Oct. 23, 1928. 1,688,342

C. L. McCUEN

PUMP FOR REFRIGERATING APPARATUS

Filed Jan. 17, 1920 4 Sheets-Sheet 1

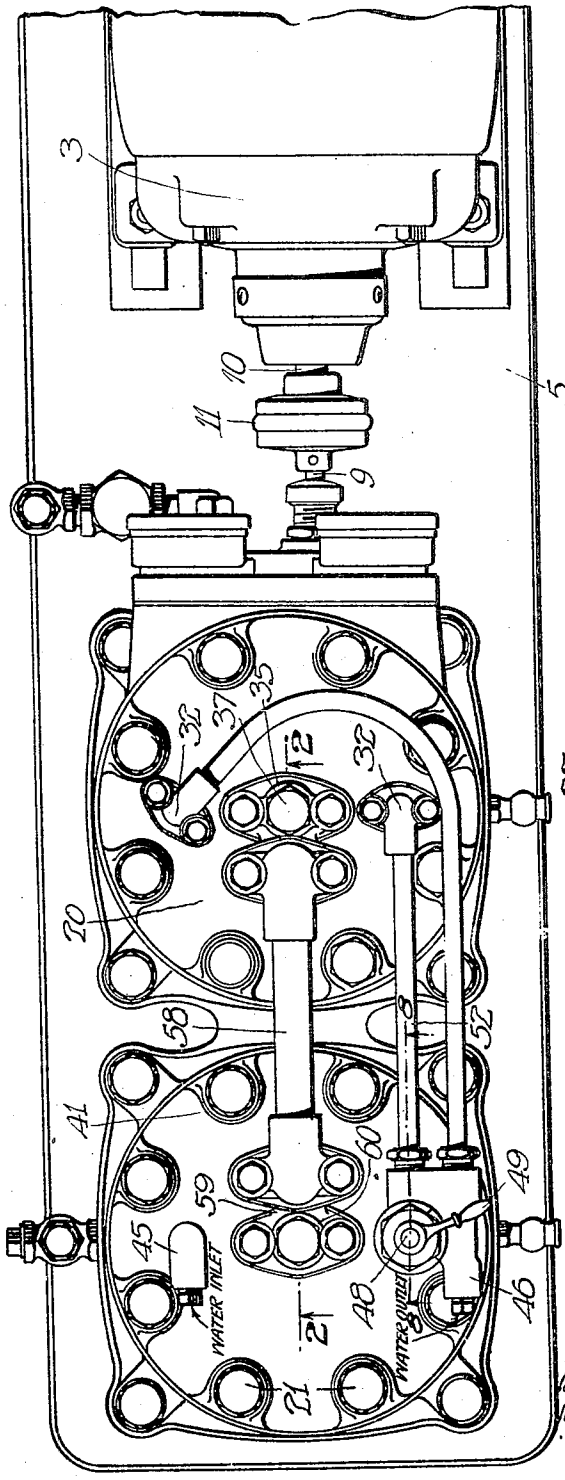


Fig. 1.

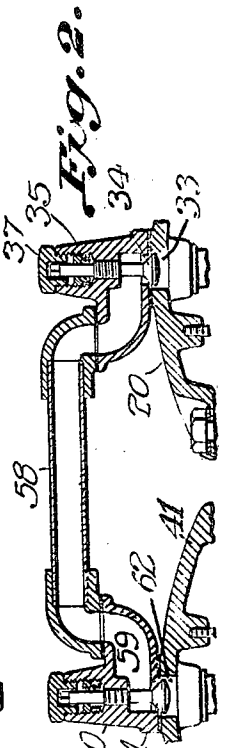


Fig. 2.

