasolene from the main reservoir begins, lowering the level of the gasolene, a lowering of the level of the gasolene in the closed chamber also takes place. The liquid columns and the pressure-transmitting agent now seek new conditions of equilibrium; the column of oil being now greater than that which can be supported by the head of gasolene and therefore descending through the lower end of the tube E back into the oil reservoir so as to raise the level of the oil in this reservoir. The raising of the oil level in the auxiliary reservoir concurrently with the lowering of the gasolene level in the closed chamber reduces the height of the oil column to a point where it may be maintained by the head of gasolene then existing. As the oil rises in the auxiliary reservoir, it pushes the air back into the closed chamber where it replaces the gasolene as the latter recedes. As soon as enough gasolene has been withdrawn to permit the float chamber to empty itself below the line of flotation, the valve K is opened and new oil enters the system so as to maintain the level in the float chamber. As the gasolene is withdrawn the valve will automatically open and close so as to supply the oil as required to raise the level in the oil reservoir.

In Fig. 3 I have illustrated the condition wherein the main reservoir has been partially emptied, the float having just dropped so as to permit more oil to flow into the system. This condition of the valve will last only long enough, however, to permit a state of equilibrium to be obtained, together with a rise of the oil level in the float chamber sufficient to raise the float and close the valve. When the gasolene has been completely withdrawn so as to leave the main reservoir empty, the condition will again be that shown in Fig. 1, the oil chamber being full so that there is no head of oil.

In practice I prefer to make the auxiliary reservoir and the closed chamber approximately equal in cross section, the distance from the lower end of the pipe E to the line of overflow being approximately equal to the height of the closed chamber. Consequently, the closed chamber is filled completely with gasolene when the main reservoir is full.

It will be seen that the oil is supplied automatically in the proper quantity regardless of the extent to which the main reservoir is filled. If it is desired to place more gasolene in the main reservoir after it has been partially emptied, as indicated in Fig. 3, this may be done without disturbing the ratio between the oil and the gasolene, for as soon as the level of the gasolene in the main reservoir rises, that in the closed chamber follows and forces the air back into the auxiliary reservoir so that there is a displacement of the oil approximately equal to the amount of gasolene which has been added to that in the closed chamber and a transfer of such oil to the main reservoir.

While I have described with particularity only the best form of my invention now known to me, I do not desire to be limited to this single form, but intend to cover all constructions and arrangements of parts which fall within the terms used in the definitions of my invention which constitute the appended claims.

What I claim is:

1. In an apparatus for receiving and mixing together two liquids in a predetermined ratio, a main reservoir for receiving one of said liquids, an auxiliary reservoir for receiving the second of said liquids, there being a discharge outlet leading from the auxiliary to the main reservoir, and means for automatically and progressively displacing in the auxiliary reservoir and forcing through the discharge outlet quantities of the second of said liquids sufficient to establish and maintain the ratio between the two liquids in the main reservoir as the first of said liquids is introduced into the main reservoir.

2. In an apparatus for receiving and mixing together two liquids in a predetermined ratio, a main reservoir for receiving one of said liquids, an auxiliary reservoir for receiving the second of said liquids, there being a discharge conduit leading from a point considerably below the top of the auxiliary reservoir to the top thereof and into the main reservoir, and means associated with said reservoirs for producing and maintaining a progressively increasing pressure upon the top of the liquid in the auxiliary reservoir as the level of the liquid in the main reservoir rises so as progressively to transfer the liquid from the auxiliary reservoir to the main reservoir in sufficient quantities to maintain said predetermined ratio between the two liquids in the main reservoir.

3. In an apparatus of the character described, a main reservoir, a closed auxiliary reservoir, a chamber communicating at its lower end with the bottom of the main reservoir, a pressure-transmitting agent between said chamber and the auxiliary reservoir, and there being a discharge passage leading from the auxiliary reservoir into the main reservoir.

4. In an apparatus of the character described, a main reservoir, a closed auxiliary reservoir, a closed chamber communicating at its lower end with the bottom of the main

reservoir, a pressure-transmitting agent between the top of said chamber and the top of said auxiliary reservoir, and a discharge conduit communicating at its lower end with the interior of the auxiliary reservoir at a point considerably below the top, said conduit extending upwardly and into the main reservoir.

5. In an apparatus of the character described, a main reservoir, a closed auxiliary reservoir, a closed chamber communicating at its lower end with the bottom of the main reservoir, a pressure-transmitting agent between the top of said chamber and the top of said auxiliary reservoir, and a discharge conduit communicating at its lower end with the interior of the auxiliary reservoir at a point considerably below the top, said conduit extending upwardly to the top of the auxiliary reservoir and opening into the main reservoir.

6. In an apparatus of the character described, a main reservoir, a closed auxiliary reservoir, a closed chamber communicating at its lower end with the bottom of the main reservoir, a conduit connecting the top of said chamber with the top of the auxiliary reservoir, and a discharge conduit opening at its lower end into the auxiliary reservoir at a point considerably below the top thereof, said conduit extending into proximity to the top of the auxiliary reservoir and opening into the main reservoir.

