998,434.

J. F. WEBB.

REFRIGERATOR.

APPLICATION FILED DEC. 18, 1909.

Patented July 18, 1911.

4 SHEETS—SHEET 1.

Fig. 1.

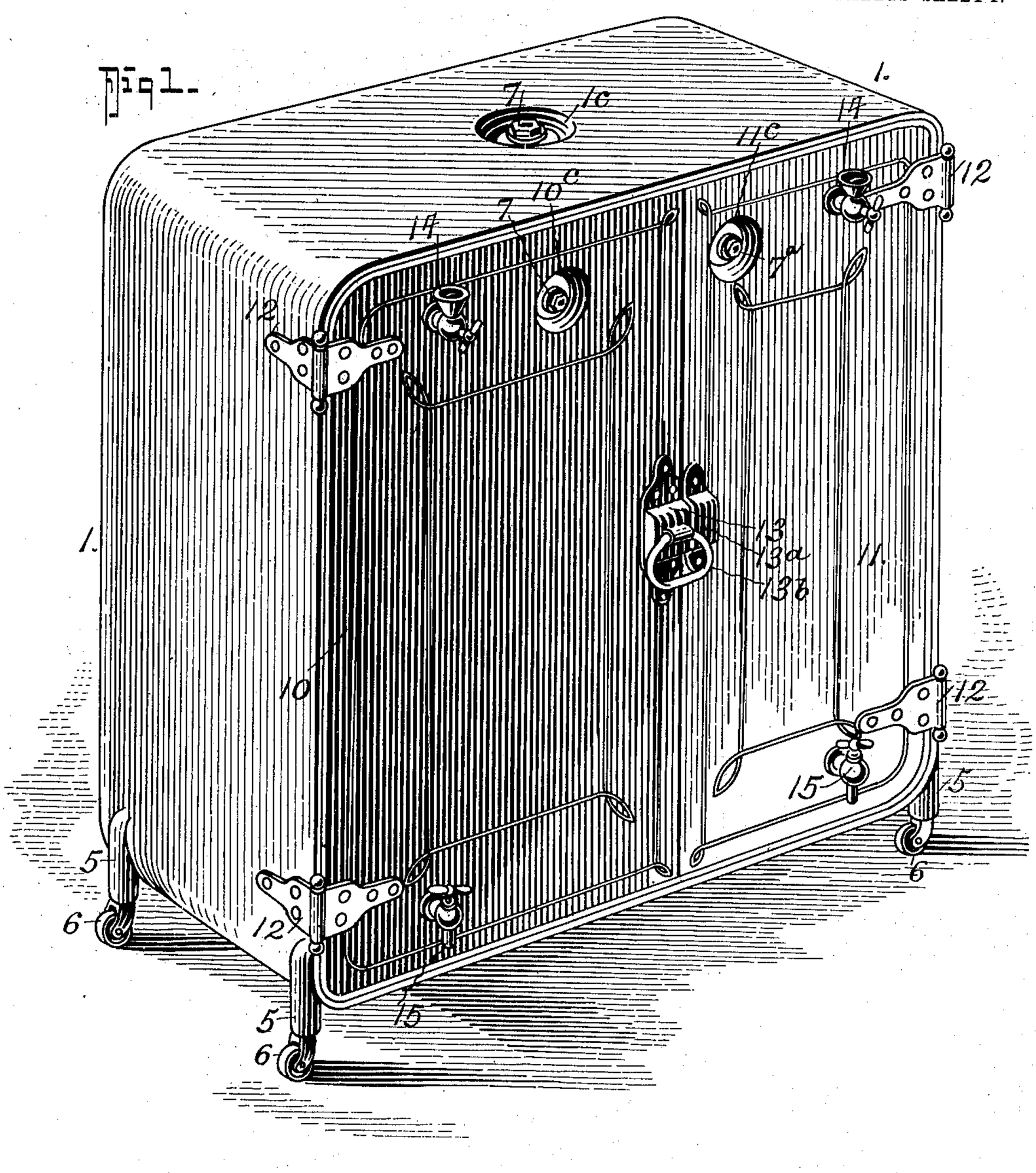
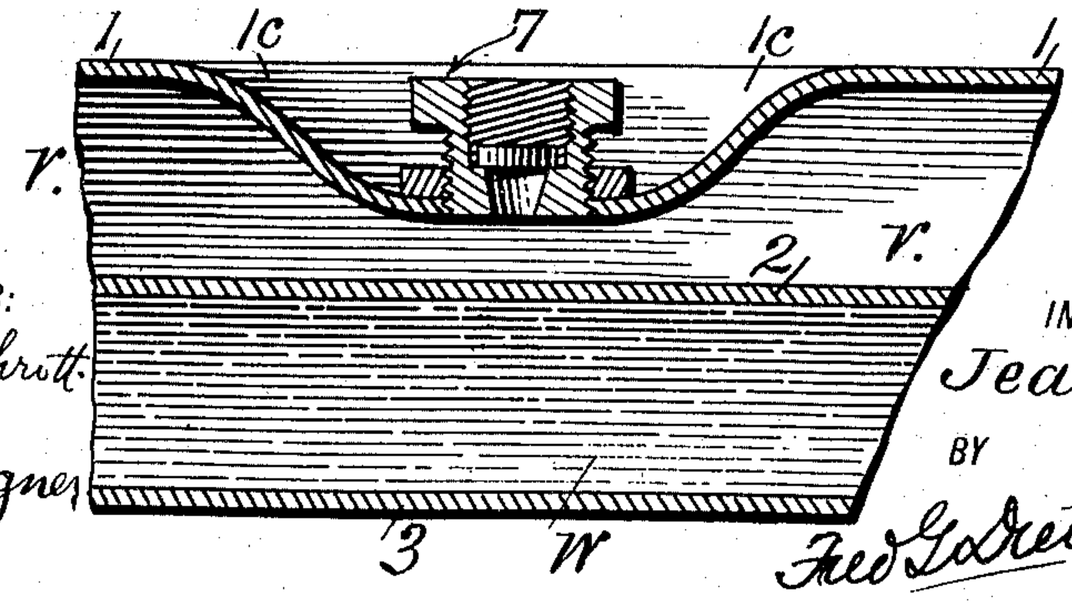


