No. 835,095. PATENTED NOV. 6, 1906.

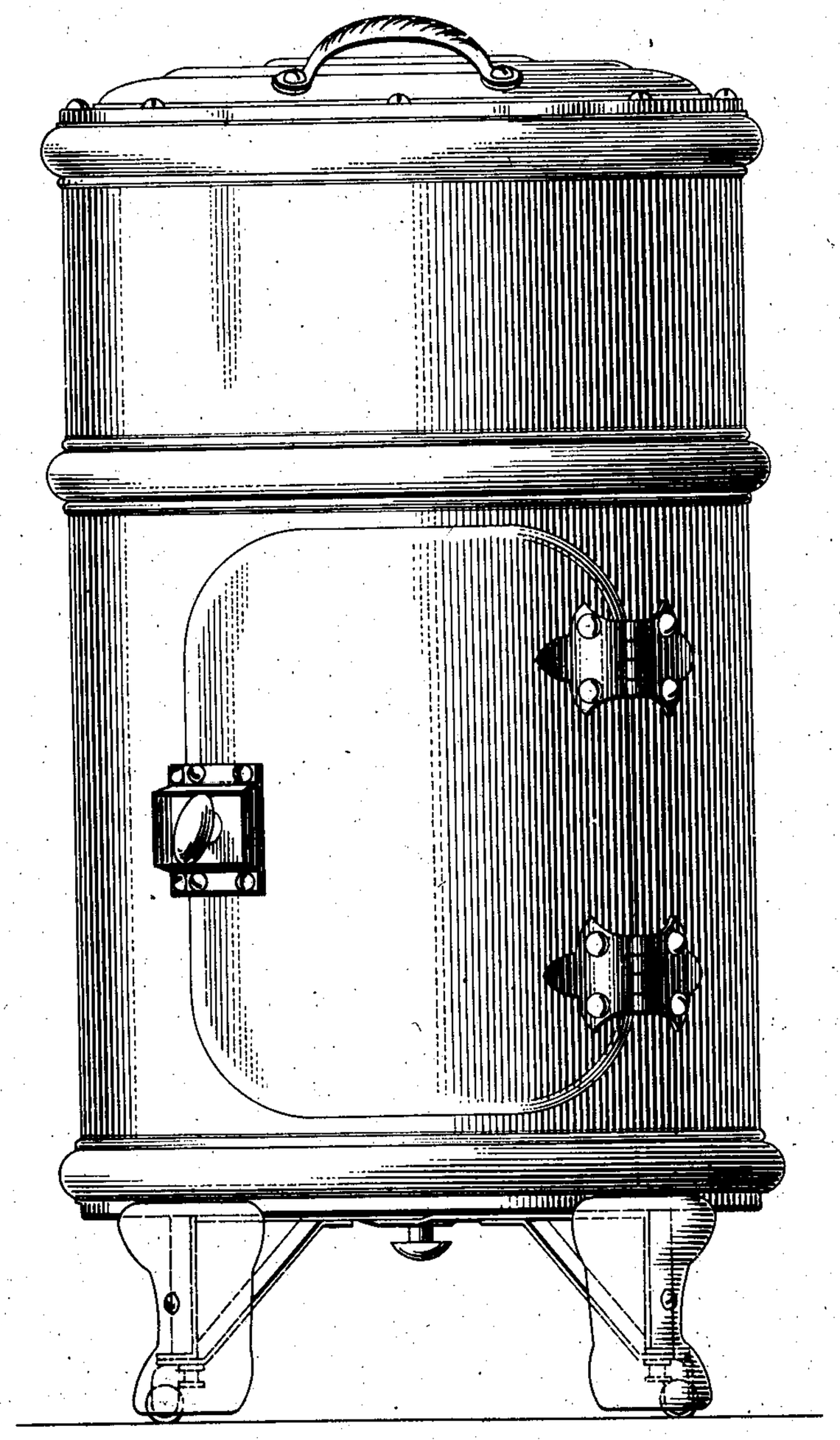
C. H. BOECK.

REFRIGERATOR.

APPLICATION FILED APR. 3, 1905.

5 SHEETS—SHEET 1.

Fig. 1.



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No. 835,095. PATENTED NOV. 6, 1906.

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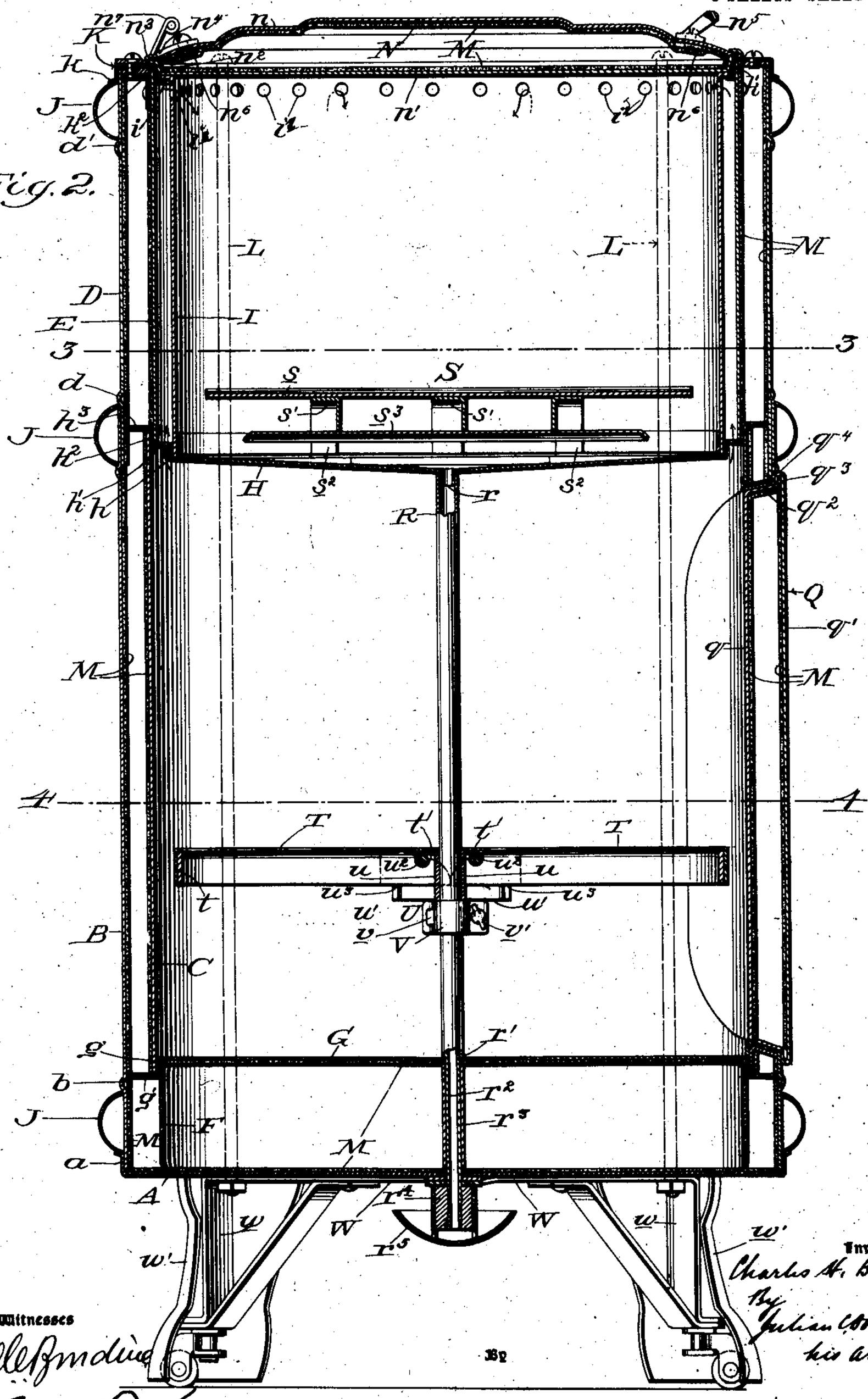
5 SHEETS—SHEET 2.

