Aug. 7, 1945. W. L. MORRISON 2,380,987

TWIN CYLINDER REFRIGERATOR

Filed March 18, 1944 2 Sheets-Sheet 1

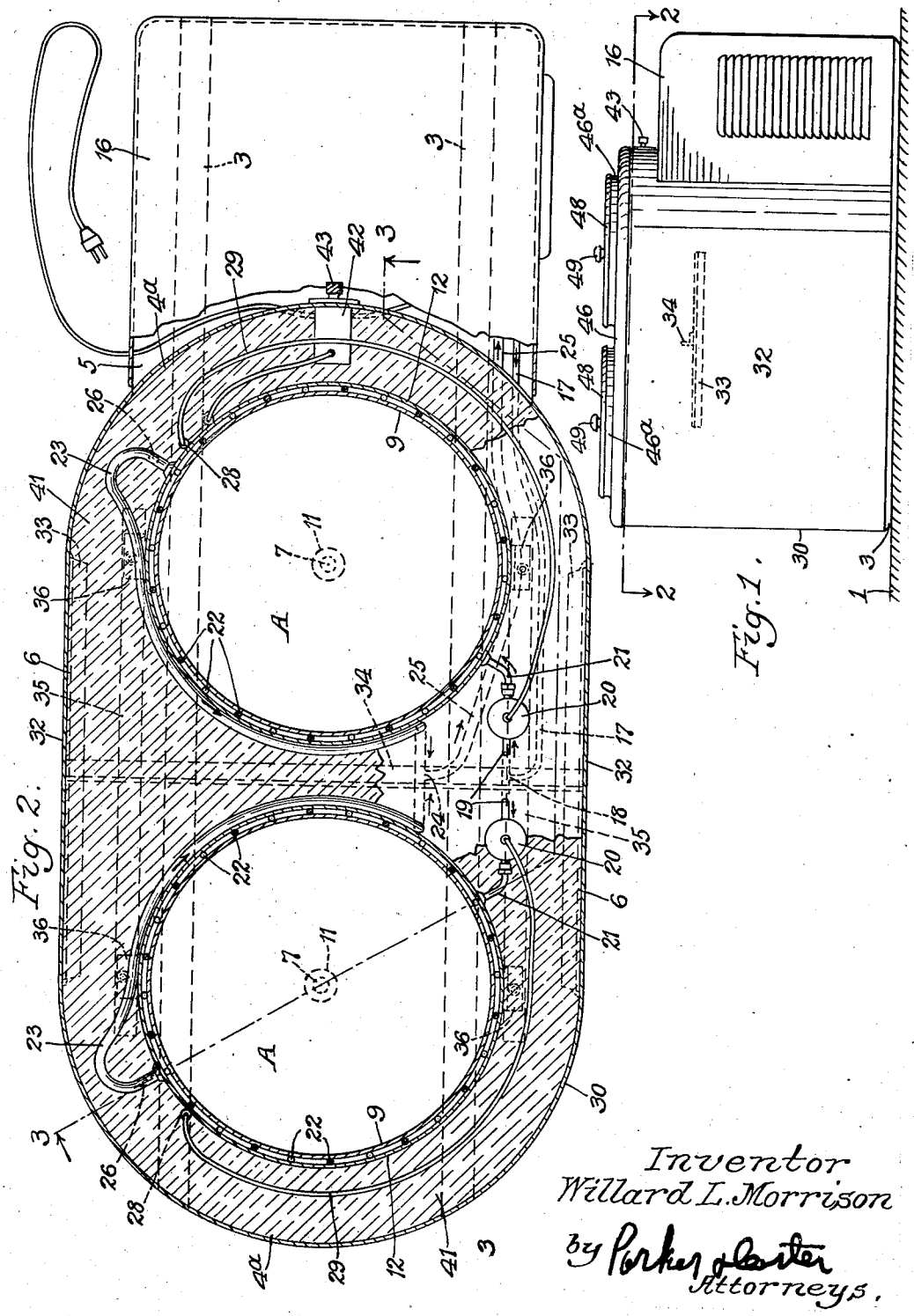


Fig. 1.

