June 7, 1932. H. M. HESSENBRUCH 1,862,491

REFRIGERATOR

Filed March 26, 1931 2 Sheets-Sheet 1

FIG. I

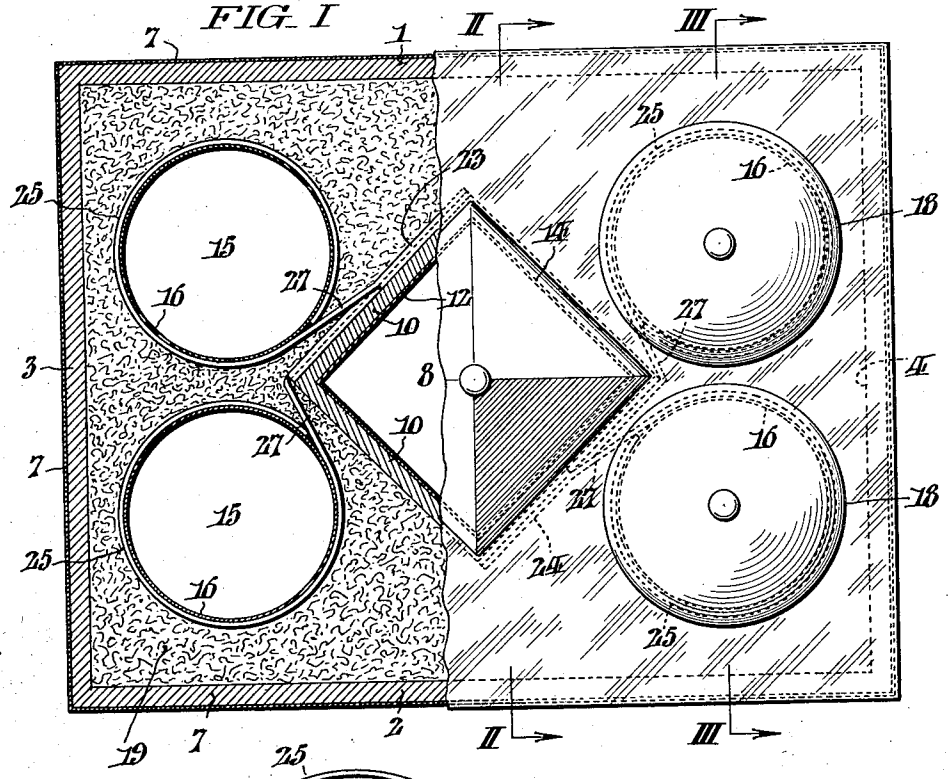
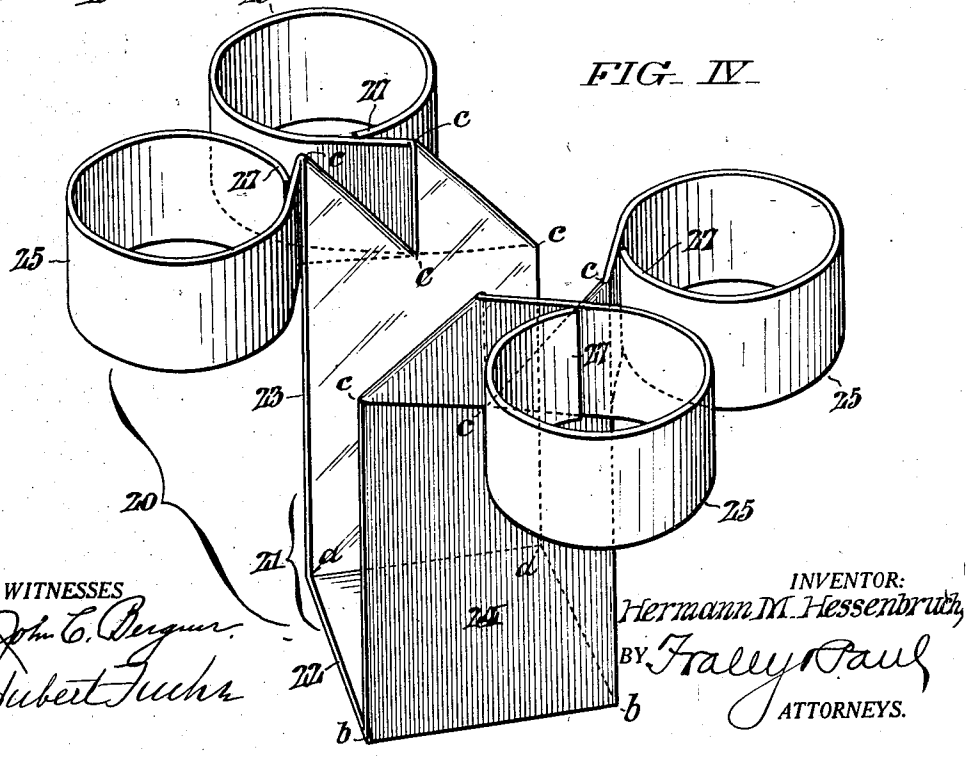