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His Attys

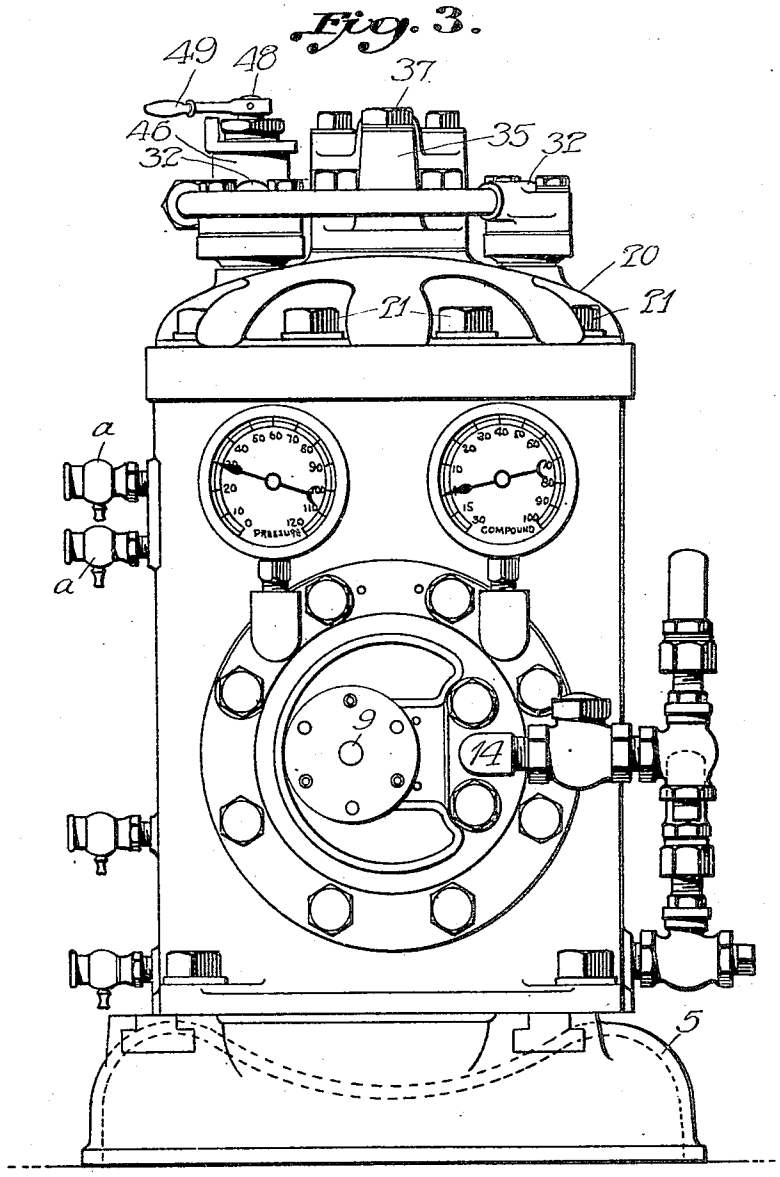
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PUMP FOR REFRIGERATING APPARATUS

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Fig. 3.



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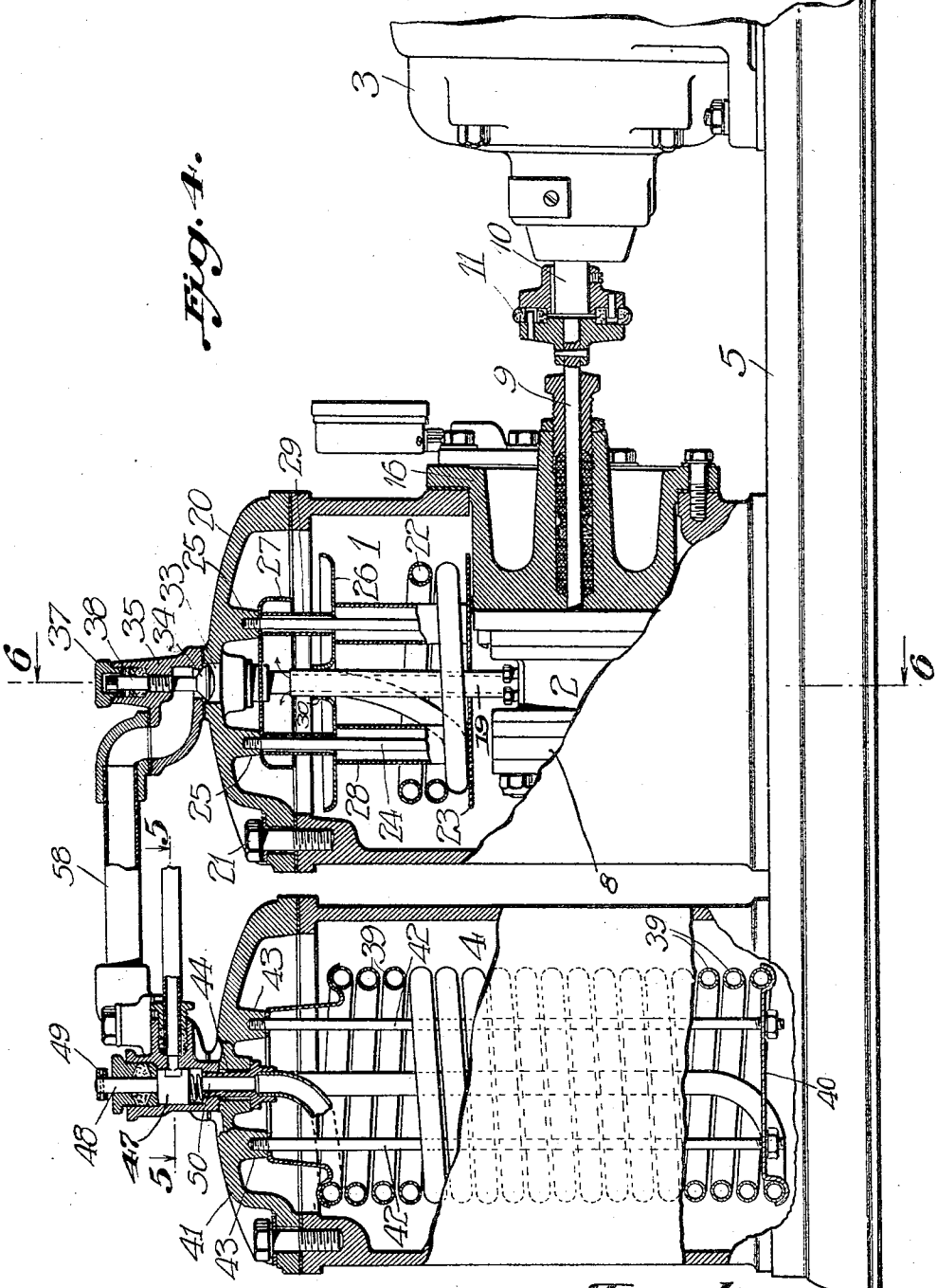
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PUMP FOR REFRIGERATING APPARATUS