7. In an apparatus of the character described, a closed reservoir, a closed auxiliary reservoir, a closed chamber communicating at its lower end with the bottom of the main reservoir, a conduit connecting the top of said chamber with the top of the auxiliary reservoir, and a discharge conduit extending from a point within the auxiliary reservoir to the top thereof and into the main reservoir.

8. In an apparatus for receiving and mixing together two liquids in predetermined proportions, a main reservoir adapted to receive one of said liquids, an auxiliary reservoir adapted to receive the second of said liquids, there being a discharge outlet leading from the auxiliary reservoir to the main reservoir, and means associated with said reservoirs and dependent upon the level of the liquid in the main reservoir for causing the auxiliary reservoir to discharge into the main reservoir quantities of liquid proportional to the quantity of liquid entering the main reservoir.

9. In an apparatus of the character described, a main reservoir, a closed auxiliary reservoir, a conduit opening into the auxiliary reservoir at a point considerably below and leading to a point above the top of the auxiliary reservoir, there being a discharge outlet from the upper end of said conduit into the main reservoir, a chamber opening at the bottom into the bottom of the main reservoir, and a pressure-transmitting agent between said chamber and the top of said auxiliary reservoir so arranged that the pressure upon the liquid in the auxiliary reservoir increases with the level of the liquid in the main reservoir.

10. In an apparatus for receiving and mixing together two liquids in predetermined proportions, a main reservoir adapted to receive one of said liquids, an auxiliary reservoir adapted to receive the other of said liquids, a closed chamber communicating at its lower end with the bottom of the main reservoir, said closed chamber having a volume equal to the volume of the second of said liquids which it is desired to mix with a sufficient quantity of the first of said liquids to fill the main reservpir and the height of said chamber being approximately one-half the height of the main reservoir, a conduit leading downward from the top of the main reservoir and communicating with the interior of the auxiliary reservoir at a point approximately midway between the top and bottom of the main reservoir, and a pressure-transmitting agent between the top of said chamber and the top of the auxiliary reservoir.

11. In an apparatus for receiving and mixing together two liquids in predetermined proportions, a main reservoir adapted to receive one of said liquids, a closed auxiliary reservoir adapted to receive the other of said liquids, a closed chamber communicating at its lower end with the bottom of the main reservoir, said closed chamber having a volume equal to the volume of the second of said liquids which it is desired to mix with a sufficient quantity of the first of said liquids to fill the main reservoir and the height of said chamber being approximately one-half the height of the main reservoir, a conduit leading downward from the top of the main reservoir and communicating with the interior of the auxiliary reservoir at a point approximately midway between the top and bottom of the main reservoir, and a conduit leading from the top of said chamber to the top of said auxiliary reservoir.

12. In an apparatus for receiving and mixing together two liquids in a predetermined ratio, a main reservoir for receiving one of said liquids, an auxiliary reservoir for receiving the second of said liquids, there being a discharge outlet leading from the auxiliary to the main reservoir, means for automatically and progressively displacing in the auxiliary reservoir and forcing through the discharge outlet quantities of the second of said liquids sufficient to establish and maintain the ratio between the two liquids in the main reservoir as the first of said liquids is introduced into the main reservoir, and means for automatically supplying said auxiliary reservoir with the second of said

liquids at a rate bearing said ratio to the rate of withdrawal of the first of said liquids upon withdrawal of the latter liquid from the main reservoir.

13. In an apparatus of the character described, a main reservoir, a closed auxiliary reservoir, a discharge conduit leading downward from the top of the auxiliary reservoir and opening into the auxiliary reservoir, said conduit opening into the top of the main reservoir, a liquid supply pipe connected to said conduit, a valve controlling the outlet from said pipe, a float in said conduit controlling said valve, said float being arranged to close the valve before the liquid in the conduit reaches the overflow level, a closed chamber opening at its lower end into the bottom of the main reservoir, and a pressure-transmitting agent between the upper end of said chamber and the top of said auxiliary reservoir.

14. In an apparatus for receiving and mixing together two liquids in a predetermined ratio, a main reservoir for receiving the first of said liquids, an auxiliary reservoir for receiving the second of said liquids, a discharge conduit leading downward from the top of the auxiliary reservoir and opening into the auxiliary reservoir at the lower end, said conduit opening at its upper end into the main reservoir, a liquid supply pipe connected to said conduit, a valve controlling the outlet from said pipe, a float in said conduit controlling said valve, said float being arranged to close the valve when the liquid in the conduit reaches a certain predetermined point and to open the valve when the liquid level drops below said predetermined point, and means for automatically and progressively displacing the liquid in the auxiliary reservoir and forcing it upwardly through said conduit in quantities sufficient to establish and maintain the ratio between the two liquids in the main reservoir as the first of said liquids is introduced into the main reservoir.

In testimony whereof, I sign this specification in the presence of two witnesses.

FREDERICK PURDY.

Witnesses:

WM. F. FREUDENREICH,

BRICENA SWEET.