Fig. 2.



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No. 835,095. PATENTED NOV. 6, 1906.

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6 SHEETS—SHEET 3.

Fig. 3.

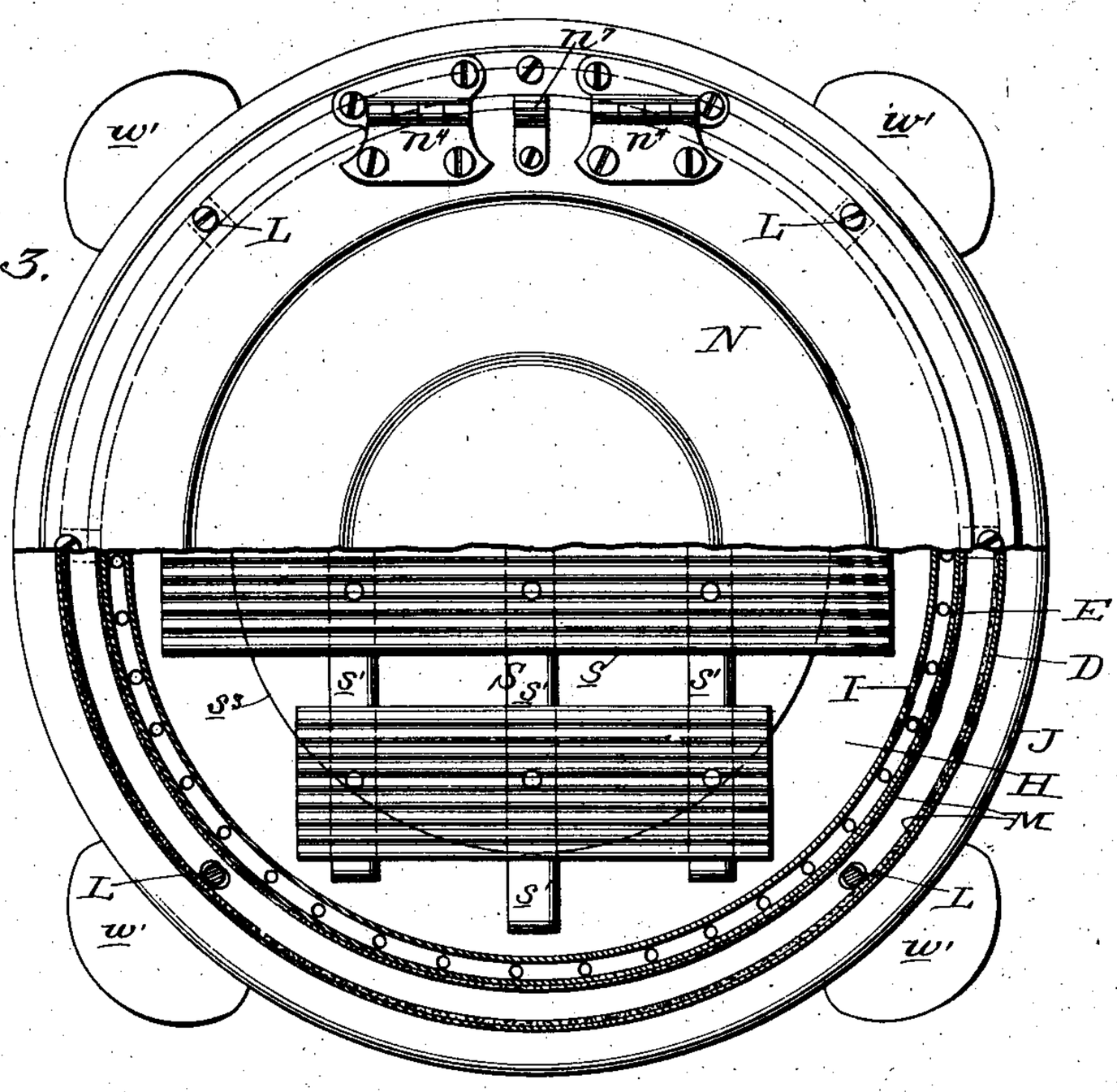
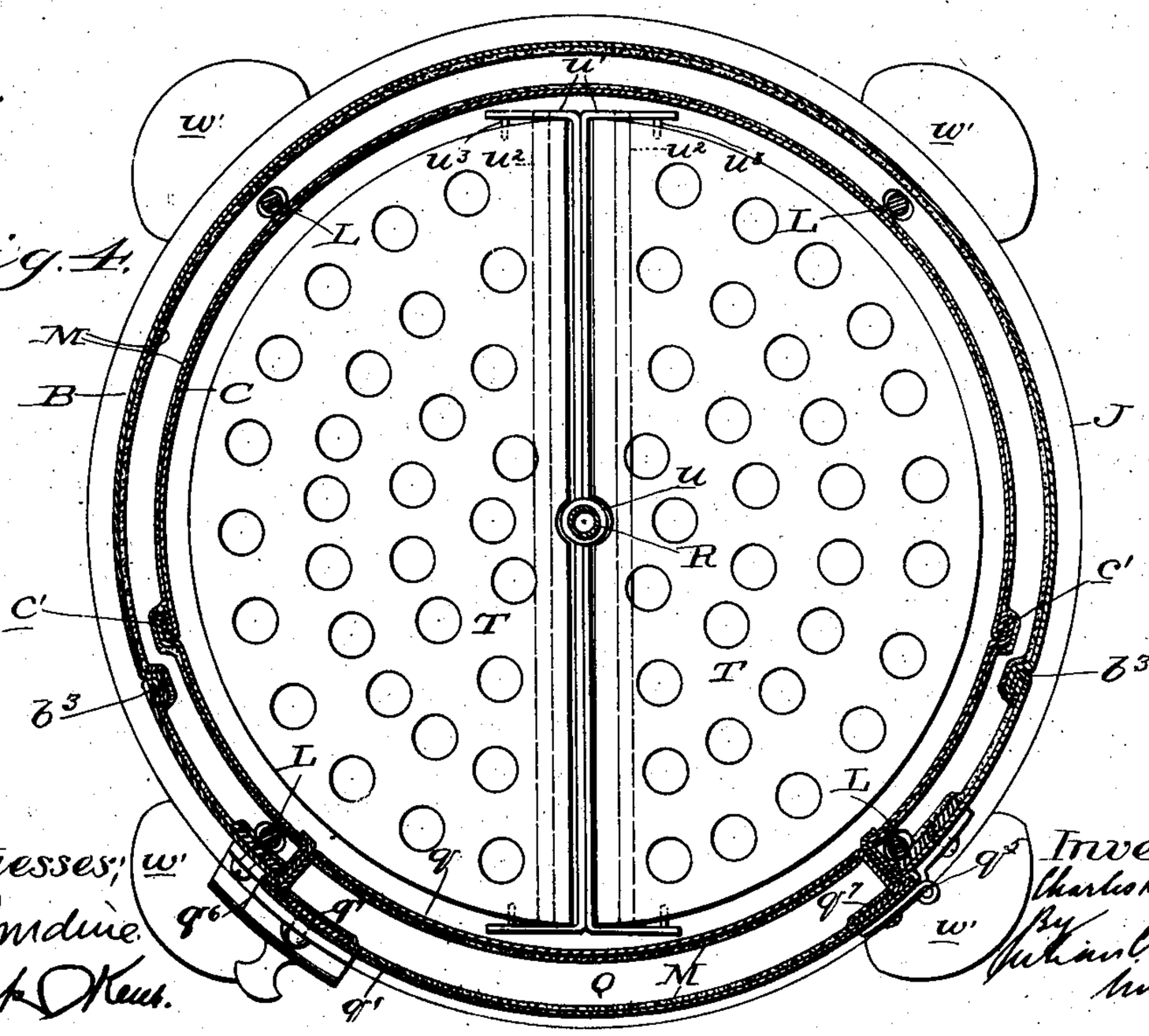