FIG. IV



WITNESSES

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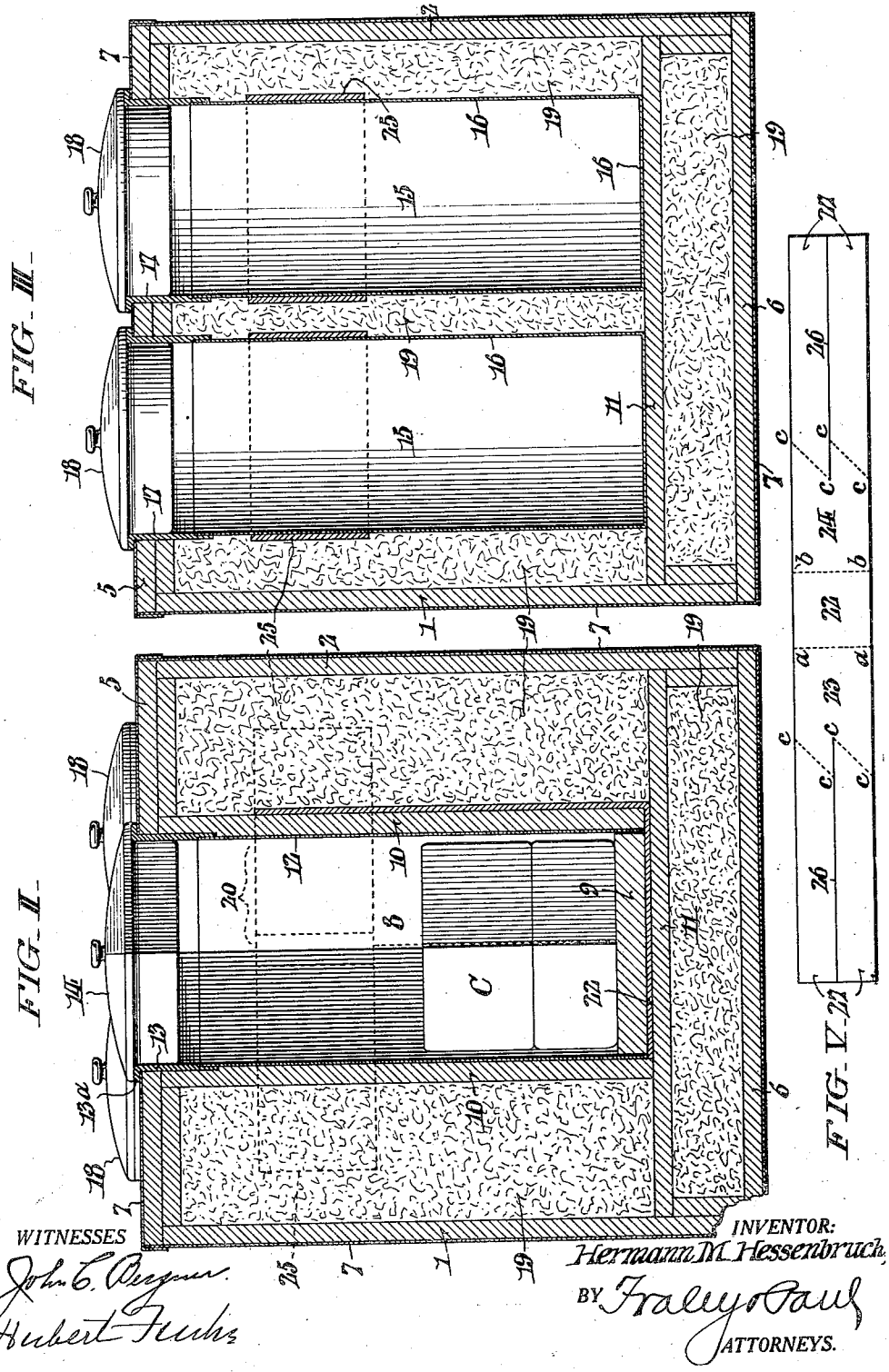
BY Fraley & Paul

ATTORNEYS.

June 7, 1932. H. M. HESSENBRUCH 1,862,491

REFRIGERATOR

Filed March 26, 1931 2 Sheets-Sheet 2



WITNESSES

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Patented June 7, 1932 1,862,491

UNITED STATES PATENT OFFICE

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REFRIGERATOR

Application filed March 26, 1931. Serial No. 525,444.

