

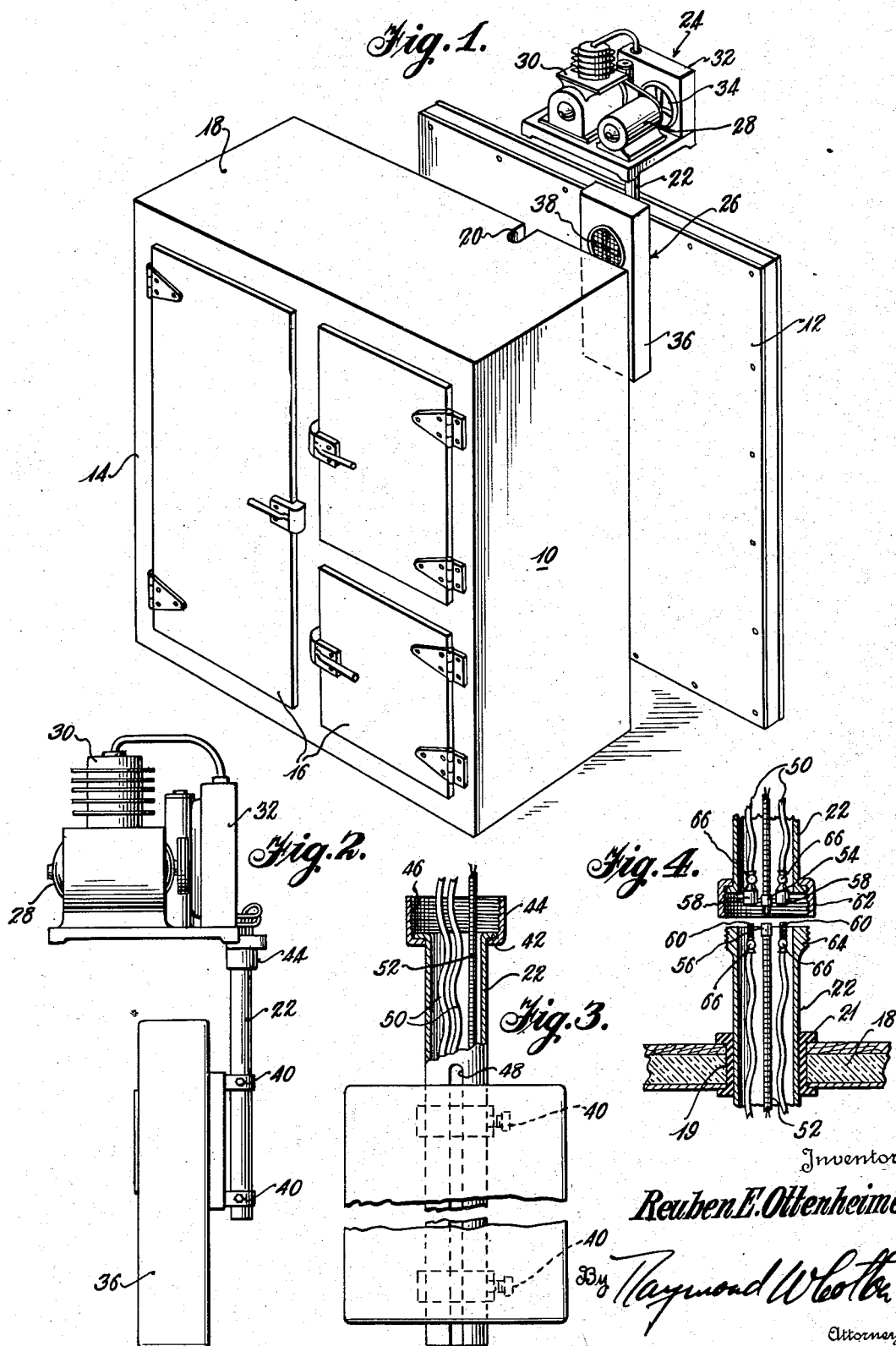
Dec. 1, 1942.

R. E. OTTENHEIMER

2,303,577

PORTABLE REFRIGERATING APPARATUS

Filed Aug. 20, 1940



UNITED STATES PATENT OFFICE

2,303,577

PORTABLE REFRIGERATING APPARATUS

Reuben E. Ottenheimer, Baltimore, Md.

Application August 20, 1940, Serial No. 353,433

9 Claims. (Cl. 62—116)

This invention relates to refrigerating apparatus characterized primarily by its portability and its ease of installation and removal with respect to a cabinet to be cooled and is especially well adapted for use as a unit for converting various types of ice cooled cabinets which may already be in the field to the more modern mechanically cooled types.

Conversion units for a similar purpose have been proposed in the past, but in almost every such case, it was necessary to assemble the parts and connect the pipe fittings on the job, or alternately, as disclosed in the patent to Richter et al., 1,256,730, dated February 19, 1918, for example, a relatively large opening had to be made through a wall of the cabinet, resulting in substantial heat losses.