Fig. 4.



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No. 835,095. PATENTED NOV. 6, 1906.

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5 SHEETS—SHEET 4.

Fig. 5.

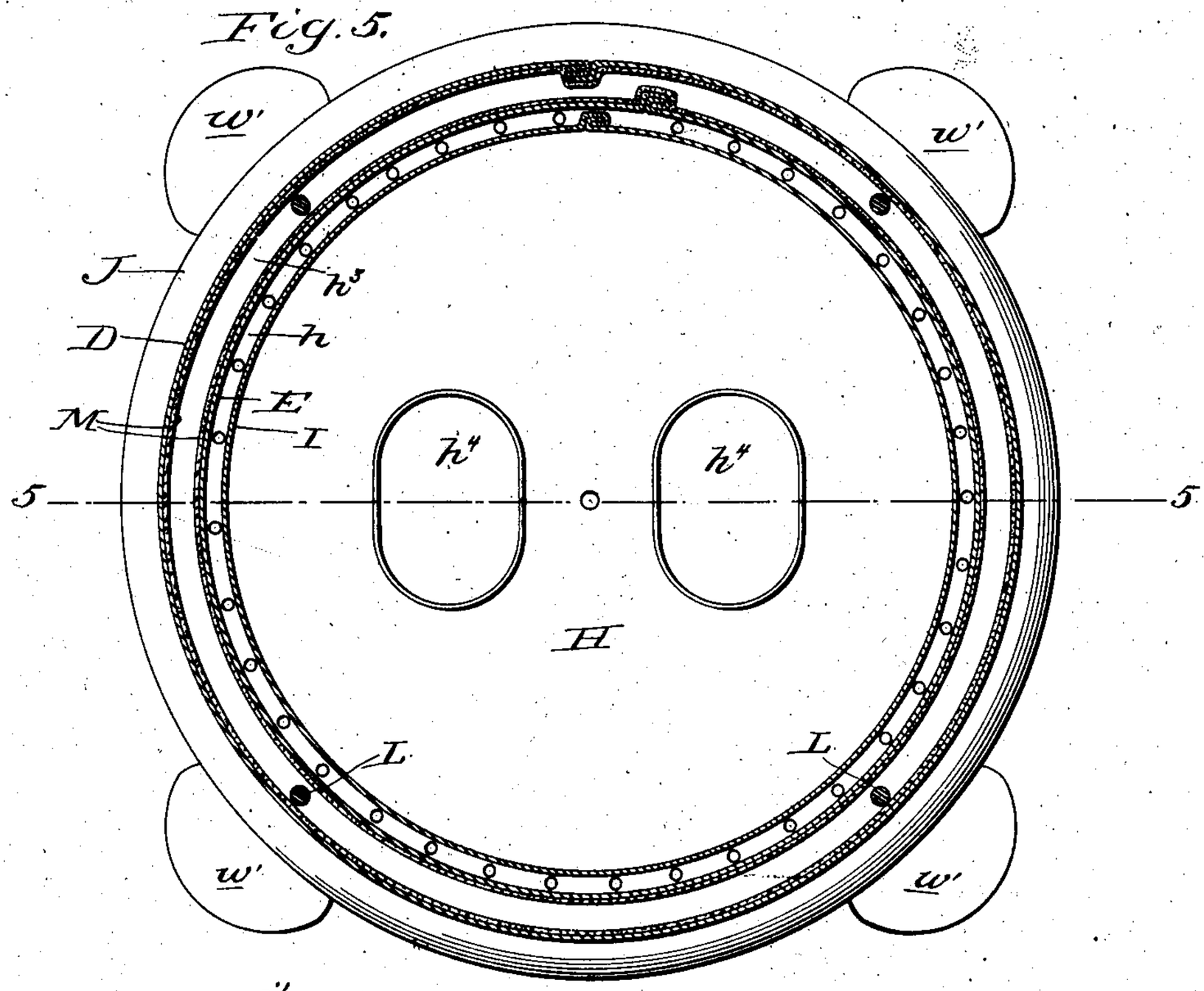
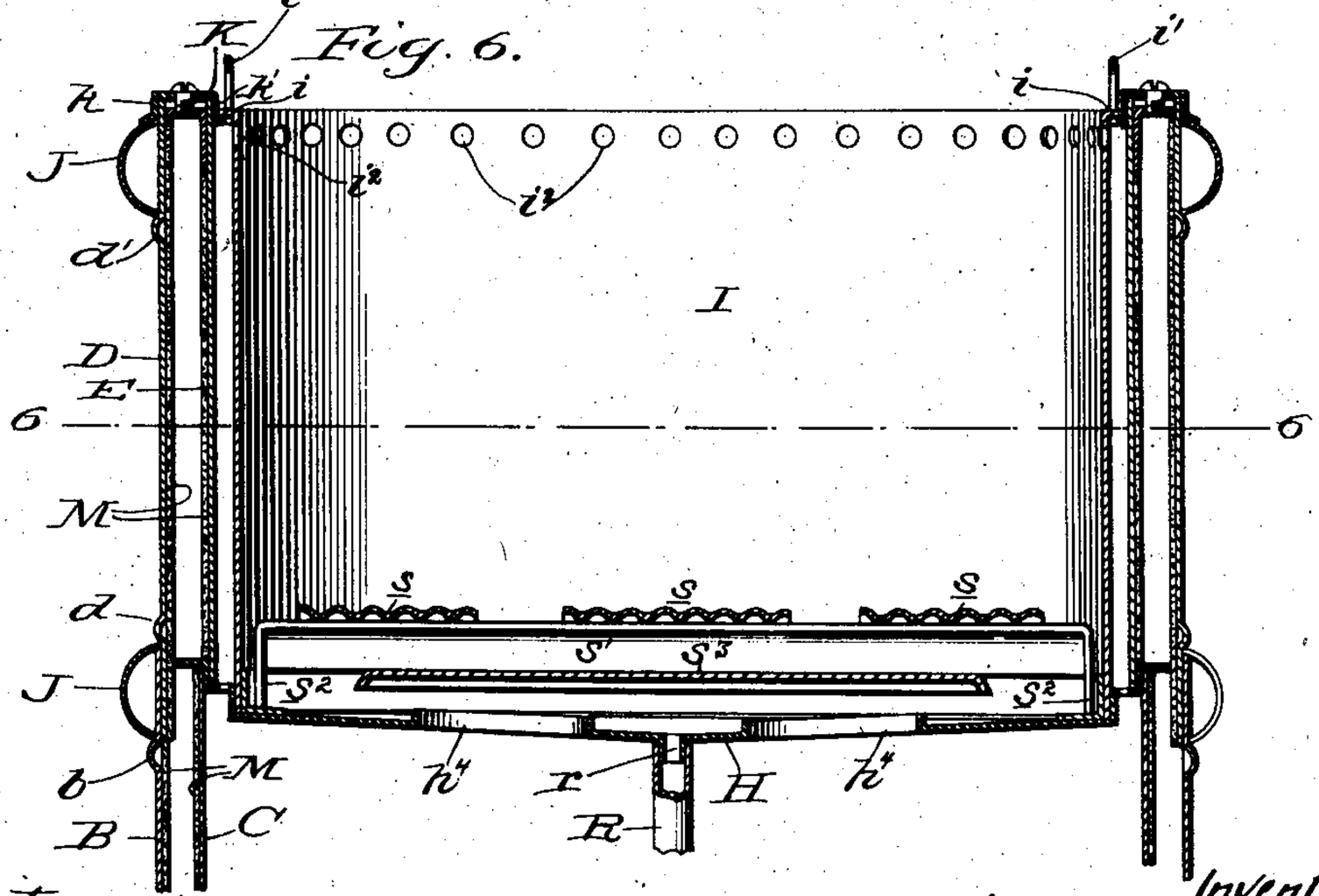


