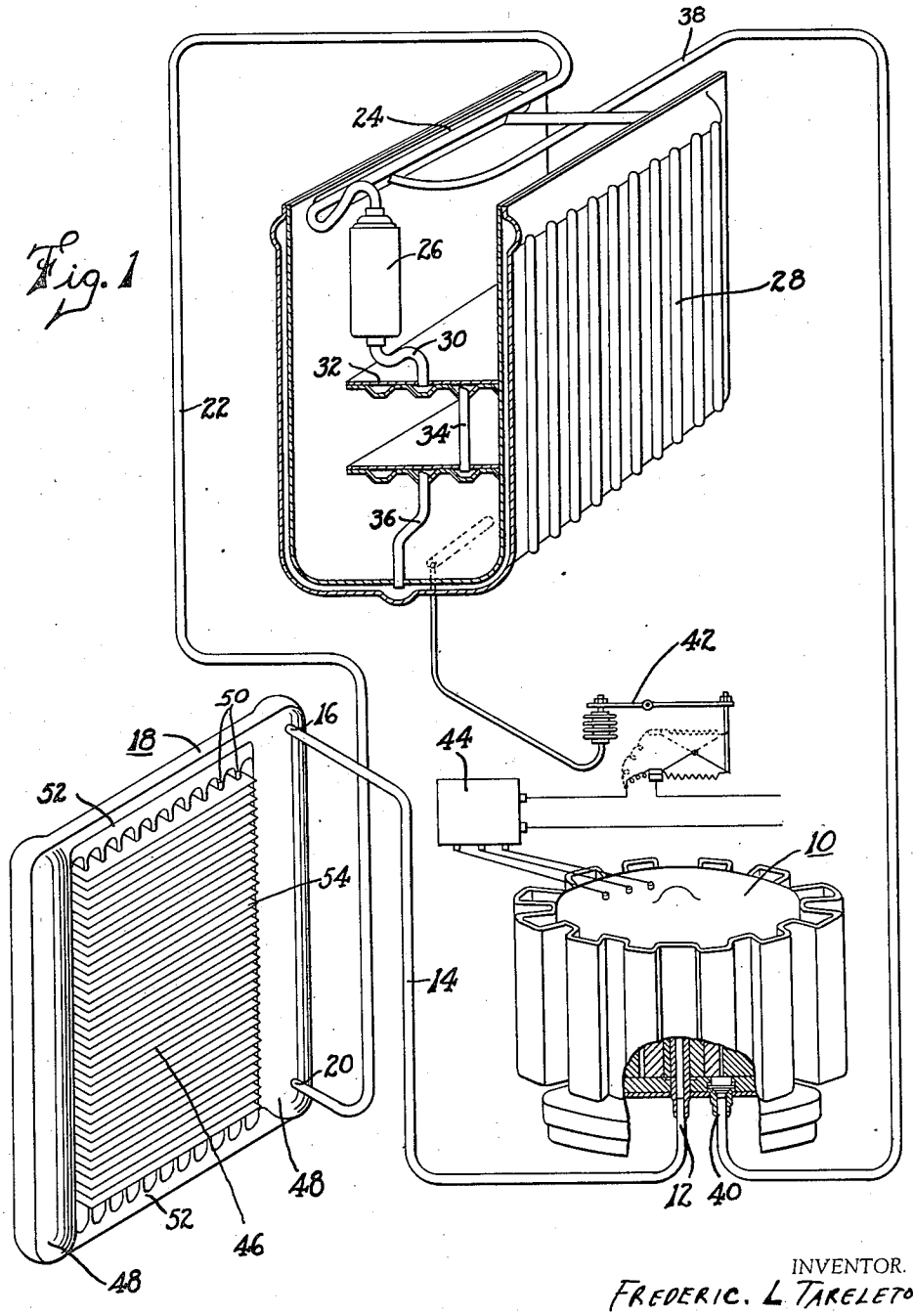
Oct. 13, 1936. F. L. TARLETON 2,057,505

CONDENSER FOR REFRIGERATING APPARATUS

Filed Oct. 31, 1934 2 Sheets-Sheet 1

Fig. 1



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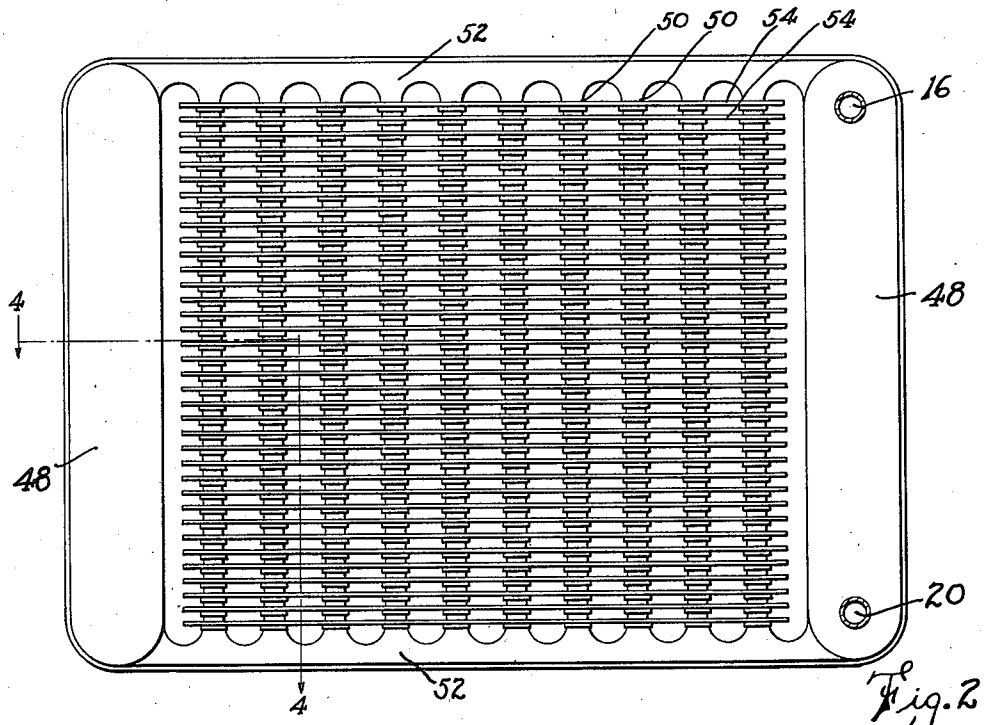


Fig. 2

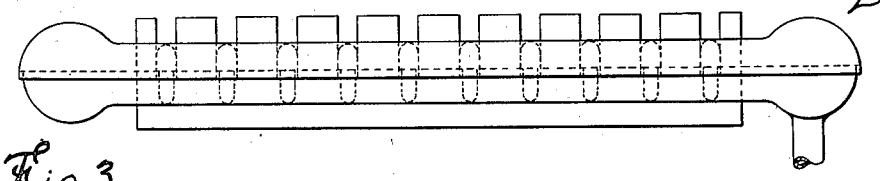


Fig. 3

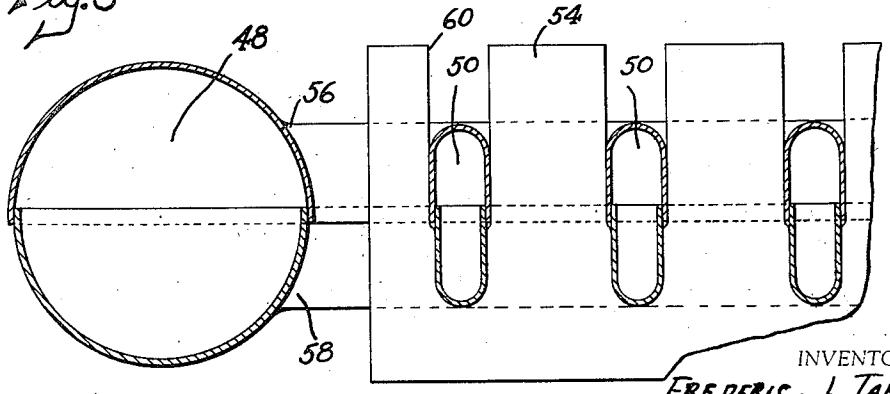


Fig. 4

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CONDENSER FOR REFRIGERATING APPARATUS

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Application October 31, 1934, Serial No. 750,868

9 Claims. (Cl. 257—36)

This invention relates to refrigerating apparatus and more particularly to a novel condenser construction for refrigerating apparatus of the compressor-condenser-expander type.

It is an object of the invention to provide a unitary condenser and storage chamber in which the storage chamber is disposed vertically and extends from the top to the bottom of the condenser portion.

More specifically, it is an object to provide a condenser of this type in which both the condensing portion and the storage chamber portion are formed from the same pair of metal sheets which have oppositely facing concavities formed therein with their edges telescoped together and sealed.