Fig. 2.

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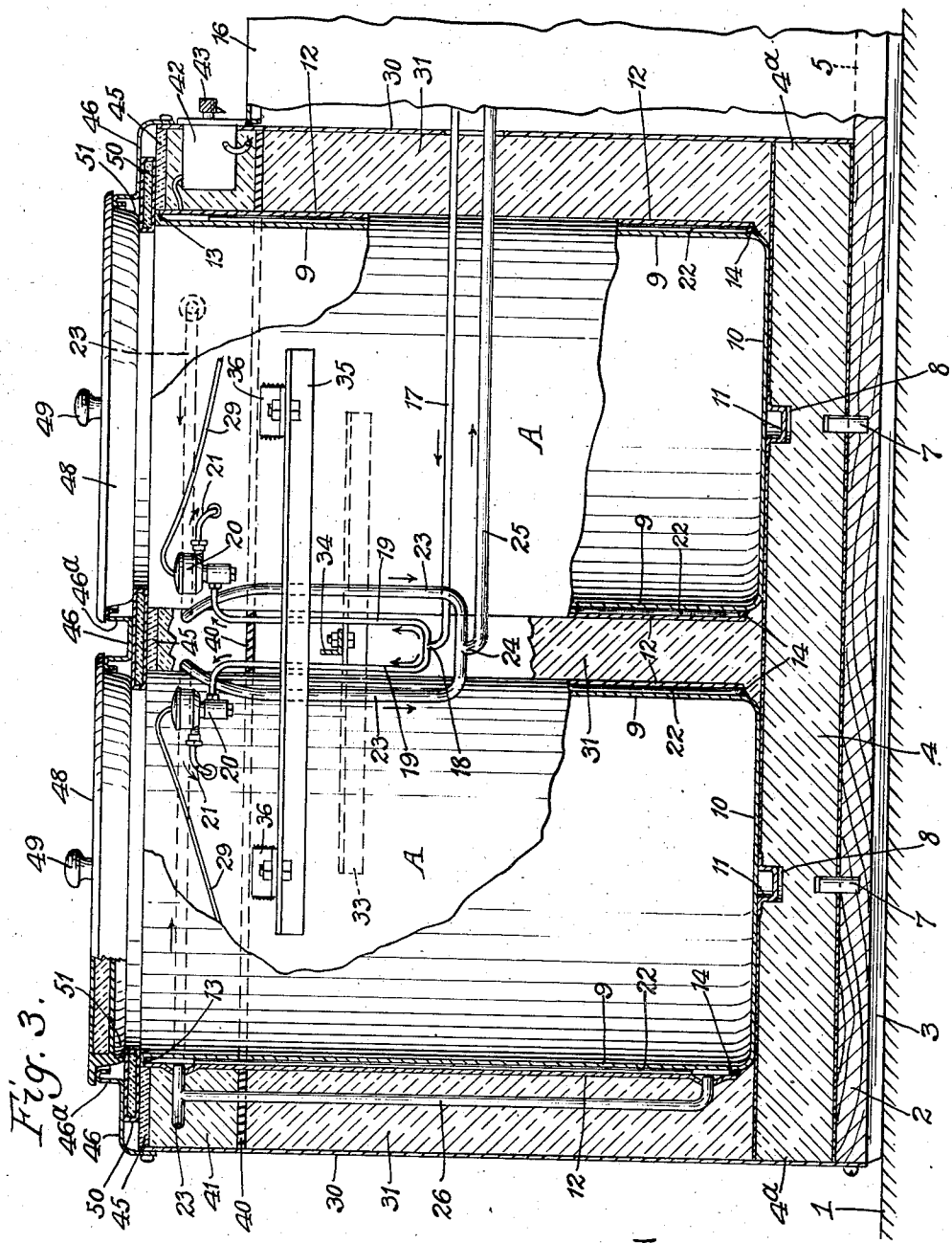


Fig. 3.