Fig. 6.



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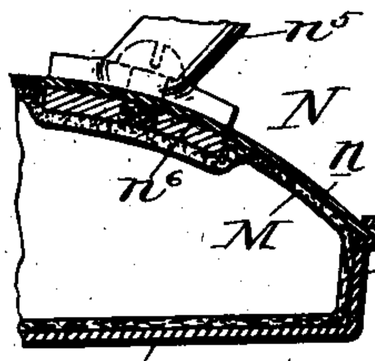
REFRIGERATOR.

APPLICATION FILED APR. 3, 1905.

6 SHEETS—SHEET 5.

Fig. 7.



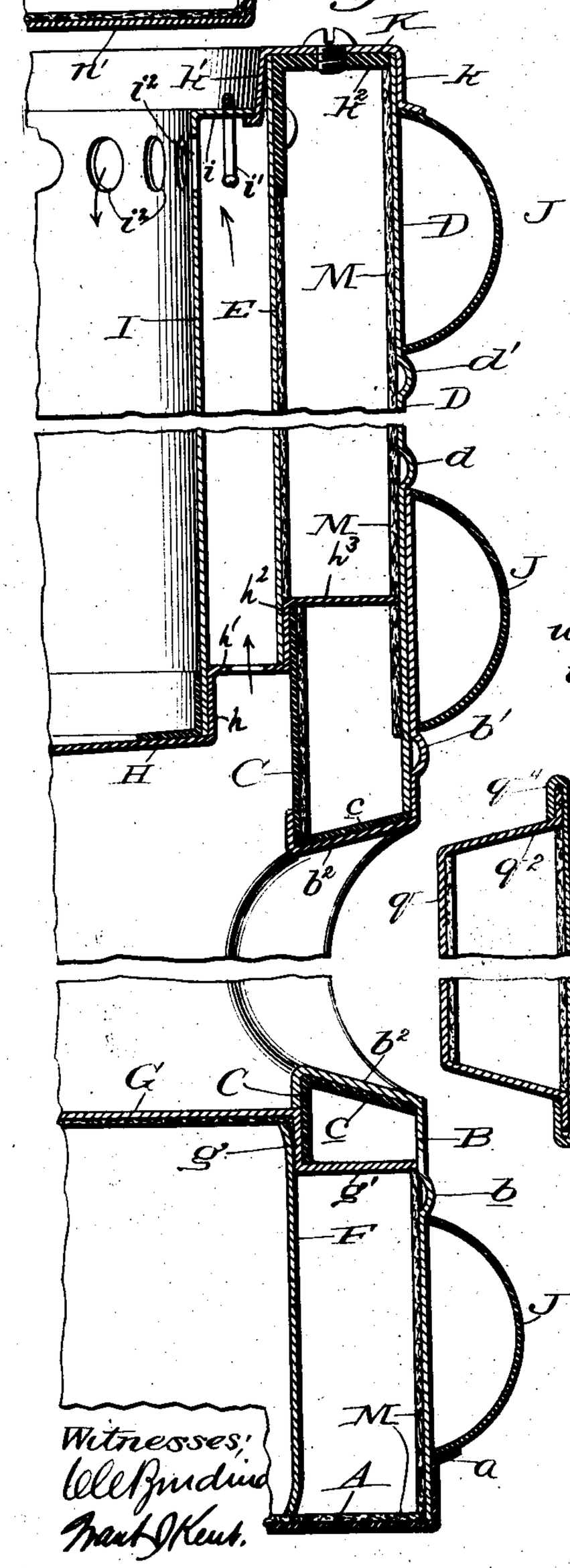


Fig. 8.