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Fig. 4.



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PUMP FOR REFRIGERATING APPARATUS

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Fig. 5.

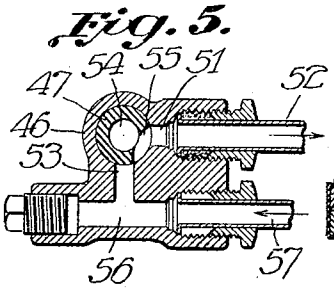


Fig. 6.

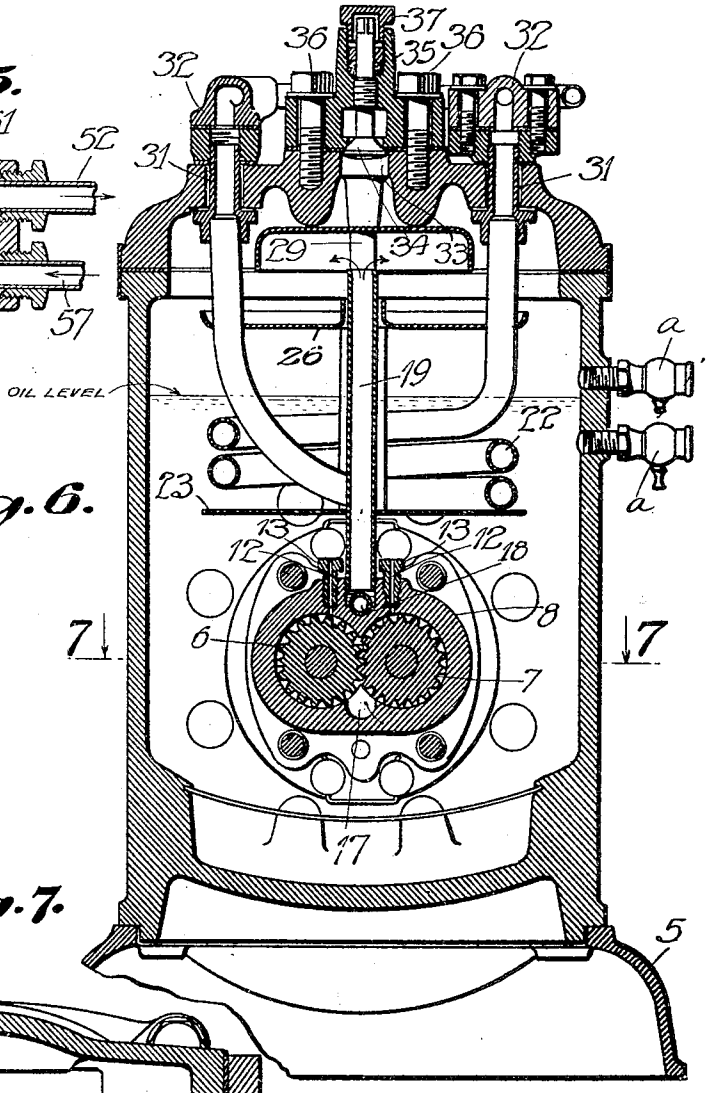
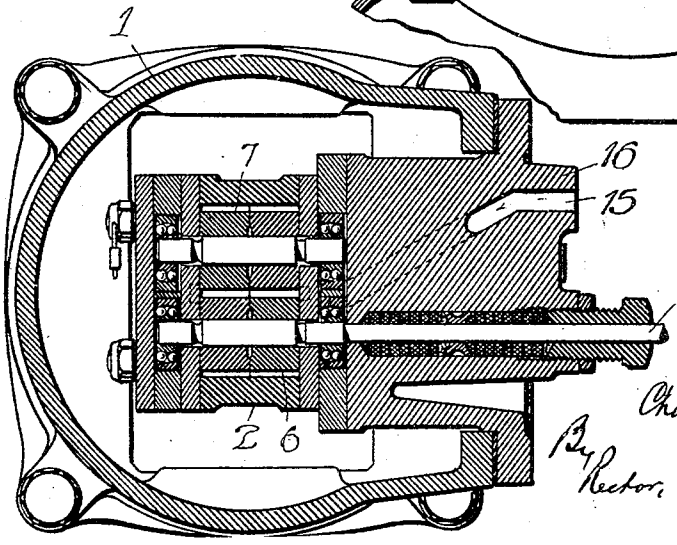