This invention relates to refrigerators; and it has reference more particularly to refrigerators of the ice cream cabinet type designed for the use of solid carbon dioxide or other so-called "dry" ices.

In connection with refrigerators of the kind specifically referred to, I aim to make possible effective thermal transfer or conduction between a compartment or well containing the refrigerant, and a multiplicity of individual chambers or wells containing the different ice creams or other commodities which are to be preserved, so that the latter may be maintained at a uniform and constant temperature over protracted periods with a minimum consumption of the refrigerant.

The foregoing desiderata I realize in practice as a consequence of the provision of a thermal transfer or conductor element to connect the compartment or well containing the refrigerant with the several refrigerating chambers or wells, the said element being integrally formed from a single strip of conductive sheet material with incidental elimination of junctures such as would be likely to interfere with uniform thermal transfer between the refrigerant and the products undergoing refrigeration or to otherwise impair the efficiency of the refrigerator.

Other objects and attendant advantages of this invention will be manifest from the following detailed description in coordination with the attached drawings, wherein

Fig. I is an illustration, partly in plan and partly in horizontal section, of my improved cabinet refrigerator.

Fig. II shows a central cross sectional view taken as indicated by the arrows II—II in Fig. I.

Fig. III is a transverse sectional view taken as indicated by the arrows III—III in Fig. I.

Fig. IV is a perspective view of the thermal conductor element provided for connecting the individual refrigerating chambers or wells of my cabinet refrigerator and the compartment or well containing the refrigerant; and

Fig. V is a plan view of the strip sheet material from which the element of Fig. IV is integrally formed, drawn to a smaller scale.

As delineated in Figs. I–III my novel refrigerator has the form of a rectangular cabinet with side walls 1, 2; end walls 3, 4; top 5; and bottom 6 which may be either of wood or of insulation board, the whole being enveloped by a sheathing 7 of sheet metal. Medially of the structure in this instance, is a vertical compartment or well 8 for the refrigerant conventionally represented at C which is supported on a block 9 of wood or the like. The compartment or well 8 is square in cross section, accessible from above, and defined by inner walls 10 of the refrigertor casing and a cross partition 11, the said walls and the horizontal partition being likewise of wood or insulation board. The sides of the well or compartment 8 are lined with sheet metal as indicated at 12, the said lining terminating short of the top of the cabinet and being lapped by a supplemental lining member 13 of rubber or the like formed with a perimetric flange 13*a* to marginally lap the well opening in the cabinet top 5. The compartment or well 8 is protected by a removable cover 14 which is preferably constructed hollow from suitable sheet material and filled with thermal insulation packing.

From Fig. I it will be noted that the compartment or well 8 for the refrigerant C is located in the midst of a multiplicity of individual vertical refrigerating chambers or wells 15, which, in the present instance, are cylindric, and adapted to receive the cans (not shown) containing the ice cream or other commodity which is to be preserved. The chambers or wells 15 have metal linings 16 that cover their sides and also their bottoms. Like the lining 12 of the refrigerant compartment 8, the linings 16 of the chambers or wells 15 do not extend quite to the top of the refrigerator casing. Also, as with the well 8, supplemental lining members 17 are employed here around the tops of the wells 15 above the metallic linings 16; and removable covers 18 are relied upon to normally protect the wells against extraneous temperature influence. The refrigerating chambers or wells 15 are effectively isolated from one another and from the central com-

partment or well 8 by ample intervals or hollows afforded through the liberal proportioning of the refrigerator casing, the said hollows being filled with a fibrous insulating packing 19 such for example as kapok.

As a means for connecting the compartment or well 8 with the chambers or wells 15, I have provided a thermal transfer or conductor element which is illustrated in perspective, and comprehensively designated by the numerad 20 in Fig. IV. This element 20 may be of sheet metal or any other suitable conducting material, and, as shown, it has a U-shaped body portion 21 with a cross web 22 to overlie the horizontal partition 11 of the refrigerator casing (Fig. II) within the bottom of the chamber or well 8, and sides 23, 24 to extend up along opposite side walls 10 of the said chamber or well 8. Extending laterally from the tops of the sides 23, 24 of the element 20 are horizontal loops 25 which embrace the upper portions of the linings 16 of the wells 15, see Figs. I and III.

To preclude joints likely to decrease the conductivity of the element 20 and thereby impair the efficiency of the refrigerator as a whole, I form the said element from a strip blank proportioned as shown in Fig. V and split at the ends as indicated at 26. I first bend the blank through right angles on transverse lines *a*—*a* and *b*—*b* to set up the U-shaped body portion 21 of the element 20. I next fold the four ends 27, resulting from the splitting at 26, crosswise of the sides of the body portion on diagonal lines *c*—*c*, and then roll them into the shape of the loops 25.