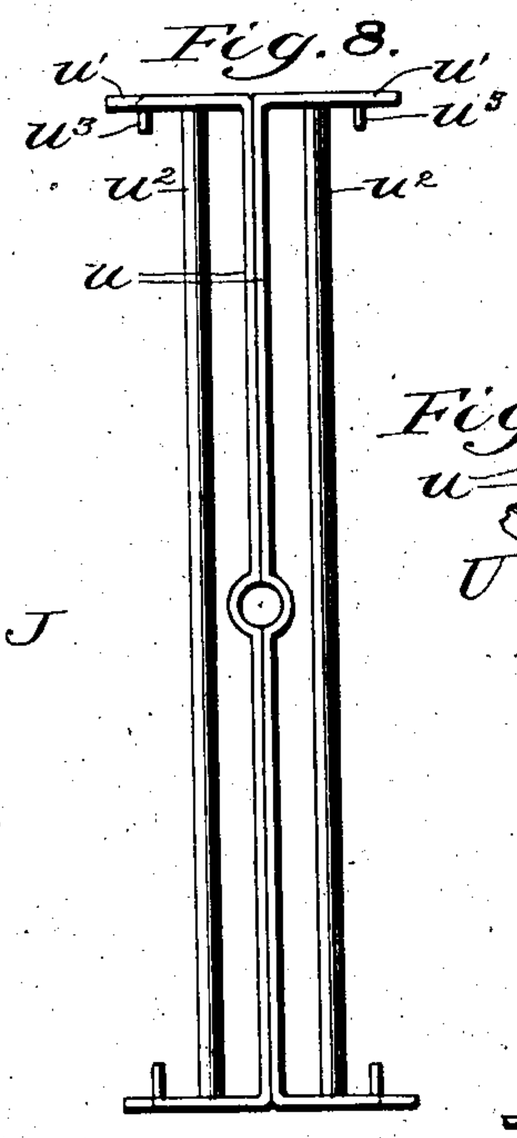
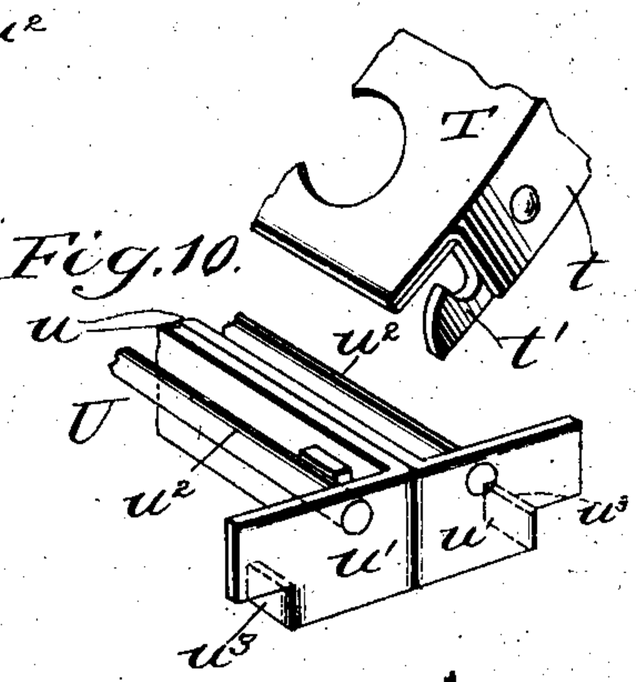


Fig. 9.

Fig. 10.



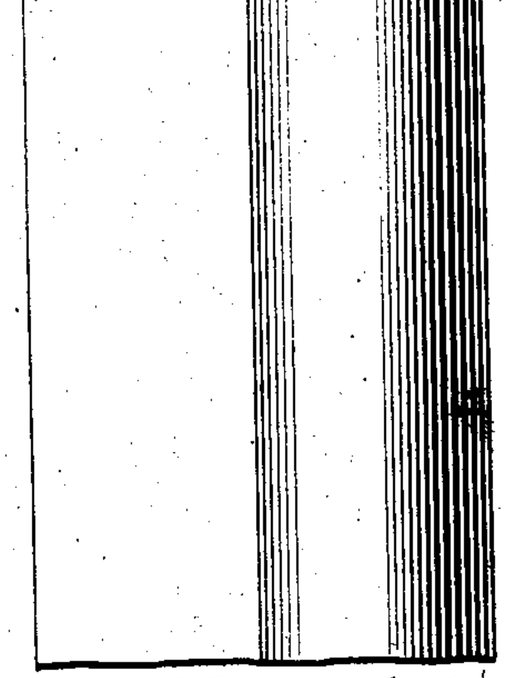


Fig. 14.

Fig. 11.

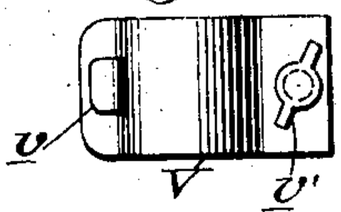
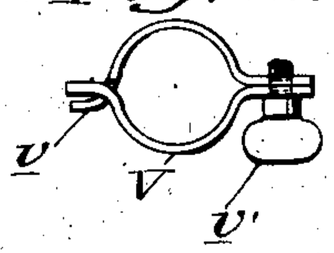


Fig. 12.



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Mark D. Kent.

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UNITED STATES PATENT OFFICE.

CHARLES H. BOECK, OF JACKSON, MICHIGAN, ASSIGNOR TO METAL STAMPING COMPANY, OF JACKSON, MICHIGAN, A CORPORATION OF MICHIGAN.

REFRIGERATOR.

No. 835,095. Specification of Letters Patent. Patented Nov. 6, 1906.

Application filed April 3, 1905. Serial No. 253,542.

To all whom it may concern:

Be it known that I, CHARLES H. BOECK, a citizen of the United States, residing at Jackson, ir the county of Jackson and State of Michigan, have invented certain new and useful Improvements in Refrigerators; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

This invention relates to domestic refrigerators. It provides a practicable and efficient metal construction therefor, principally of sheet metal, combining lightness of weight and simplicity of structure with strength and durability. The parts are ingeniously constructed and arranged so as to be readily assembled and are firmly secured together simply by long bolts extending from the top to the bottom of the body. The interior chambers of the refrigerator are well protected from the influences of outside temperature, while the arrangement of the air-passages between the ice-chest and provision-chamber is such as to maintain an effective circulation of cold-air currents about the provisions. Important features of improvement pertain also to the various mechanical appointments, the ice-tray, the drip-pipe, the provision-shelves, and the supporting-base, all of which are of novel construction and contribute to the general efficiency and excellence of the refrigerator.

The accompanying drawings, which are to be taken as a part of this specification, illustrate one preferred form of embodiment of the invention, the details of which, however, may be modified in various ways, so that without restricting myself to the specific embodiment shown the invention will be fully described with reference to said drawings and then particularly pointed out and defined in the annexed claims.

Figure 1 of the drawings is a front view of a refrigerator embodying my invention. Fig. 2 is a central vertical section of the same. Fig. 3 is a half top plan view and a half horizontal cross-section, the section being taken on line 3 3 of Fig. 2. Fig. 4 is a horizontal cross-section taken on line 4 4 of Fig. 2. Fig. 5 is a horizontal cross-section through the ice-chest or on line 6 6 of Fig. 6 with the ice-tray removed. Fig. 6 is a vertical section through the upper part of the refrigerator, taken on line 5 5 of Fig. 5 and showing the ice-tray in place. Fig. 7 is an enlarged view, in central vertical section, taken through the front of the refrigerator, showing fragments of the body, the top cover, and the front door, the said cover and door being removed from the body for better disclosure of the respective constructions. Fig. 8 is a detail top plan view of an adjustable bracket on the drip-pipe for attachment of provision-shelves. Fig. 9 is a central cross-section of the device shown in Fig. 8. Fig. 10 is a detail perspective view showing a fragment of the said bracket and a fragment of a provision-shelf about to be attached thereto, illustrating the mode of attachment. Figs. 11 and 12 are detail side and top views of the clip or clamp on the drip-pipe. Figs. 13 and 14 are end and side views showing a novel corner construction for square or polygonal refrigerators, the preceding views having illustrated a cylindrical refrigerator.