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TWIN-CYLINDER REFRIGERATOR

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Application March 18, 1944, Serial No. 527,094

5 Claims. (Cl. 62—116)

My invention relates to an improvement in refrigerating devices.

One purpose is to provide a refrigerating and storing unit having a maximum of storage space and taking up a minimum of floor space.

Another purpose is to provide a refrigeration and storage unit in which a plurality of storage members are associated.

Another purpose is to provide a multiple storage unit in which a plurality of separate evaporators each surround and circumferentially define an open topped storage space.

Another purpose is to provide an improved refrigeration and storage unit having a maximum of storage space and a minimum of supporting structure.

Another purpose is to provide a refrigeration unit in which a plurality of open topped storage members are surrounded by a single exterior wall.

Another purpose is to provide an improved refrigerator assembly in which the evaporator elements not only circumferentially define the storage space, but serve as the central frame and reinforcement, of the refrigerating cabinet.

Other purposes will appear from time to time in the course of the specification and claims.

I illustrate the invention more or less diagrammatically in the accompanying drawings wherein:

Figure 1 is a side elevation;

Figure 2 is a section on an enlarged scale along the line 2—2 of Figure 1; and

Figure 3 is a section along the line 3—3 of Figure 2.

Like parts are indicated by like characters throughout the specification and drawings.

Referring to the drawings, 1 generally indicates the supporting surface or floor on which the unit is supported. 2 is a bottom or base member, herein shown as having generally flat, parallel top and bottom surfaces. I illustrate this member as formed of wood, but it may be of any other suitable material. The base member 2 has on its underside the supporting strips 3 which rest on the floor 1. Mounted on the base 2 is a layer 4 of thick relatively firm insulating material such as a thick body of fiber board. It will be observed that whereas the base extends laterally outwardly as at 5 to receive any suitable compressor-condenser unit, the member 4 stops short of the lateral extension 5. It may be of any suitable form but I illustrate it as having rounded ends as at 4a and generally parallel sides as at 6. The member 4 may be secured to the base 2, by any suitable means but I find it practical and simple to dowel it as at 7, 7. The member 4 can thus be superposed on the base 2 quickly and easily, and its lateral movement is prevented by the doweling. The member 4 is also shown as provided with depressions 8, 8. Positioned upon the member 4 are a plurality of evaporator elements generally indicated as A. Each such element is shown as including an inner cylinder 9 with an integral closed bottom 10 and a downward projection 11 extending into one of the depressions 8 in the member 4. This is a convenient means for centering and positioning the evaporator and for preventing its lateral movement in relation to the insulating member 4. It will be understood, however, that a variety of means may be employed for holding the evaporator in place. They may, for example, be cemented to the upper surface of the member 4, and the member 4 may be cemented to the upper surface of the base 2. The evaporator structure is completed by an outer cylinder 12 which extends about the cylinder 9 and is sealed to it at the top and bottom as at 13, 14. The two cylinders define a relatively restricted circumferentially extending space to which a volatile refrigerant is delivered from any suitable compressor-condenser structure mounted on the base extension 5 and housed within any suitable housing 16, if a housing is desired. The details of the compressor-condenser unit do not of themselves form part of the present invention, and are not herein shown. It will be understood that the refrigerant is delivered toward the evaporator units along the delivery pipe 17 which forks as at 18. Each branch passage 19 then extends to any suitable expansion valve structure 20, the details of which do not form part of the present invention. The refrigerant is delivered from each expansion valve 20 along a duct 21 to the interior of the evaporator space defined between the inner and outer cylinders. I may employ any suitable means for distributing the refrigerant through the evaporator space in such fashion that the entire inner wall of the inner cylinder 9 constitutes a primary cooling surface. I illustrate, for example, a plurality of rods or baffles 22 extending vertically between the cylinders and constraining the refrigerant to take a tortuous path from the inlet to the outlet of the evaporator space. The details of this baffling do not of themselves form part of the present invention. It will further be realized that I may employ a variety of different types of evaporators in my unit. I prefer, however, that the evap-

orators be generally cylindrical and have a closed bottom and an open top. 23 indicates any suitable outlet passages joining as at 24 in the general outlet passage or duct 25 which returns to the compressor-condenser unit. 26 is an oil pick-up passage which extends from the bottom of each evaporator to its outlet passage 23. It serves to prevent the accumulation of oil at the bottom of the evaporator. Each expansion valve 20 may be controlled from any suitable temperature responsive elements, 28, placed near the outlet passage 23, and connected to the expansion valve by any suitable duct 29.