Fig. 7.



Inventor,
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By Rector, Shibley, Davis & Pearne,
his Attys

Patented Oct. 23, 1928. 1,688,342

UNITED STATES PATENT OFFICE.

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PUMP FOR REFRIGERATING APPARATUS.

Application filed January 17, 1920. Serial No. 352,039.

My invention relates to refrigerating apparatus in which a compressible refrigerant such as sulfur dioxid is employed, the same being compressed by a suitable pump or compressor, then condensed into a liquid, then permitted to expand in refrigerating coils or the like and thereafter compressed and so on through continuing cycles. The object of my invention is to provide a simple, efficient and reliable apparatus of this kind characterized more particularly by certain improvements in the water circulating system of the apparatus and in the structure and assembly of the pump chamber and the condenser chamber.

In the drawings Fig. 1 is a plan view of my apparatus; Fig. 2 a section on the line 2—2 of Fig. 1; Fig. 3 an end elevation of the apparatus with the electric motor removed; Fig. 4 a side elevation of the apparatus with portions of the two cylinders or chambers broken away as on the line 2—2 (extended) of Fig. 1 and with the water valve shown in section as on the line 8—8 of Fig. 1; Fig. 5 a section on the line 5—5 of Fig. 4; Fig. 6 a vertical section on the line 6—6 of Fig. 4; and Fig. 7 a horizontal section on the line 7—7 of Fig. 6.

As my invention relates to the pump and condenser cylinders it is unnecessary to show the complete refrigerating system and therefore the refrigerating coils more particularly which may be of the usual and well-known character are not shown. Referring to the particular embodiment of the apparatus as herein shown, the same comprises a pump cylinder or chamber 1, a compressor or pump 2 therein, a prime mover such as an electric motor 3 for driving the pump and a condenser cylinder or chamber 4 all preferably mounted upon a suitable single base plate 5 and having the connections, coils, and other devices hereinafter set forth in detail.

The pump 2 is of the general construction and mode of operation as the pump illustrated and described in Leonard Patent No. 1,233,069 dated July 10, 1917. This pump is characterized by two intermeshing herring-bone gears, 6 and 7 contained within a casing 8 and driven by the shaft 9 which is in turn driven by the extended armature shaft 10 through the medium of the coupling 11. The pump is submerged in a body of oil contained within the pump chamber (the oil level being between the test cocks *a*) and the oil is supplied to the gears through a series of restricted passages 12 entering through the top of the casing and emerging from the interior thereof at the top middle portion of said gears. In practice these restricted oil supply openings 12 are formed for the most part by central bores through screw plugs 13, Fig. 6. The gas as it comes from the refrigerating coils through the inlet pipe 14 and inlet passage 15 through the pump head 16 enters the pump chamber at 17 at the lower portion thereof and in communication with the pump gears. The gas is compressed by these gears and is discharged at the upper portion of the casing into the horizontal discharge passage 18 and the vertical discharge pipe 19. This discharge pipe 19 extends above the oil level in the pump chamber and towards the upper part thereof, discharging the gas into the space above such body of oil.