The refrigerator-body, formed in upper and lower sections, comprises concentric outer and inner casings of sheet metal, preferably sheet-steel. These casings leave between them an annular dead-air space surrounding the internal chambers of the refrigerator. A denotes a sheet-metal base. B and C designate the outer and inner casings of the lower section; D and E, the outer and inner casings of the upper section. The bottom of the outer casing B fits snugly within the flanged periphery *a* of the bottom plate A and is supported thereby. Resting upon said bottom plate is a ring F, upon which is supported a plate G, said ring and plate being likewise of sheet metal. The plate G constitutes the bottom of the provision-chamber contained within the lower section. Said plate G has drawn thereon an annular depending shoulder *g*, with a peripheral flange *g'*, which fits within the outer casing B. Said shoulder *g* incloses the upper edge of the ring F and is itself fitted within the lower end of the inner casing C, which rests upon the flange *g'*. Thus the casing C, plate G, and ring F are properly centered and held rigidly in correct relation. Resting upon the upper end of the inner casing C is a sheet-metal plate H. This constitutes the top of the provision-chamber and the bottom of the ice-chest, which is contained within the upper section.

Said plate H has drawn thereon an annular shoulder h, with an outer flange h', which latter has a second annular shoulder h^2, with an outer peripheral flange h^3 fitted within the outer casing. The upper end of the lower inner casing C fits snugly around shoulder h^2 and supports the plate H by its flange h^3. The upper inner casing E rests upon the flange h' and has its lower end fitted within the shoulder h^2. Within the casing E is a third concentric casing or cylinder I, providing an annular air-flue around the ice-chest, or between I and E. This innermost casing I rests upon said plate H and has its lower end fitted within the shoulder h. Thus the casings C, E, and I are properly centered and supported by the plate H. These parts H, E, and I should be zinc-plated or galvanized to prevent corrosion. The innermost casing I has a top flange i shown fitting within the inner flange k' of the top ring K and closing the aforesaid air-flue at the top, and said flange i is shown provided with handles i' for lifting out this cylinder I from time to time for cleansing. The handles i' consist of U-shaped bars whose legs depend through apertures in the flange i, the lower extremities of said legs being formed with knobs, as shown in Fig. 7, to prevent the handles from being detached, while yet allowing them to be lifted for taking out the cylinder I. When in place, the handles i' drop down through the flange i out of the way. The lower end of the upper outer casing D is fitted within the upper end of the lower outer casing B and has an annular bead or corrugation d resting upon the upper edge of B, thus supporting and centering D. The whole outer casing B D is preferably, though not essentially, made in upper and lower sections, as shown in view of the doorway construction in the lower section of the refrigerator, as hereinafter explained. Annular sheet-metal bands or rings J, which may be flat or other ornamental shape, but preferably concave or semicircular in cross-section, surround the body, strengthening the same, making it rigid and preventing marring or denting in transportation, as well as covering the joints and ornamenting the structure. One of these bands is located around the bottom between the flange a of A and an annular bead b on B. Another is disposed around the joint between the upper and lower sections, being secured between the beads b' and d on B and D, respectively. A third one is placed around the top between an annular bead d' on D and a depending flange k on the top ring K. This top ring is secured upon the upper ends of casings D and E, having inner and outer flanges k and k' depending around the upper peripheries of said casings, and it closes the annular hollow refrigerator-walls or dead-air space at the top. It is secured in place by screwing it to liners k^2 or small angle-shaped metal pieces riveted or otherwise attached to the casing E. The parts thus constructed and assembled are rigidly secured together by long bolts or rods L, connecting the top ring K and bottom plate A and extending longitudinally through the hollow refrigerator-walls, being passed through appropriate apertures in the flanges of the plates H and G.

It is observed that the internal chambers of the refrigerator are surrounded by the hollow refrigerator-walls or aforesaid annular dead-air space between the outer and inner casings, while a dead-air space is also formed below the provision-chamber within the ring F. All of such dead-air spaces, as well as those in the cover and front door, are preferably lined interiorly with asbestos-cloth, (denoted by the letter M,) which is for the well-understood purpose of increasing the non-conductivity of the walls and insuring the interior of the refrigerator from the influence of outside temperature.

A removable top cover N closes the ice-chest, fitting tightly within the top-ring K and resting upon the annular seat afforded by the flange i on the innermost casing I. This top cover is hollow and lined with asbestos-cloth, as aforesaid. It may consist of sheet-metal plates, the upper one n of which is convex and has a peripheral flange, while the lower one n' has an upset flange n^2, (which fits within the top ring K,) and a recurved peripheral flange n^3, embracing the periphery or flange of n, and thus forming a thin flange for the whole cover, which rests upon the top ring when the cover is down. The lower plate n' may be of zinc or galvanized metal. The top cover is shown hinged at n^4 to the top ring K and provided with a handle n^5. The butts or leaves of the hinges are secured to the sheet-metal cover and ring by screwing or bolting them to concealed liners n^6 or metal pieces under the surface of said cover and ring, and the handle n^5 is attached in like manner. It may be remarked here that such liners are employed throughout the structure for fastening to the sheet metal all the door and other fittings or mountings comprising the hinges, locks, handles, &c. A stop or rest n^7 is likewise secured on the hinged side of the cover to hold it up when opened.

The doorway construction at the front of the provision-chamber is as follows: Around the opening or doorway the inner casing C is flanged outwardly at c, while the outer casing B is flanged inwardly at b^2, the flange b^2 fitting snugly around the flange c and projecting beyond the same and reflanged, so as to fit tightly to the interior walls. In view of this construction it is desirable to make the casings B and C each of two parti-cylindrical parts, which are shown in Fig. 4 of the drawings secured together along the longitudinal

seams b^3 b^3 and c' c'. The door Q fits tightly within the doorway. It is hollow and asbestos-lined like the other parts. It comprises an inner plate q and an outer plate q', both of sheet metal. The inner plate is flanged outwardly at q^2 and terminates in a peripheral flange q^3, which is embraced by the recurved flange q^4 of the outer plate. The hinges q^5 and lock members q^6 are attached to the sheet-metal parts by means of concealed liners q^7, as aforesaid.

I make no specific claim herein to the construction of the door Q *per se*, since the same forms the subject-matter of an additional application for improvements in refrigerator-doors, filed December 8, 1905, Serial No. 290,941.