Attempts to solve some of the problems confronting the present inventor are considered in the disclosure of the patent to Sweezy, 1,789,913, dated January 20, 1931, and that to Thornton, 1,789,916, dated January 20, 1931; but in the case of each of these patents, it is necessary to construct a cabinet especially to fit the refrigerating apparatus and there is no provision for adjustability or flexibility of the parts. Moreover, the disclosures of these patents necessitate the presence of two notches or perforations for introduction of the apparatus into their special cabinets, whereas only a single notch or perforation is required in accordance with the present invention, which is attended by many advantages.

It is among the objects of the present invention to provide a portable refrigerating apparatus which may be readily installed in a cabinet or removed therefrom by any person handy with tools, thereby obviating the need for attendance by a skilled mechanic. The high pressure side or unit of the system is preferably spaced from the low pressure side or unit by a relatively small single conduit which houses all of the conductors interconnecting the high and low sides of the system and which conduit further serves as a physical connection for rendering the system unitary and self contained. Since the single conduit or housing is substantially smaller in diameter than either the compressor-condenser unit or other pressure mechanism on the one hand; or the evaporator or other heat absorbing mechanism on the other; installation of the system requires merely the presence of a small notch or perforation in one of the cabinet walls. The conduit is preferably offset with respect to the high and low pressure units especially where it is

desired to utilize a notch of minimum length to adapt a cabinet to the mechanical system.

The conduit may contain a swivel joint intermediate its ends to permit relative rotary movement of the evaporator, for example, in a compressor-condenser-evaporator system. The conduit may also support the heat absorber in a manner that will permit it to be adjusted longitudinally, in which event at least the lower portion of the conduit will be slotted so that the flexible conductors carried thereby may project there-through to communicate with the heat absorber at any one of the various positions assumed by the absorber. It is also contemplated, that in some instances the conduit be separable as by a bolted flange or screw thimble joint, and that the enclosed conductors, electrical and/or fluid, be separable as well. In such a case, the fluid conductors would be provided with suitable joints to permit assembly and disassembly, and with valves to prevent loss of refrigerant when such joints are disconnected.

A more complete understanding of the invention will follow from a description of the appended drawing wherein:

Fig. 1 is a perspective view of a refrigerating unit about to be assembled with a cabinet;

Fig. 2 is an elevation of the refrigerating unit;

Fig. 3 is a front elevation of a housing supporting an evaporator, partly in section and partly broken away; and

Fig. 4 is a partial sectional elevation of a modified form of housing having conductors contained therein.

The cabinet 10 depicted in Fig. 1 of the drawing is shown as having its rear wall 12 removed, the front wall 14 thereof being provided with a plurality of doors 16 suitably hung and latched. A top wall or roof 18 is provided with a single notch 20 of proper size and shape to receive a housing 22 which interconnects and spaces a high pressure unit 24 from a low pressure unit 26 of a portable refrigerating system.

As illustrated, the high pressure side or unit comprises a driving motor 28, suitably supplied with current by conductors, not shown, a compressor 30, a condenser 32 and a fan 34. Depending from this high pressure unit, is the housing 22 through which the fluid refrigerant conductors and any electrical control conductors pass to the evaporator 36 suitably fastened to the housing. A fan 38 carried with the evaporator is provided to circulate air in the cabinet. Thus, the conduit or housing 22 serves not only to enclose the fluid and/or electrical conductors,

but as a physical interconnection between the high and low pressure units as well.

As will appear from the enlarged elevation of Fig. 2 of the drawing, the evaporator or other heat absorbing unit may be adjustably fastened to the conduit 22 by one or more set screws 40. Accordingly, the spacing between the high and low pressure units may be varied in some instances to suit the dimensions of the cabinet or to vary the path of the air circulated within the cabinet. In some instances of course, the set screws may be permanently set or the evaporator otherwise rigidly secured to the housing to render the system a single, unitary, portable one.

Where both longitudinal and rotary adjustment of the evaporator with respect to the compressor are desired, the housing 22 is provided with a swivel joint defined by a flanged end 42 in cooperation with a collar 44. This collar may be connected to the compressor support in any suitable manner, as for example, by screw threads 46. As shown in Fig. 3, the lower end of the housing 22 is provided with a slot 48 through which the flexible fluid conduits 50 and the likewise flexible electrical conductors 52 may project for connection with the evaporator, its fan and control mechanism. If desired, the slot may extend throughout the length of the housing, imparting thereto a channel-like section. It will be evident that by loosening the set screws 40, the evaporator may be shifted longitudinally of the housing, and that when the collar 44 permits, the lower portion of the housing and the evaporator may be rotated within reasonable limits imposed by the flexibility of the conductors. In some cases of course, the collar 44 may be integral with the housing and rigidly fastened to the compressor unit or its support.

To assemble the portable apparatus thus far described in an existing ice cooled cabinet, a suitable notch 20 is cut through the roof after the rear (or in some cases, side) wall is removed, whereupon the housing 22 together with suitable packing material is pushed into the notch, the compressor-condenser unit resting upon the roof or other support suitably provided, and the evaporator suspended within the enclosure to be cooled. After the packing operation is complete, it remains merely to replace the removed wall and fasten it in its original position with suitable screws or bolts. Where a swivel joint is used in the housing, ready access may be had to the evaporator or its controls by removing the rear panel or wall 12 and rotating the evaporator until the parts to be adjusted are most accessible. Where the housing is slotted, the position of the evaporator may be shifted to suit the thickness of the cabinet roof or to establish a desired path for circulation of air.