The pump cylinder is provided with a removable head 20 to whose lower side the cooling coils for the pump cylinder together with the baffle plates and coil supports are attached so that such cover and said parts constitute a unit which in assembling the structure is inserted within the pump chamber and the cover thereupon secured to the pump cylinder in suitable manner as by means of the bolts 21.

The cooling coils 22 which are adapted to circulate cold water are of such a size and length as to keep this chamber at the proper temperature which is somewhat higher than the temperature of the cooling coils in the condenser chamber hereinafter described. These coils 22 rest upon a horizontal supporting plate 23 which is itself supported and held to the cover 20 by vertical rods 24, the lower ends or heads of which support the plate 23 and the upper ends of which are screw threaded into the depending bosses 25 of the cover. These rods are also adapted to support and position the two baffle plates 26 and 27, the former of which is clamped between the lower distance tubes 28 interposed between the plates 23 and 26 and the upper distance tubes 29 interposed between the plates 26 and 27. The plate 26 has its periphery upwardly flanged so as to retain any liquid refrigerant that might possibly be discharged from the pipe 19 and the same is provided with a central opening through which such discharge pipe 19 passes and which is provided with an outwardly extending flange 30 fitting around such pipe. The other baffle plate 27 which is itself clamped between the lower

ends of the bosses 25 and the top of the distance tubes 29 has a downwardly turned flange and is of less diameter than the plate 26. The gas which is discharged from the pipe 19 strikes against the central portion of the plate 27 and is downwardly deflected so as to separate any liquid refrigerant from the gas. The lower plate 26 acts to catch any such liquid refrigerant and prevent it from dropping upon the body of oil below, such plate retaining the liquid refrigerant until such time as in the course of operation it will become gaseous and pass on to the condenser chamber.

The cooling coils 22 are likewise secured to the cover 20 as shown in Fig. 6 wherein it is seen that the ends of these coils are secured to couplings 31 which pass through vertical openings in the cover and are secured to the pipe fittings 32 extraneous of the cover.

The cover 20 is provided with a central gas outlet 33 which is controlled by a hand operated valve 34 contained within a valve casing 35 removably secured to the cover by the bolts 36. In the drawings this valve 34 is shown closed but by removing the screw cap 37 and turning the screw threaded stem 38 of the valve by means of a suitable socket wrench, the valve may be readily opened and the same remains in open condition during the regular operation of the apparatus.

Next describing the condenser chamber and associated parts, the cooling coils 39 are of much greater extent than the cooling coils 22 because it is necessary to keep the condenser chamber at a lower temperature in order to condense the incoming refrigerant or gas supplied from the pump chamber. These coils 39 are supported by a horizontal plate 40 which in turn is supported from the lower side of the top cover 41 of the condenser chamber through the medium of the vertical rods 42 which screw into the bosses 43 depending from the lower side of the plate 41. The upper ends of the coils 39 are provided with fittings 44 which pass through vertical openings in the plate 41 and are thereat secured to pipe connections 45 and 46. The pipe connection 46 is provided with a valve for controlling the supply of water through the coils 22 and 39 and for regulating the amount of flow relatively through such two coils. As shown in Fig. 5 this valve is a hollow plug valve 47 provided with a stem 48 to whose upper end is secured an operating handle 49. This valve is located in the pipe connection 46 which is provided with the port 50 communicating with the outlet end of the coil 39, a port 51 communicating through the horizontal pipe 52 with one of the pipe connections 32, and also with a port 53, which ports are governed by the valve 47. For this purpose the valve has a central vertical passage 54 and a lateral communicating way or passage 55 on its periphery. In addition this pipe connection 46 has an outlet passage 56 with which the outlet 50 of the coil 39 is adapted to communicate directly through the passage 53, or indirectly through pipe connection 52, cooling coils 22 and pipe connection 57 which connects between the outlet of the coils 22 at one of the pipe connections 32 and the pipe connection 46.