The bottom plate H of the ice-chest slants downwardly all around from the periphery to the center, where an aperture is provided into a medial drip-pipe R. This drip-pipe has its upper end fitted over a depending tube or boss r on the bottom of the plate H and extends downward through the bottom of the refrigerator. It has a shoulder r' resting upon the plate G. Surrounding the lower reduced part r^2 of the pipe is a sleeve r^3, interposed between A and G. The lower end of the pipe beneath the bottom of the refrigerator is threaded and has a nut or nipple r^4 screwed thereon, to which is attached a drip-cup r^5. By virtue of the sleeve r^3, if the nipple r^4 is screwed up tight it is impossible to bend or press the plates A and G together. Said sleeve also supports the center of the plate G against the weight of the provision-shelves on the drip-pipe. The plate H has large openings h^4 therein to allow the cold air from the ice to fall down into the provision-chamber below. The edges of the plate are flanged upward around said openings to prevent the dripping of water into the provision-chamber. The flange h' of H between E and I is provided with apertures to allow the ascent of the warmer currents from the provision-chamber, which pass upward through the annular flue surrounding the ice-chest and enter the latter through an annular series of apertures i^2 at the top. Thus an effective circulation and constant descent of fresh cold-air currents upon the provisions is maintained and there can be no moisture in the provision-chamber. Matches may be kept dry there, if desired. The ice is supported upon an ice-tray S. As shown, this comprises corrugated metal sheets s secured upon bars s' of angle-iron, making a very strong rigid support for the ice. The ends of the bars s' are bent down to form supporting-legs s^2, resting upon the plate H, and under said bars there is attached a plate s^3 large enough to cover the apertures h^4 in the plate H to prevent drippings from the ice into the provision-chamber. Since the plate s^3 is held above the apertures h^4 by the legs s^3, the cold air from the ice naturally passes down around over the plate s^3 and through the said openings into the provision-chamber.

The drip-pipe R furnishes a convenient means for supporting the provision-shelves, of which there may be one or more or any desired number, according to the height of the provision-chamber or the requirements. It is desirable to mount the shelves so as to be adjustable up and down and also so as to revolve for facilitating the placing and removal of food or other provisions onto and from the shelves. One shelf is shown comprising two detachable semicircular parts or half-shelves, each denoted by the letter T. These are attached at opposite sides of the drip-pipe to a cross-piece or frame U, which is revolubly mounted on the drip-pipe and can also be raised and lowered, being supported upon a vertically-adjustable clamp V. This clamp may be integral; but, as shown in detail in Figs. 11 and 12, it preferably comprises two separable parts, whereof one has a tongue v engaging in a slot or opening in the other at one side of the drip-pipe, while both parts are clamped together on the drip-pipe by a thumb-screw v' engaging through the flanges at the opposite side of the drip-pipe. This allows the clamp to be readily applied or removed from the drip-pipe. The frame or cross-piece U comprises two metal strips or plates u, secured flatwise together and medially formed into a sleeve or hub to loosely inclose the drip-pipe and having oppositely angled or bent ends u', between which longitudinally-disposed rods u^2 are supported, one at each side of the drip-pipe, and the said ends or arms u^2 also have inwardly-projecting rests or shoulders u^3, which may be formed by cutting and bending parts of the arms u^2. The semicircular half-shelves comprise reticulated metal plates, allowing the free circulation of air therethrough, and have their outer circumferential edges provided with flanges t, preferably reinforced by semicircular bands when the plates are of sheet metal. The ends of the half-rings t are formed with hooks t', adapted to hook under the rods u^2, while the half-rings t rest upon the shoulders or supports u^3, thus supporting the half-shelves in horizontal position, while affording a ready means for attachment for detachment for cleaning or other purposes.

The refrigerator-body is supported by a metal trusswork comprising cross bars or strips W, attached to the bottom of the refrigerator and bent downward and braced to provide the supporting-legs w, which are mounted on rollers or casters. To these legs are attached sheet-metal stove-leg-shaped legs w', which cover the trusswork beneath and produce an ornamental effect. The bolts or rods L are desirably inserted through the bars W as well as through the bottom plate A.

The construction and arrangement of the several sections and parts, as well as the novel accessory features, are applicable also to square or polygonal refrigerators, as before stated. In Figs. 13 and 14 I show a rigid sheet-metal corner construction especially adapted for such square or angular bodies, either for refrigerators or other structures. The sheet-metal part X is shown formed into parti-cylindrical shape with its ends flanged or bent inward, as at x, to a common point x' and reflanged outward, as at x^2, providing slots or seats between x and x^2, in which the sides Y and Z may be tightly fitted. The flanged parts x may be joined at x'. This feature forms the subject-matter of my pending application for "Corner construction for sheet-metal bodies," filed April 3, 1905, Serial No. 253,543.

The construction described provides an ideal sheet-metal refrigerator which is light and convenient to move around, artistic as a household article, durable, and absolutely sanitary, being fireproof and disease-proof and characterized by cleanliness, in all of which respects it is far superior to refrigerators constructed of wood, indurated fiber, &c. Furthermore, there is nothing to swell, warp, or shrink. The refrigerator is also economical and effects a saving of ice by virtue of the construction and arrangement of the air-spaces and the non-conductivity. Food and dainties may be preserved in purity and freshness. They will never "taste of the ice-box," for the refrigerator is so constructed that all chance for taste, odor, or other unsanitary condition has been eliminated. In the cylindrical form there are no corners to wipe out to the annoyance of the tidy housewife.

Having thus fully described my invention, what I claim as new, and desire to secure by Letters Patent of the United States, is—

1. A refrigerator having, in combination, a body or casing, a horizontal transverse partition therein dividing the casing interiorly into a lower provision-chamber and a superimposed compartment, an internal casing in said superimposed compartment providing an ice-chamber and surrounding flue, said internal casing having openings at its upper end providing communication between said flue and ice-chamber, the said partition constituting the bottom of the ice-chamber and having a concave upper surface and provided with a central drip-opening and with flanged openings for descent of cold air from the ice-chamber into the provision-chamber and also provided with openings around said internal casing for circulation of air through said flue, a medial drip-pipe in communication with said central drip-opening and extending down through the bottom of the refrigerator, and an ice-tray in the ice-chamber having a plate covering the air openings or passages in the bottom thereof.

2. A refrigerator comprising a double-walled sheet-metal body, the inner shell of which consists of superimposed sections, a horizontal plate arranged between said sections, an internal shell set within the upper section and resting on said plate, thereby providing an ice-chamber and surrounding flue, there being openings at the top and bottom of said flue for circulation of air from the provision-chamber to the ice-chamber, said plate constituting the bottom of the ice-chamber and having a central drip-opening and large air-openings with upwardly-flanged edges, and a raised ice-tray in said ice-chamber having a bottom plate of lesser diameter than said chamber supported above said plate and covering the air-openings thereof.

3. A sheet-metal refrigerator comprising outer and inner casings, the inner casing consisting of superimposed sections, a partition between adjacent upper and lower sections providing an upper ice-chamber and a lower provision-chamber, said partition resting upon the lower section and supporting the upper section and having an annular shoulder fitted to the ends of said sections and having another annular shoulder inclosed within the first, and an internal casing constituting the walls of the ice-chamber and resting upon said partition and having its lower end fitted to the inner shoulder thereof.

