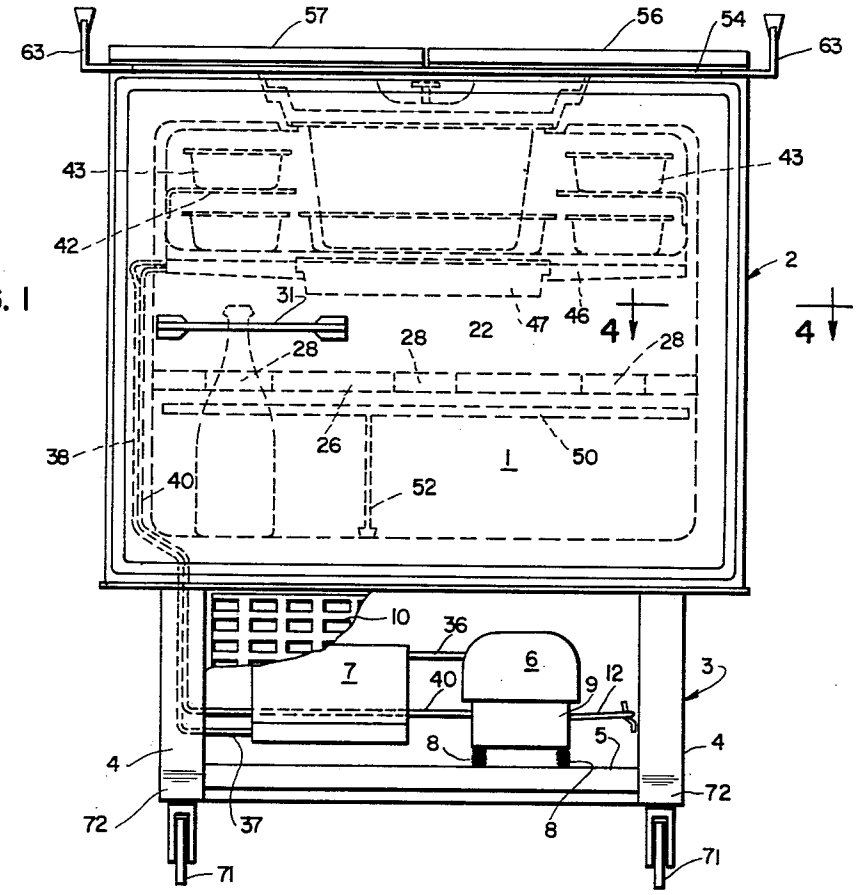
Oct. 27, 1964 R. R. FINK ETAL 3,153,918

MOBILE DOMESTIC REFRIGERATOR HAVING FRONT AND TOP ACCESS

Filed July 18, 1962 3 Sheets-Sheet 1

FIG. 1



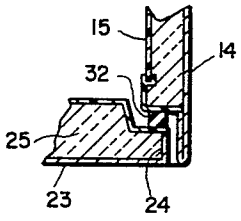


FIG. 4

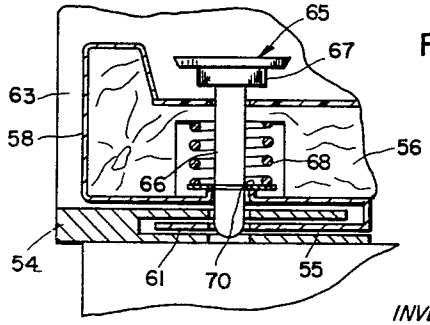


FIG. 5