Fig. 5.



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4 SHEETS—SHEET 2.

Fig. 2.

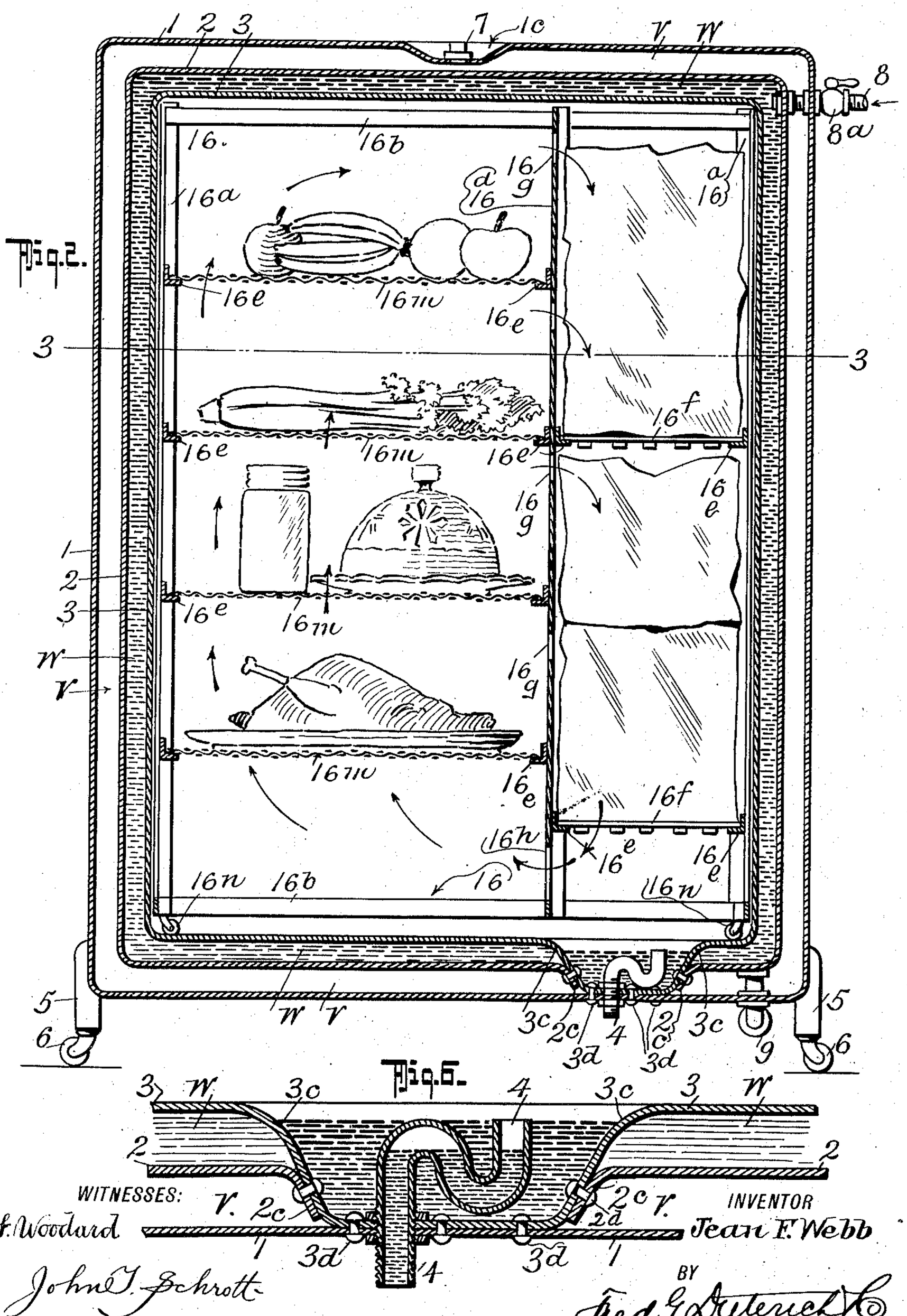

Fig. 6.

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4 SHEETS—SHEET 3.

Fig. 3.