Further objects and advantages of the present invention will be apparent from the following description, reference being had to the accompanying drawings, wherein a preferred form of the present invention is clearly shown.

In the drawings:

Fig. 1 is a perspective view of a refrigerating system embodying the present invention, portions of the apparatus being cut away to show the internal construction;

Fig. 2 is a side view of a condenser embodying the present invention;

Fig. 3 is a top view of the condenser; and

Fig. 4 is a fragmentary section on line 4—4 of Fig. 2.

Referring now to Fig. 1, there is illustrated a refrigerating apparatus comprising a motor-compressor unit 10 of the hermetically sealed type, having an outlet 12 from which compressed refrigerant is conveyed by conduit 14 to the inlet 16 of the condenser 18. Compressed refrigerant is liquefied in the condenser and the liquid refrigerant is conducted from the outlet 20 of the condenser by conduit 22 to a heat interchanger 24, where the liquid refrigerant is cooled before entering the restrictor or liquid refrigerant control device 26. The restrictor 26 reduces the pressure of the refrigerant before it is delivered to the evaporator 28 by conduit 30 which leads first to a shelf 32 of the evaporator. Refrigerant is conducted by conduits 34 and 36 through the shelves to the side walls of the evaporator, whence the expanded refrigerant is delivered by conduit 38 to the inlet 40 of the motor-compressor unit 10. A suitable automatic control switch 42 is provided for intermittently operating the motor-compressor unit 10, in accordance with the temperature of the evaporator while an automatic starting switch 44 is provided to control the windings of the motor during starting. The condenser 18 comprises generally a heat exchange portion 46 and a storage chamber portion 48 which, in the form illustrated, is comprised of a pair of chambers one on either side of the heat exchange portion 46. The heat exchange portion 46 is composed of a plurality of vertical refrigerant conduits 50 which are connected in parallel with each other and with the storage chamber portion 48 by horizontal headers 52 at the top and bottom of the condenser. Suitable horizontal heat radiating fins 54 are situated in heat conducting relation with the vertical conduits 50.

The condenser thus described may be formed by any of the well known methods for forming heat exchange devices, but it is preferred to form the vertical conduits, 50, the horizontal headers 52 and the vertical storage chamber portion 48 from a single pair of sheet metal members 56 and 58 (see Fig. 4). Each of the sheet metal members is formed with oppositely facing concavities which comprise the storage chamber portion 48, the conduits 50 and the headers 52 and are pierced between the several conduits 50 and between the end conduits and the storage chamber portion 48. The dimensions of the concavities thus formed are made different in the two sheet metal members so that the edges thereof may be telescoped together as shown in Fig. 4. After telescoping the pair of members together, a plurality of comb shaped fins 54 having slots 60 which are open at one edge of the fin 54 and which correspond in shape to the exterior of the conduits 50 are pressed onto the conduits 50. The assembly thus formed may be suitably bonded together by any of the well known metallic fusion bonds, it being preferred to copper braze the assembly in a furnace having a hydrogen or other reducing atmosphere.

The present condenser is particularly adapted for use in refrigerating systems of low cost and in which the system is constructed with the individual units thereof of very low capacity. It is necessary that such systems operate at very high efficiency under all conditions, due to the low capacity of the individual units employed in its construction. With systems of this character which utilize a fixed restrictor for a refrigerant flow control device, it is necessary, in order to secure satisfactory ice freezing characteristics, to increase the rate of flow of refrigerant through the restrictor when water to be frozen is placed in the ice trays located on the evaporator shelves. The present condenser provides this extra ice freezing capacity due to the fact that the storage chamber portion thereof is located between the top and bottom of the heat exchange portion thereof and is so connected thereto that the same level of liquid refrigerant will be maintained in both portions. Thus, when a heavy ice freezing load is imposed on the evaporator, the large amount of heat which is thus transmitted to the evaporator causes a rapid vaporization of refrigerant in the shelves

which increases the suction pressure in the evaporator, and, therefore, causes the compressor to deliver refrigerant to the condenser at a more rapid rate measured in units of weight per unit of time. The result is that the refrigerant formerly stored in the evaporator in the liquid state is soon transferred to the condenser where it also collects in the liquid state, thus raising the level of liquid refrigerant therein. Inasmuch as the same level of liquid refrigerant exists in both the heat exchange portion and the storage portion of the condenser, the rise in that level will block off a proportionate amount of heat exchange area in the condenser, to thus decrease its effective condensing area. This results in a rather rapid rise in the head pressure which is much larger than the rise in suction pressure caused by the sudden load imposed on the evaporator and, therefore, produces a larger pressure differential across the fixed restrictor **26**. Since the rate of flow of refrigerant through the restrictor is roughly proportional to the pressure differential across it, the refrigerant will be delivered to the evaporator at a more rapid rate, thus giving a temporary "hike-up" in the refrigerating output of the apparatus.