In the operation of the refrigerator, as the carbon dioxide C sublimates, heat is drawn from the chambers on wells 15 through the medium of the transfer or conductor element 20, and conveyed to the compartment or well 8 containing the refrigerant. Due to the balanced design of the thermal transfer or conductor element 20, the transmission of heat from the refrigerating chambers or wells 15 is uniform to the end that like and unvarying conditions of temperature are maintained in them at all times, as long as any of the carbon dioxide remains. The advantages just pointed out are obviously enhanced by the unitary construction of the thermal transfer or conductor element 20, with the result that the highest efficiency is obtained in the operation of the refrigerator with a minimum consumption of the refrigerant.

Having thus described my invention, I claim:

1. In a refrigerator designed for use of a refrigerant like solid carbon dioxide, a multiplicity of individual refrigerating chambers; a separate compartment for the refrigerant; and a thermal conductor element formed integrally from a single strip of sheet material and connecting the several refrigerating chambers with the compartment containing the refrigerant.

2. In a refrigerator designed for use of a refrigerant like solid carbon dioxide, a multiplicity of individually accessible refrigerating chambers; a separately accessible compartment for the refrigerant; and a thermal conductor element formed integrally from a single strip of sheet material and connecting the several refrigerating chambers with the compartment containing the refrigerant.

3. In a refrigerator designed for use of a refrigerant like solid carbon dioxide, a multiplicity of individual refrigerating chambers; a separate compartment for the refrigerant; and a connecting thermal conductor element formed integrally from a single strip of sheet material surrounding portions of the several refrigerating chambers and the compartment containing the refrigerant.

4. In a refrigerator designed for use of a refrigerant like solid carbon dioxide, a multiplicity of individual refrigerating chambers, each lined with metal; a separate compartment for the refrigerant; and a thermal conductor element formed integrally from a single strip of sheet material, extending from the compartment containing the refrigerant and connecting with the linings of the several refrigerating chambers.

5. In a refrigerator designed for use of a refrigerant like solid carbon dioxide, a separate compartment for the refrigerant in the midst of a multiplicity of individual refrigerating chambers; and a thermal conducting element formed integrally from a single strip of sheet material and connecting the several refrigerating chambers with the compartment containing the refrigerant.

6. In a cabinet refrigerator designed for use of a refrigerant like solid carbon dioxide, a multiplicity of vertical refrigerating chambers or wells individually accessible from above; and a separate vertical compartment or well for the refrigerant, likewise accessible from above, and a thermal conductor element formed integrally from a single strip of sheet material and connecting the several refrigerating chambers or wells with the compartment or well containing the refrigerant.

7. In a cabinet refrigerator designed for use of a refrigerant like solid carbon dioxide, a multiplicity of vertical refrigerating chambers or wells individually accessible from above; and a separate vertical compartment or well for the refrigerant, likewise accessible from above; and a thermal conductor element formed integrally from a single strip of sheet material with a body portion partly surrounding the side and bottom of the compartment or well containing the refrigerant, and with laterally extending por-

tions reaching from the body portion to the refrigerating chambers or wells.

8. In a cabinet refrigerator designed for use of a refrigerant like solid carbon-dioxide, a vertical compartment or well for the refrigerant in the midst of a multipliicty of individual chambers or wells for the materials to be refrigerated; and a thermal conductor element integrally formed from a single strip of sheet material with a U-shaped body portion surrounding the sides and the bottom of the compartment or well containing the refrigerant, and with portions reaching laterally from the said body portion and embracing the refrigerating chambers or wells.

9. In a cabinet refrigerator designed for use of a refrigerant like solid carbon dioxide, a compartment or well for the refrigerant in the midst of a multiplicity of individual refrigerating wells or chambers; and a thermal-conductor element integrally formed from a split-ended strip of sheet material with the solid section of the latter bent on transverse lines into a U-shaped body portion adapted to extend around the sides and the bottom of the compartment or well containing the refrigerant, and with the split ends aforesaid folded on diagonal lines and bent into horizontal loops to embrace the refrigerating chambers or wells.

10. In a cabinet refrigerator designed for use of a refrigerant like solid carbon dioxide, a compartment or well for the refrigerant in the midst of a multiplicity of individual refrigerating wells or chambers; the said refrigerating chambers or wells being lined with metal; and a thermal conductor element integrally formed from a split-ended strip of sheet material with the solid portion of the latter bent on transverse lines into a U-shaped body portion adapted to extend around the sides and the bottom of the compartment or well containing the refrigerant, and with the split ends aforesaid folded on diagonal lines and bent into horizontal loops to embrace the linings of the said refrigerating wells or chambers.

In testimony whereof, I have hereunto signed my name at Philadelphia, Pennsylvania, this 25th day of March, 1931.

HERMANN M. HESSENBRUCH.