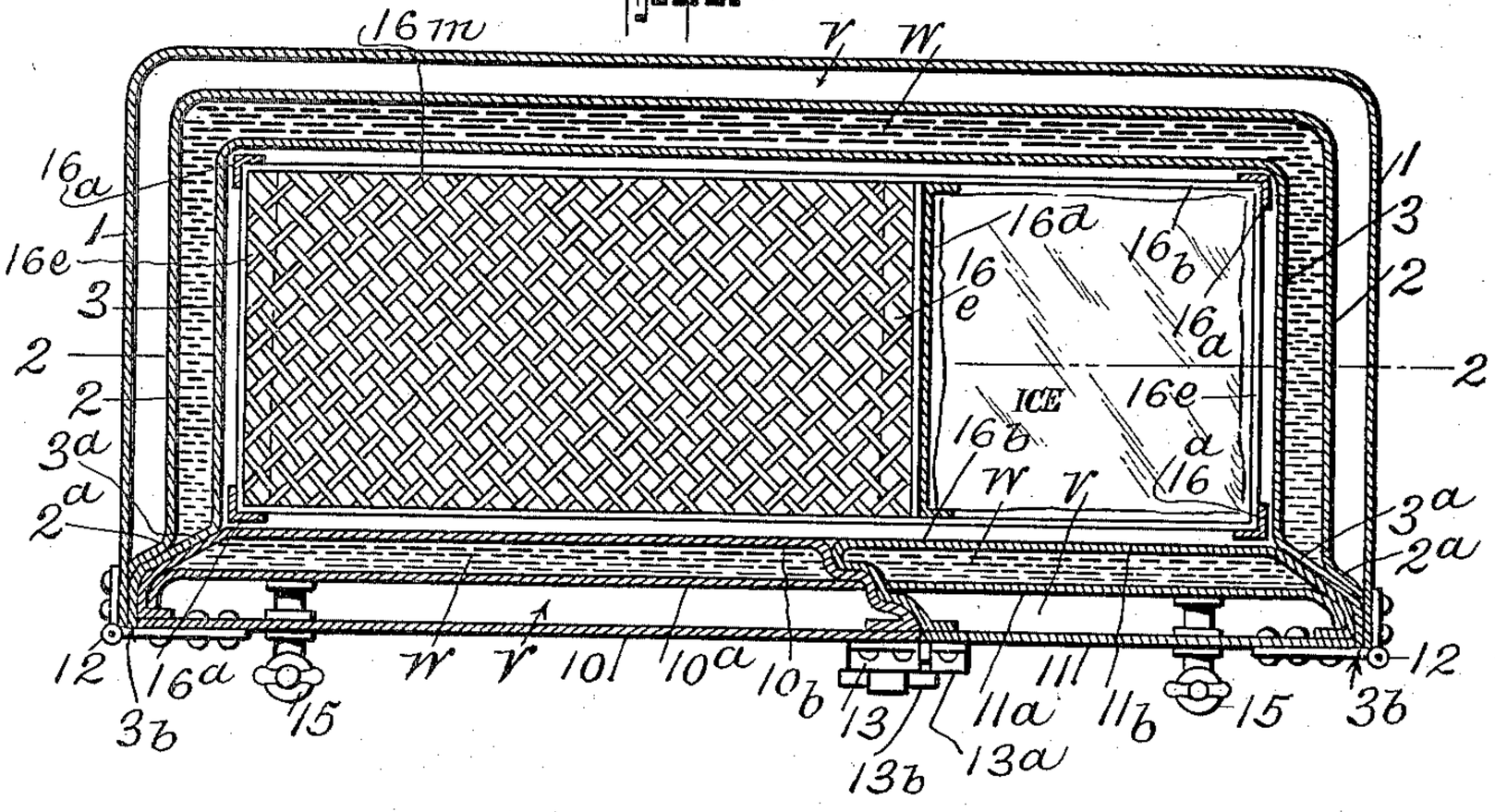