While the form of embodiment of the invention as herein disclosed constitutes a preferred form, it is to be understood that other forms might be adopted, all coming within the scope of the claims which follow.

What is claimed is as follows:

1. A condenser for a refrigerating apparatus comprising a vertically extending heat exchange portion, and a vertically extending storage portion in communication with the heat exchange portion above and below the liquid level therein for maintaining the liquid level in both portions the same at all times, both of said portions being formed from the same pair of sheet metal members formed with oppositely facing concavities having their edges telescoped together and sealed.

2. A condenser for a refrigerating apparatus comprising a vertically extending heat exchange portion, and a vertically extending storage portion in communication with the heat exchange portion above and below the liquid level therein for maintaining the liquid level in both portions the same at all times, the bottom of the heat exchange portion being substantially as low as the bottom of the storage portion, both of said portions being formed from the same pair of sheet metal members formed with oppositely facing concavities having their edges telescoped together and sealed.

3. A condenser for a refrigerating apparatus comprising a vertically extending heat exchange portion comprising a plurality of vertical conduits connected in parallel, and a vertically extending storage portion in communication with the heat exchange portion above and below the liquid level therein for maintaining the liquid level in both portions the same at all times, both of said portions being formed from the same pair of sheet metal members formed with oppositely facing concavities having their edges telescoped together and sealed.

4. A condenser for a refrigerating apparatus comprising a vertically extending heat exchange portion comprising a plurality of vertical conduits connected in parallel, and a vertically extending storage portion in communication with the heat exchange portion above and below the liquid level therein for maintaining the liquid level in both portions the same at all times, the bottom of the heat exchange portion being substantially as low as the bottom of the storage portion, both of said portions being formed from the same pair of sheet metal members formed with oppositely facing concavities having their edges telescoped together and sealed.

5. A condenser for a refrigerating apparatus comprising a vertically extending heat exchange portion comprising a plurality of vertical conduits connected in parallel, and heat radiating fins in heat conducting relation thereto, and a vertically extending storage portion in communication with the heat exchange portion above and below the liquid level therein for maintaining the liquid level in both portions the same at all times, both of said portions being formed from the same pair of sheet metal members formed with oppositely facing concavities having their edges telescoped together and sealed.

6. A condenser for a refrigerating apparatus comprising a vertically extending heat exchange portion comprising a plurality of vertical conduits connected in parallel, and heat radiating fins in heat conducting relation thereto, and a vertically extending storage portion in communication with the heat exchange portion above and below the liquid level therein for maintaining the liquid level in both portions the same at all times, the bottom of the heat exchange portion being substantially as low as the bottom of the storage portion, both of said portions being formed from the same pair of sheet metal members formed with oppositely facing concavities having their edges telescoped together and sealed.

7. A condenser for a refrigerating apparatus comprising a vertically extending heat exchange portion including a plurality of vertically extending conduits, a vertically extending storage portion, and a horizontal conduit at the top and bottom of the heat exchange portion connecting the same with the storage portion to maintain the same liquid level in both portions at all times, both of said portions being formed from the same pair of sheet metal members formed with oppositely facing concavities having their edges telescoped together and sealed.

8. A condenser for a refrigerating apparatus comprising a vertically extending heat exchange portion including a plurality of vertically extending conduits, horizontal fins in heat conducting relation to said conduits, a vertically extending storage portion, and a horizontal conduit at the top and bottom of the heat exchange portion connecting the same with the storage portion to maintain the same liquid level in both portions at all times, both of said portions being formed from the same pair of sheet metal members formed with oppositely facing concavities having their edges telescoped together and sealed.

9. A condenser for a refrigerating system comprising, a vertically extending heat exchange portion, and an enlarged vertically extending storage portion on opposite sides of the heat exchange portion and in communication therewith, said storage portions and said heat exchange portion being formed by a pair of sheet metal members provided with oppositely facing concavities having their edges telescoped together and sealed.

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