After the evaporators have been positioned as shown in the drawings an outer housing is formed by positioning a relatively thin flexible sheet material 30 about the periphery of the body of insulation 4. It may also extend downwardly about and be secured to the base 2, for example, by screws. It is cut away to permit the base portion 5 to extend laterally outwardly at one end of the unit. After the surrounding member 30 is in position I find it practical to tamp relatively soft insulation 31 into the space about the two evaporators. It will be observed that the various connecting ducts are located between the member 30 and the evaporators, and may be readily embedded in the soft insulation. The tamping of the soft insulation would tend to bulge out the straight side portions 32 of the member 30. I may employ one or more reinforcing elements 33 which may be secured to the inner face of the straight portions 32 and may be connected by any suitable transversely extending member or members 34. Thus, the side portions 32 are prevented from bulging out when the insulation is tamped therebetween. Whereas I have shown parallel plane vertical side portions at 32, it will be understood that the form may be varied in any suitable manner. For example, the side may be arcuately outwardly bulged to a controlled degree, or may be more or less indented in alignment with the space between the two evaporators. The structure herein shown, however, is practical and involves a minimum use of floor space, connected with simplicity of design and economy of materials. I also may couple the two evaporators together by longitudinally extending structural members or angles 35 which may be bolted or otherwise secured to lugs or flanges 36 outwardly extending from the outer cylinders of the evaporators. I may provide any suitable insulating means between the members 35 and the flanges 36, but under normal circumstances none is necessary, because the member 35 is deeply embedded within the soft insulation 31. 34 and 35 are offset and out of contact, to prevent any conduction of heat inwardly from the outer wall 30.

I may provide a transverse extending sealing layer 40 of material having low heat transmitting properties, but serving as a seal or separation between the low mass of soft insulation 31 and an upper mass 41 of soft insulation. This upper mass 41 may be somewhat looser than the lower mass 31 to permit ready access to the expansion valves 20 embedded therein. No joints or connections which are able to become loose are located below the level of the seal 40. Above it I may locate the expansion valves and the connections between the expansion valves and the various necessary ducts. I may also position the control box 42 in the space above the seal 40, the control box having an exterior control nob 43. The details of the control connection do not form part of the present invention and are not shown. It will be understood that the manipulation of the control element 43 varies the temperature to which the stored material is subjected. The loose insulation 41 may be sealed and confined within an upper insulating layer 45. Above it may be positioned any suitable top cover 46, of sheet metal, plastic sheet or the like. It may be advantageous to make it of plastic. I show it as having an upwardly turned flange 46a about the top of each storage space, upon which seat the removable covers 48 with their nobs 49.

50 is any suitable rubber or synthetic sealing member, which receives the downwardly extending soft sealing ring 51 of the cover. It will be seen that the flange 46a, and the covers 48 are all located at a level above the upper edge of the evaporator, and therefore, are insulated therefrom by an intervening layer of still air, which constitutes an ideal insulant.

It will be realized that whereas I have described and shown a practical and operative device, nevertheless many changes may be made in size, shape, number and disposition of parts without departing materially from the spirit of my invention. I therefore wish my description and drawings to be taken as in a broad sense illustrative and diagrammatic, rather than as limiting me to my specific showing herein. For example, the shape of the unit as a whole may be widely varied. The housing 16 may be employed or omitted. The details of the evaporator unit may be widely varied. The refrigerant circuit may be of any suitable size.