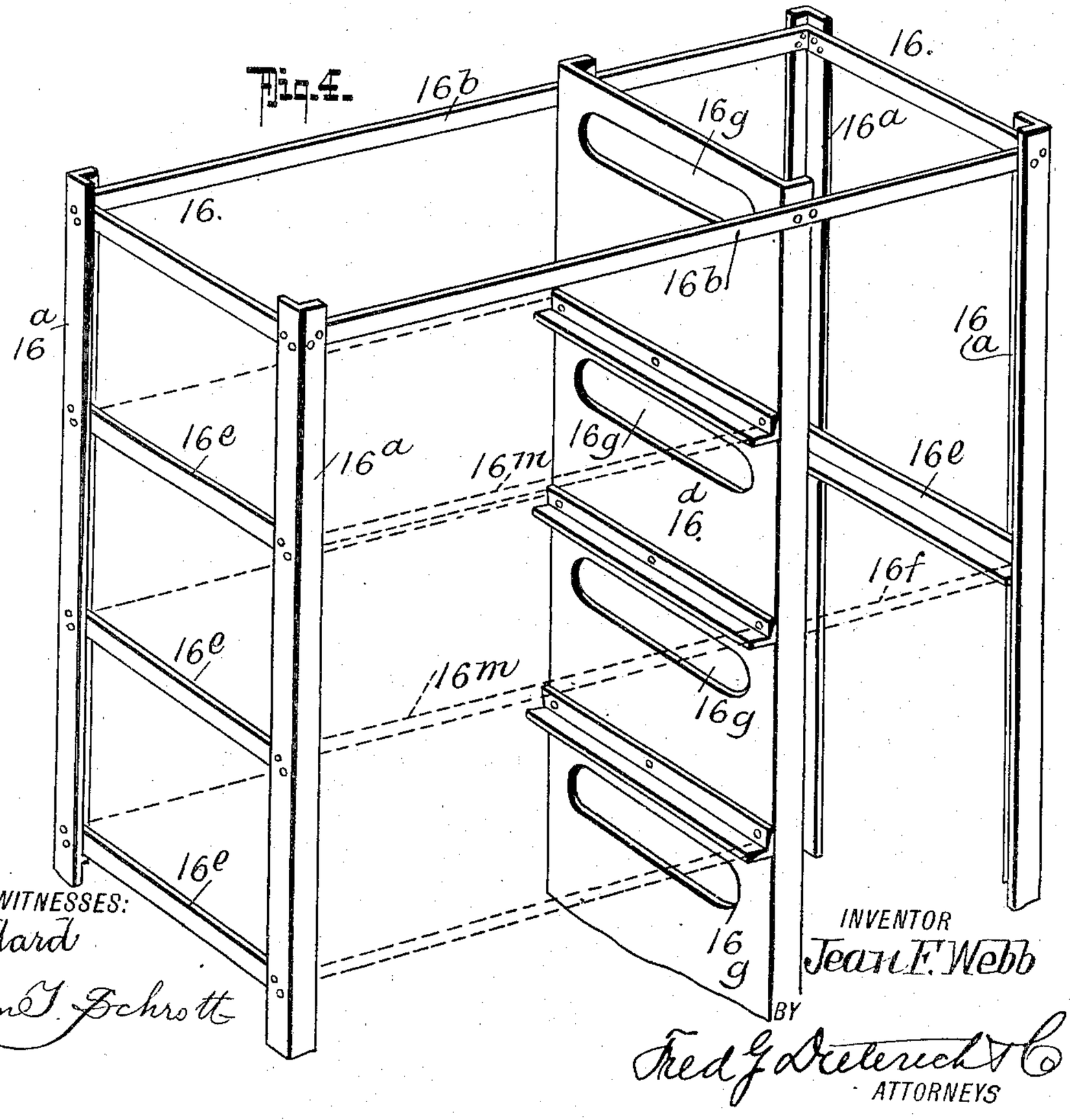