With the modification shown in Fig. 4 of the drawing, the high pressure unit and low pressure unit may be shipped separately and assembled on the job without requiring the presence of a skilled mechanic. The housing 22 and its flexible conduits 50 and 52 are separable and provided with joints for their assembly. Due to the flexibility of the fluid conduits 50 and the electrical conductors 52, they may be pulled from the housing sufficiently to join them whereupon the housing sections may be drawn together and secured. The electrical conductors may be connected by a multi-conductor plug 54 and socket 56, while the refrigerant lines may be connected by a gas tight joint which has been depicted as comprising a screw thimble 58 carried by one end

in cooperation with a threaded nipple 60 carried by its mating end. The housing itself may be connected by a screw thimble 62 threaded upon an enlargement 64. In order to prevent loss of refrigerant from the system during shipment or disassembly, suitable valves 66 may be provided near the ends of the fluid conductors, which valves will be open only when the joints have been established in fluid tight relationship.

If the connections are completed prior to installation in a cabinet, the modification of Fig. 4 may be assembled in the cabinet in the same manner as described with reference to the preceding modification. Otherwise, an aperture 18 may be formed entirely within the body of one of the cabinet walls, such as the roof 18, and the housing passed therethrough, whereupon the parts can be assembled with a suitable packing 21 without necessitating removal of any of the cabinet walls.

This invention adapts itself admirably to the problems encountered in government camps and commercial institutions where ice-cooled cabinets of various sizes are already installed and their conversion to mechanical cooling is desired. This invention is more flexible in its possible applications to cabinets of various sizes and shapes than devices known heretofore. Accordingly, the units are interchangeable with respect to large numbers of cabinets regardless of style or arrangement. And the units can readily be transferred from one cabinet to another or replaced when desired.

Whereas the present invention would be equally applicable to absorption type refrigerating systems, the description has been based upon a system of the compressor-condenser-evaporator type for purposes of illustration. The scope of the invention should not be construed specifically upon such illustrations but should be governed solely by the appended claims.

I claim:

1. A portable refrigerating apparatus comprising a high pressure unit and a low pressure unit spaced therefrom, fluid conductors extending between said units, a single housing substantially smaller in section than either of said units surrounding said conductors and physically interconnecting said units, said housing and conductors each being separable, and means to retain fluid in said conductors when they are separated.

2. A portable refrigerating apparatus comprising a high pressure unit and a low pressure unit spaced therefrom, fluid and electrical conductors extending between said units, a single housing substantially smaller in section than either of said units surrounding said conductors and physically interconnecting said units, and joint means for separably connecting said housing and conductors each at a point intermediate their lengths.

3. A portable refrigerating apparatus comprising a high pressure unit and a low pressure unit spaced therefrom, fluid conductors extending between said units, a single housing substantially smaller in section than either of said units surrounding said conductors and physically interconnecting said units and means to provide for varying the spacing between said units along said housing.

4. A portable refrigerating apparatus comprising a high pressure unit and a low pressure unit spaced therefrom, flexible conductors extending between said units, a single housing substantially smaller in section than either of said units sur-

rounding said conductors, said housing being slotted to permit said conductors to project therethrough, and means to provide for adjusting one of said units along said housing.

5. A portable refrigerating apparatus comprising a high pressure unit and a low pressure unit spaced therefrom, fluid conductors extending between said units, a single housing substantially smaller in section than either of said units surrounding said conductors and physically interconnecting said units, and means to provide for relatively rotatably adjusting said units about the axis of said housing.

6. A portable refrigerating apparatus comprising a high pressure unit and a low pressure unit spaced therefrom, fluid conductors extending between said units, a single housing substantially smaller in section than either of said units surrounding said conductors and physically interconnecting said units, said housing and conductors each being separable, and means to retain fluid in said conductors when they are separated and establish communication between said conductors when they are joined.

7. Refrigerating apparatus comprising a high pressure unit and a low pressure unit, refrigerant conductors interconnecting said units, a single housing substantially smaller in section than

either of said units receiving said conductors and interconnecting said units, said conductors and housing being readily separable to impart relative portability to said units, and valve means in at least one of said conductors to establish communication between said conductors when they are joined.

8. A portable refrigerating apparatus comprising a high pressure unit and a low pressure unit spaced therefrom, flexible fluid conductors extending between said units, a single housing substantially smaller in section than either of said units surrounding said flexible conductors and physically interconnecting said units, said housing and flexible conductors each being separable, and means to retain fluid in said flexible conductors when they are separated.

9. A portable refrigerating apparatus comprising a high pressure unit and a low pressure unit spaced therefrom, fluid conductors extending between said units, a single housing substantially smaller in section than either of said units surrounding said conductors and physically interconnecting said units, and joint means for separably connecting said housing and conductors each at a point intermediate their lengths.

REUBEN E. OTTENHEIMER.