4. A refrigerator-body comprising outer and inner casings, the latter in two superimposed sections, a bottom plate on which the outer casing is supported, a ring resting on said bottom plate, a second plate supported on said ring and constituting the bottom of the provision-chamber, the lower section of the inner casing resting upon said second plate, a third plate or partition supported upon the upper end of said lower section and constituting the bottom of the ice-chest, the upper section of the inner casing resting upon said third plate, a ring supported upon the upper ends of the outer and inner casings and closing the space between them at the top, and long bolts or rods connecting said top ring and the bottom plate and securing the parts together.

5. A refrigerator-body comprising outer and inner casings, the latter in two superimposed sections, a bottom plate upon which the outer casing is supported having an annular shoulder or flange within which the lower end of said casing is fitted, a ring resting upon said bottom plate, a second plate constituting the bottom of the provision-chamber supported on said ring and having a shoulder fitting the upper end of said ring to center it, the lower section of the inner casing resting upon said second plate and having

its lower end fitting with the shoulder thereon, a third plate or partition constituting the bottom of the ice-chest supported upon the upper end of said lower section of the inner casing and having a shoulder fitted therewith, the upper section of the inner casing resting on said third plate and having its lower end fitting with the shoulder thereon, a top ring covering the space between the outer and inner casings, and long bolts or rods connecting said top ring and bottom plate and securing the parts together.

6. A sheet-metal refrigerator-body comprising a flanged bottom plate, an outer casing resting thereon within the flange thereof, a ring resting on said bottom plate, a second plate resting on said ring having a drawn shoulder surrounding the upper end of said ring and a flange fitted within said outer casing, a lower inner casing-section resting on the flange of said second plate around said shoulder, a third plate resting upon said section having a shoulder fitting the upper end of said section and a flange fitted within the outer casing, an upper inner casing-section resting upon said third plate within the shoulder thereof, a ring at the top of said outer and inner casings, and long bolts or rods connecting said top ring and bottom plate and securing the parts together.

7. In a sheet-metal refrigerator-body, the combination of outer and inner casings, the latter consisting of superimposed sections, an internal partition arranged between said sections and providing an ice-chamber above said partition and a provision-chamber below the same, said partition having an upset or drawn shoulder thereon fitted within the end of one section and around the end of the other section and having a peripheral flange fitted within the outer casing.

8. A sheet-metal refrigerator-body comprising outer and inner casings, the latter consisting of superimposed upper and lower sections, a partition or plate between adjacent sections dividing the ice-chest from the provision-chamber below, said partition resting upon the lower section and supporting the upper one and having a shoulder fitted to the ends of said sections and a peripheral flange fitted within the outer casing, said partition having a second shoulder within the first, and a third internal casing within said upper section providing an ice-chamber and surrounding flue, said third casing resting upon said partition and fitted to said second shoulder thereon and having a top flange fitted within said upper section, said partition having an annular series of openings between the inner casing and said third casing, and said third casing having an upper annular series of openings establishing communication between the ice-chest and the surrounding flue.

9. A refrigerator-body comprising a bottom plate, upright outer and inner casings concentrically arranged and mounted on said bottom plate, the inner casing comprising a plurality of sections, interior partitions arranged between said sections, thereby providing a medial provision-chamber and an upper ice-chamber and a bottom dead-air chamber, a top ring mounted on the upper ends of said casings, long bolts or rods arranged in the annular space between said casings and connecting said top ring and bottom plate and securing the parts together, the partition between the ice-chamber and provision-chamber having a central drip-opening and having openings for circulation of air between the provision-chamber and ice-chamber, a central drip-pipe extending through the provision-chamber, a door in the side of the casing for access to the provision-chamber, and a removable cover for access to the ice-chamber.

10. A sheet-metal refrigerator-body having a bottom plate, top ring, and connecting casing, and bands or rings surrounding the body at the top and bottom, said bottom plate and top ring having flanges and the casing having annular beads or corrugations, said bands being respectively fitted between the flanges of the top and bottom rings and the annular beads on the casing.

11. A sheet-metal refrigerator-body having a casing composed of sections, the end of one section fitted in the end of the other, said sections having annular beads or corrugations near the joint, and a ring or band of semicircular cross-section surrounding the casing at the joint and arranged between the annular beads or corrugations on the sections.

12. A sheet-metal body comprising outer and inner casings, and having a doorway whereof the construction is as follows: the inner section is flanged outwardly around the opening or doorway, while the outer section is flanged inwardly, the flange of the outer section fitting closely within that of the inner section and being reflanged closely around the interior side of the opening and against the interior wall of the inner casing.

13. In a refrigerator, the combination with the body or casing having a provision-chamber and superimposed ice-chest, the bottom of the ice-chest having a central drip-port, of a drip-pipe fitted to said port and extending down through the provision-chamber and beneath the bottom of the refrigerator-body, a raised bottom for the provision-chamber above the bottom of the refrigerator, the drip-pipe having a shoulder resting on said raised bottom, a sleeve surrounding the portion of the drip-pipe between said raised bottom and the refrigerator-bottom, and a nut tapped or screwed on the lower end of the drip-pipe against the bottom of the refrigerator.

14. The combination with a central upright rod or pipe in the provision-chamber, of a cross-piece thereon having opposite horizontal rods and rests at the ends thereof, and semicircular half-shelves having peripheral flanges or rings formed with end hooks adapted to hook under said rods whereby the half-shelves are supported by their flanges resting on said rests.

15. In a refrigerator, an ice-tray comprising bars of angle-iron and corrugated plates arranged transversely of said bars and secured to the horizontal flanges thereof, the ends of said bars being bent downwardly to provide supporting-legs, and a bottom plate attached to the lower sides of said bars, both the bottom plate and corrugated ice-supporting plates being raised above the lower ends of the supporting-legs.

16. In a refrigerator, the combination of an upright body having a provision-chamber and an ice-chamber above the same, a central drip-pipe, a revolving cross-piece on the drip-pipe, and detachable semicircular provision-shelves mounted on said cross-piece at opposite sides of the drip-pipe.

17. In a sheet-metal refrigerator, an outer casing of sheet metal composed of superimposed sections whose adjacent ends are fitted one within the other, the said sections having annular beads or ribs, and a band or ring secured around the casing between the said beads or ribs on the respective sections thereof and covering the interfitted or overlapping portions of the sections.

18. A refrigerator comprising a bottom plate, and concentric or outer and inner casings mounted upright thereon, the inner casing being composed of a plurality of superimposed sections, partitions arranged between adjacent sections, and a top ring secured upon the upper ends of said casings, thereby providing a medial provision-chamber and an ice-chamber above the same and a bottom dead-air chamber and an annular dead-air space around the ice-chamber and provision-chamber.

19. In a refrigerator, the combination of the casing or body comprising concentric inner and outer shells of sheet metal, and a top ring secured on the upper ends thereof and closing the space between said shells, and angle-shaped metal pieces secured to the inner shell in the space between the two shells, the top ring being secured to said angle-shaped pieces.

In testimony whereof I affix my signature in presence of two witnesses.

CHARLES H. BOECK.

Witnesses:

G. E. Dow,

D. R. Tarbell.