Fig. 4.



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4 SHEETS—SHEET 4.

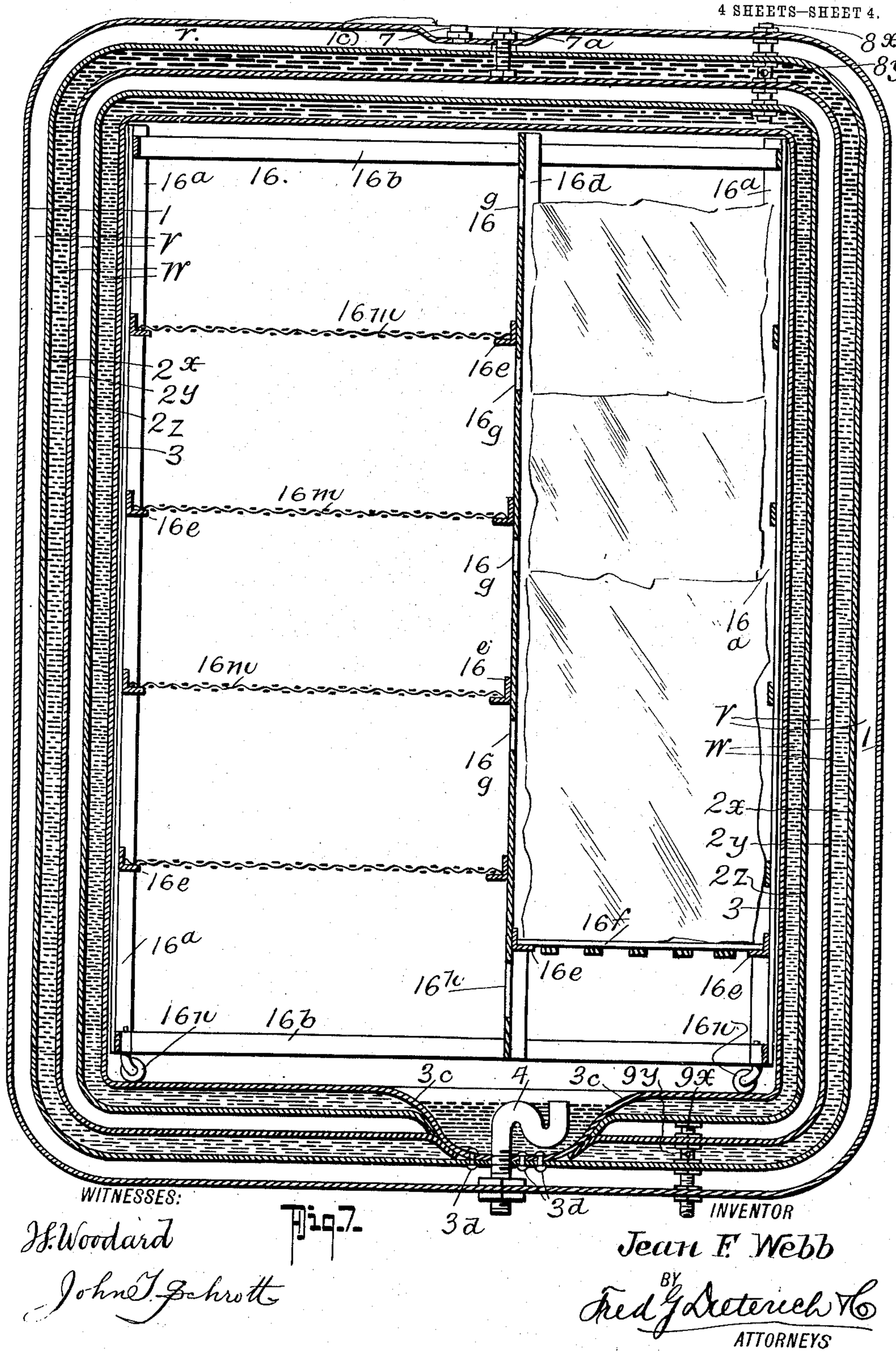

Fig. 7.

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UNITED STATES PATENT OFFICE.

JEAN FRANCIS WEBB, OF NEW YORK, N. Y.

REFRIGERATOR.

998,434. Specification of Letters Patent. Patented July 18, 1911.

Application filed December 18, 1909. Serial No. 533,800.

To all whom it may concern:

Be it known that I, JEAN F. WEBB, residing at New York, in the county of New York and State of New York, have invented certain new and useful Improvements in Refrigerators, of which the following is a specification.

This invention is an improved refrigerator wherein is provided an inner shell inclosing the food and ice chambers, which shell is surrounded by a plurality of other shells, the spaces between alternate ones of which are evacuated, while the other spaces are filled with a circulating fluid, such as water, brine, alcohol and water, or other suitable fluid having a low freezing point.

The several shells of the refrigerator are preferably formed of pressed steel and welded together at their joints. Doors are also provided having alternate fluid and vacuum chambers, and means are provided whereby the vacuum chambers may be evacuated and sealed up, and means are also provided whereby the fluid chambers may be filled and drained, as desired.

The invention also resides in providing a frame having shelves to receive the food stuff and ice, which frame may be bodily removed from the refrigerator and which supports the ice in a position such that it is held close to one side of the refrigerator so that the fluid within the fluid jacket or chamber may be cooled in such manner that effective circulation thereof will be established.