I claim:

1. In a refrigerating and storage structure, a base, a plurality of generally cylindrical open topped evaporator storage units, said base having rounded ends, each of said ends being generally concentric with the walls of one of said evaporator units, an outer housing of relatively thin flexible material surrounding said base and said evaporator units, a unitary body of insulating material upon said base, upon which the evaporator units rest, a mass of relatively loose insulation tamped into the space between said housing and said evaporator units, and between said units, inlet and outlet ducts for said units, embedded in said insulation, a compressor-condenser unit in circuit with said evaporator units, said outer housing having longitudinally extending side portions connecting said arcuate end portions, said outer housing constituting an outer cabinet wall, said evaporator units constituting the sole internal reinforcement for said cabinet wall.

2. In a refrigerating and storage structure, a base, a plurality of generally cylindrical open topped evaporator storage units, said base having rounded ends, each of said ends being generally concentric with the walls of one of said evaporator units, an outer housing of relatively thin flexible material surrounding said base and said evaporator units, a unitary body of insulating material upon said base, upon which the evaporator units rest, a mass of relatively loose insulation tamped into the space between said housing and said evaporator units, and between said units, inlet and outlet ducts for said units, embedded in said insulation, a compressor-condenser unit in circuit with said evaporator units, said outer housing having longitudinally extending side portions connecting said arcuate end portions, and reinforcing means for said longitudinally extending side portions, adapted to prevent outward bulging, said outer housing con-

stituting an outer cabinet wall, said evaporator units constituting the sole internal reinforcement for said cabinet wall.

3. In a refrigerating and storage structure, a base, a plurality of generally cylindrical open topped evaporator storage units, said base having rounded ends, each of said ends being generally concentric with the walls of one of said evaporator units, an outer housing of relatively thin flexible material surrounding said base and said evaporator units, a unitary body of insulating material upon said base, upon which the evaporator units rest, a mass of relatively loose insulation tamped into the space between said housing and said evaporator units, and between said units, inlet and outlet ducts for said units, embedded in said insulation, a compressor-condenser unit in circuit with said evaporator units, said outer housing having longitudinally extending side portions connecting said arcuate end portions, and reinforcing means for said longitudinally extending side portions, adapted to prevent outward bulging, and tension means extending between said reinforcing means for the opposite sides of said housing, said outer housing constituting an outer cabinet wall, said evaporator units constituting the sole internal reinforcement for said cabinet wall.

4. In a refrigerating and storage structure, a base, a plurality of generally cylindrical open topped evaporator storage units, said base having rounded ends, each of said ends being generally concentric with the walls of one of said evaporator units, an outer housing of relatively thin flexible material surrounding said base and said evaporator units, a unitary body of insulating material upon said base, upon which the evaporator units rest, a mass of relatively loose insulation tamped into the space between said housing and said evaporator units, and between said units, inlet and outlet ducts for said units, embedded in said insulation, a compressor-condenser unit in circuit with said evaporator units, said outer housing having longitudinally extending side portions connecting said arcuate end portions, and connecting, positioning means extending between said evaporator units, said outer housing constituting an outer cabinet wall, said evaporator units constituting the sole internal reinforcement for said cabinet wall.

5. In a refrigerating and storage structure, a base, a plurality of generally cylindrical open topped evaporator storage units, said base having rounded ends, each of said ends being generally concentric with the walls of one of said evaporator units, an outer housing of relatively thin flexible material surrounding said base and said evaporator units, a unitary body of insulating material upon said base, upon which the evaporator units rest, a mass of relatively loose insulation tamped into the space between said housing and said evaporator units, and between said units, inlet and outlet ducts for said units, embedded in said insulation, a compressor-condenser unit mounted on said base exteriorly of said housing and in general horizontal alignment with said evaporator units, said evaporator units being in circuit with said condenser-compressor unit, said outer housing having longitudinally extending side portions connecting said arcuate end portions, said outer housing constituting an outer cabinet wall, said evaporator units constituting the sole internal reinforcement for said cabinet wall.

WILLARD L. MORRISON.