When the valve 47 is in the position shown in Fig. 5 all of the water which passes through the coils 39 is passed through the coils 22 inasmuch as the passages 54 and 55 are in communication with port 51 and pipe 52. When the valve 47 is slightly rotated in a clock-wise direction a portion of the water may be passed directly to the discharge pipe 56 through the port and passage 53, the remainder which may be as much as desired passing through the coils 22. Upon a further rotation of the valve 47 the port 51 may be entirely closed and the supply of water to the coils 22 may be cut off and all of the water passed directly through the port 53 and discharge pipe 56, it being understood that at this time the passage way 55 will be in register with the port 53. By rotating the valve still further the amount of water passing through the condenser coils may be regulated by restricting the passage 55 by incomplete register between such passage and the port 53. The amount of flow through the condenser coils is thus restricted by restricting the discharge of the water therefrom. In this manner and by these means the amount of water supplied to the coils 22 relative to that supplied to the coils 39 may be controlled and regulated to a nicety and also by the employment of a single valve all or a portion of the water discharged from the condenser coils may be by-passed through the pump chamber coils, and also the amount of the flow through the condenser coils may be regulated to any desired extent.

From the pump chamber the gas passes upwardly through the outlet 33, past the valve 34, through the horizontal pipe 58 through a passage 59 in valve casing 60 similar to the casing 35 past the valve 61 (which in operation would of course be open) and through the inlet port 62 in the cover 41 of the condenser chamber, as shown in detail in Fig. 2.

The cylinder covers which are thus removable with their cooling coils are connected together by the water and gas connections and are therefore both removable at the same time together with such coils, after the fastening bolts 21 are removed.

I claim:

1. In a refrigerating apparatus, the combination with a pump chamber and the pump therefor, of a removable cover for the chamber, cooling coils attached to and depending from the cover, a plate forming a support for the coils, means attached to the cover for

supporting the plate, and a drip plate also supported by said means intermediate said first plate and the cover.

2. In a refrigerating apparatus, the combination with a pump chamber and the pump therefor, of a removable cover for the chamber, cooling coils attached to and depending from the cover, a plate forming a support for the coils, means attached to the cover for supporting the plate, a pipe connected with the pump discharge, and a drip plate having an opening through which such pipe passes and supported by said means intermediate said first plate and the cover.

3. In a refrigerating apparatus, the combination, with a pump chamber and the pump therefor, of a removable cover for the chamber, cooling coils attached to and depending from the cover, a plate forming a support for the coils, means attached to the cover for supporting the plate, a pipe connected with the pump discharge, and a baffle plate arranged above said pipe and also supported by said means intermediate said first plate and the cover.

4. In a refrigerating apparatus, the combination with a pump chamber and the pump therefor, of a removable cover for the chamber, cooling coils attached to and depending from the cover, a plate forming a support for the coils, means attached to the cover for supporting the plate, a pipe connected with the pump discharge, a baffle plate arranged above said pipe, and a drip plate arranged below the baffle plate and having an opening through which the pipe passes, said baffle plate and drip plate being also supported by said means, said means comprising rods 24 secured at their lower ends to the supporting plate and attached at their upper ends to the cover, and distance tubes encircling the rods and interposed between the baffle plate and the drip plate and between the latter plate and the supporting plate.

5. In a refrigerating apparatus, the combination of a pump chamber, a pump therein having a discharge opening, a baffle plate in said chamber adjacent said discharge opening and a drip pan under said baffle plate.

6. In a refrigerating apparatus, a pump chamber, a pump therein having a discharge pipe, a baffle plate in said chamber adjacent the end of said discharge pipe and a drip pan under said baffle plate provided with an opening through which said discharge pipe extends.

7. In a refrigerating apparatus, the combination of a pump chamber, a pump therein having a discharge opening and immersed in a body of oil, a baffle plate in said chamber adjacent the discharge opening and a drip pan under said baffle plate and over said body of oil.

8. In a refrigerating apparatus, the combination of a pump, a discharge pipe for said pump, a chamber in which the discharge end of said pipe is located, a baffle plate in said chamber adjacent the discharge end of said pipe and a drip pan under said baffle plate.

9. In a refrigerating apparatus, the combination of a pump chamber, a pump therein having a discharge opening, a removable cover for the chamber, a baffle plate in said chamber adjacent said discharge opening, a drip pan under said baffle plate, and means for supporting said drip plate and baffle from said removable cover.

10. In a refrigerating apparatus, the combination with a pump chamber and the pump therefor, of a removable cover for the chamber, cooling coils attached to and depending from the cover, a pipe connected with the pump discharge, a baffle plate arranged above said pipe, and a drip plate arranged below the baffle plate and having an opening through which the pipe passes, and mean attached to the cover for supporting the cooling coil, the baffle plate and the drip plate therefrom.

CHARLES L. McCUEN.