Those novel details of construction, combination and arrangement of parts, hereinafter described and specifically pointed out in the appended claims, also form a part of my invention.

Referring now to the drawings,—Figure 1, is a perspective view of my invention. Fig. 2, is a central, vertical, longitudinal section on the line 2—2 of Fig. 3. Fig. 3, is a horizontal section on the line 3—3 of Fig. 2. Fig. 4, is a perspective view of a part of the inner frame that supports the shelving. Fig. 5, is an enlarged detail section view of the air valve and seal. Fig. 6, is an enlarged detail sectional view of the drain and trap. Fig. 7, is a view similar to Fig. 2 of a modification of the invention.

Referring now to the accompanying drawings, in which like numerals and letters of reference indicate like parts in all of the figures, 1 designates the outer shell, which in the preferred form of the invention is of rectangular form, the shell forming in cross section three sides of a rectangle. Within the shell 1 is an inner shell 3 and an intermediate shell 2 of like form to the shell 1, except that the shells 2 and 3 have continuous flanges 2^a—3^a respectively that project toward the outer shell 1 around the mouth of the shells 2 and 3.

The flange 3^a is welded, or otherwise made secure at 3^b to the shell 1 at its mouth, while the flange 2^a is welded, or otherwise secured to the flange 3^a, thus making air and fluid-tight chambers W and V. The chamber W adjacent to the inner shell 3 forms the fluid jacket chamber while that of V forms the vacuum chamber and surrounds the chamber W.

By constructing the shells 1, 2 and 3 as described it will be observed they form a "nest" of shells, as it were, the inner shell 3 inclosing the food and ice chamber, which thus becomes completely surrounded on three sides, top and bottom, with first a fluid jacket and then a vacuum chamber.

In the bottom of the refrigerator the shells 2 and 3 are cupped at 2^c—3^c to form a catch-basin, or drain, for the water from the melted ice. A drain trap 4 is provided to permit the outflow of the drainage water.

The cup portions 3^c and 2^c are secured together at 2^d, welded or otherwise fastened if desired, and the bottom of the cup 3^c is secured at 3^d to the shell 1 in any approved manner. This not only forms a catch basin but acts as a support for the bottom of the shells 2 and 3 beneath the place of greatest strains, namely, the ice chamber portion.

The shell 1 has a depression 1^c in which the exhausting and sealing valve 7 is held, the depression protecting the valve from injury.

Water, brine, alcohol and water, or other refrigerating fluid, is admitted into the chamber W, through a pipe 8, having a valve 8^a, from any convenient source. The chamber W may be drained through a valved outlet 9 at the bottom.

Legs 5 are provided to support the refrigerator and casters 6 may be carried by the legs 5 when desired so as to make the refrigerator readily movable.

The food and ice chamber within the shell 3 is closed by doors, each being formed of the outer wall 10—11, and intermediate and inner walls 10^a—11^a and 10^b—11^b

respectively, to form fluid and vacuum chambers W and V, respectively. The doors form the front wall of the refrigerator.

Depressions 10^c—11^c are provided in the respective doors to receive the evacuating and sealing valves 7 for the respective vacuum chambers V. Inlet cocks 14 and drain cocks 15 are also provided for each door through which fluid may be admitted to and withdrawn from the fluid chamber W of the respective doors.

The doors are hinged at 12 to the refrigerator box and they may be secured by suitable catches 13—13^a—13^b of any approved type.

Instead of providing only a single fluid and vacuum chamber I may interpose several intermediate shells 2^x—2^y—2^z between the outer shell 1 and the inner shell 3 to form alternately disposed fluid and vacuum chambers W and V respectively, care being taken to have preferably an even number of each so that a fluid chamber may be adjacent to the inner shell 3 and a vacuum chamber next to the outer shell 1, as indicated in the modified form shown in Fig. 7 of the drawings.

In the form shown in Fig. 7, a valve 7—7^a is provided for each vacuum chamber V and all of such valves may terminate in the single depression 1^c in the shell instead of providing separate or individual depressions for each of the valves 7. Similarly a single inlet pipe 8^x having ports 8^y may be used for all of the fluid chambers W and a single outlet pipe 9^x having ports 9^y may be used for all of the fluid chambers W, care being taken to effectively seal the places where such pipes pass through the shell.

For sanitary reasons I make the inner shell, of a single piece with rounded corners, so that the inside thereof may be easily and effectively washed and cleaned, and I provide a frame 16 to support the ice and food stuffs, which frame 16 is bodily removable with its contents from the refrigerator.

The frame 16 is composed of a set of vertical angle irons 16^a joined by rectangular frames 16^b at the top and bottom, and by a metallic partition 16^d that extends transversely the full height of the frame to separate the food and ice compartments.

The angle irons 16^a are further braced and joined by horizontal angle irons 16^e—16^e that form shelf supports. The angle irons 16^e carry removable shelves 16^m for the food stuff which shelves are preferably formed of heavy woven wire to permit circulation of the air through the same. One or more sets of angle irons 16^e may be provided to receive shelves 16^f for the ice.

The partition 16^d has openings 16^g—16^h for the air to pass in circulating.

By providing the ice chamber at one side of the refrigerator so that the ice will be close to the wall 3, the fluid within the chamber W will be cooled at that place thus setting up an effective circulation to bring all parts of such fluid in the chamber W adjacent to the ice, whereby such fluid is effectively cooled to the lowest practicable degree.

The shelves 16^m—16^f being removable, they may readily be washed, and the frame 16 being itself removable from the refrigerator, may be taken out and cleaned with ease.

To facilitate the removal of the frame 16 it may be provided with casters 16^n, as indicated.

In practice the refrigerator is preferably made of pressed steel, galvanized, coppered or enameled, as may be found desirable.

By providing the outer chamber always as a vacuum chamber the external heat will not penetrate into the refrigerator to any great degree, any heat passing the vacuum chamber will be absorbed by the fluid in the fluid chamber. The fluid in such chamber being kept cool by the ice within the ice compartment, such heat will be absorbed before it can arrive at the inner chamber of the refrigerator.

The water within the water chamber of the door 11 will be cooled by the ice in the ice compartment and that within the water chamber of the door 10 will be cooled by radiation.

The air within the refrigerator will circulate, as indicated by the arrows in Fig. 2, so as to maintain an even temperature throughout the food stuff compartment.

The provision of the trap 4 effects a liquid seal and thus prevents the heated air and contaminating vapors from the outside of the refrigerator, entering through such pipe or trap 4.

In this application I make no claim to the specific construction of shelf supporting frame, *per se*, disclosed in Fig. 4 of the drawings, as the subject-matter thereof forms the subject-matter of a divisional application.

From the foregoing description taken in connection with the accompanying drawings, it is thought the complete construction, operation and advantages of my invention will be readily understood by those skilled in the art to which the invention appertains.

What I claim is:

1. A refrigerator comprising a plurality of concentric metallic shells inclosing a food and ice chamber and having a passageway into said food and ice chamber, a door for inclosing said passageway, said shells having a cupped portion, and a drain pipe and trap held in said cupped portion.

2. A refrigerator comprising a plurality of concentric metallic shells inclosing a food

and ice chamber and having a passageway into said food and ice chamber, a door for inclosing said passageway, said shells having a cupped portion, a drain pipe and trap held in said cupped portion, and means for admitting fluid between certain of said shells to form a fluid jacket around said food and ice chamber.

3. A refrigerator including a nest of shells opening at one end and having their opening edges flared outwardly and secured together, the inner shell having a depression in its bottom to form a catch basin and an outlet trap held in said catch basin and projecting to the outside of the outer shell and doors carried by said shells to close the opening into the inner shell.

4. A refrigerator comprising an outer shell and a plurality of inner shells nested into said outer shell, said inner shells having outwardly flared mouths secured together and to the mouth of the outer shell, said inner shells being spaced apart from one another and from said outer shell to form a plurality of chambers between said shells, said inner shell inclosing a food and ice compartment, means for supplying water to the chamber that surrounds the food and ice compartment, and means through which the chamber that surrounds the water chamber, may be exhausted, and doors fitted into the flared mouth of the inner shell to close said food and ice compartment.

5. A refrigerator comprising an outer shell and a plurality of inner shells nested into said outer shell, said inner shells having outwardly flared mouths secured together and to the mouth of the outer shell, said inner shells being spaced apart from one another and from said outer shell to form a plurality of chambers between said shells, said inner shell inclosing a food and ice compartment, means for supplying water to the chamber that surrounds the food and ice compartment, and means through which the chamber that surrounds the water chamber, may be exhausted, and doors fitted into the flared mouth of the inner shell to close said food and ice compartment, said doors being hollow and having each a partition parallel with the outer and inner walls and dividing the doors each into an inner and an outer chamber, means for admitting water to the inner chamber, and means through which the outer chamber may be exhausted.

6. In a refrigerator, an outer shell having a mouth, a plurality of shells nested into said outer shell and spaced apart from one another, said inner shells each having an outwardly flared mouth, means for securing the outwardly flared mouths of the inner shells together and to the outer shell at its mouth, said shells inclosing between them two chambers, a circulatable fluid in the inner one of said two chambers, the outer one of said two chambers being evacuated, the inner one of said shells inclosing a food and ice compartment, and doors carried by said shells and fitted into the flared mouth of the inner shell to form a closure for said food and ice compartment, the mouth of said inner shell being substantially the full width and height of the food and ice compartment.

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Witnesses:
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LORENZO C. TAIPLER.