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MOBILE DOMESTIC REFRIGERATOR HAVING FRONT AND TOP ACCESS

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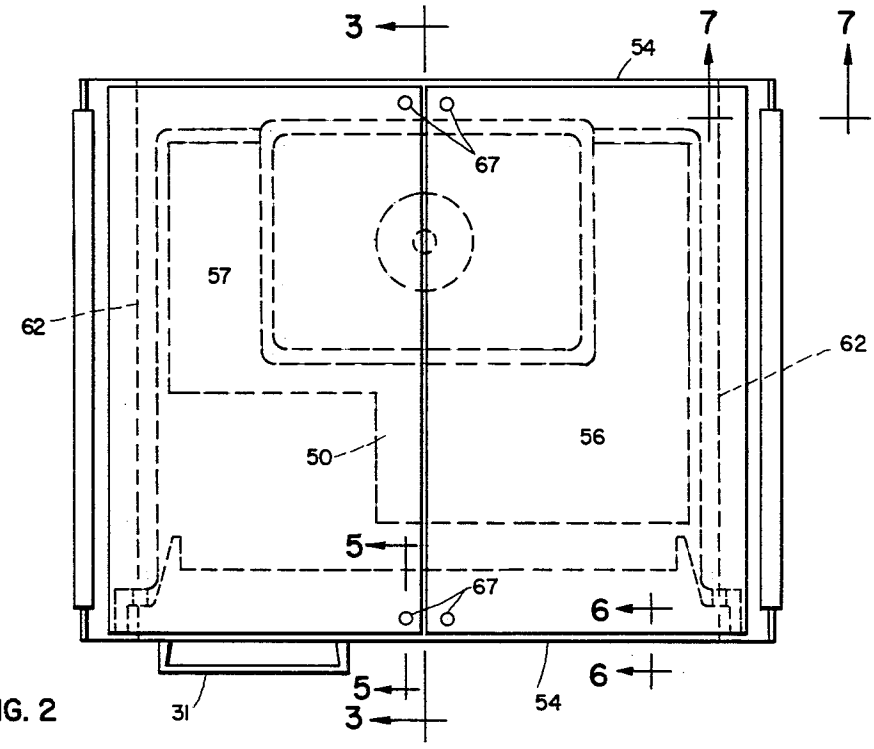

FIG. 2

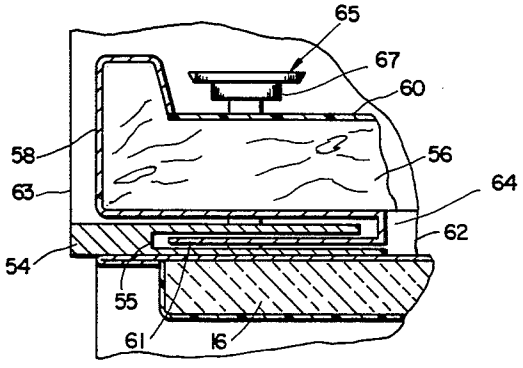

FIG. 6

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FIG. 3

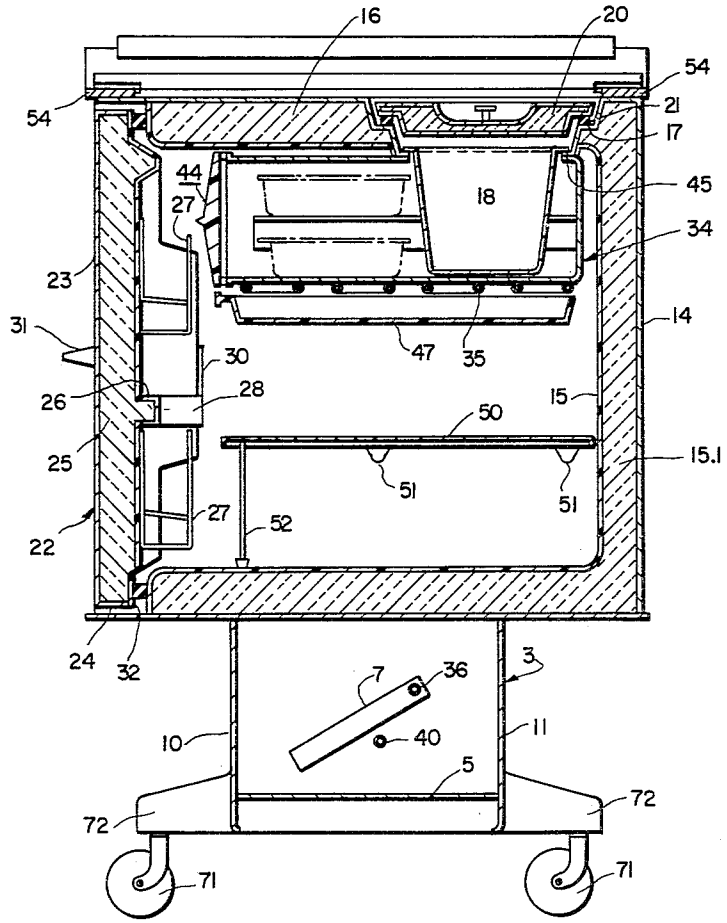
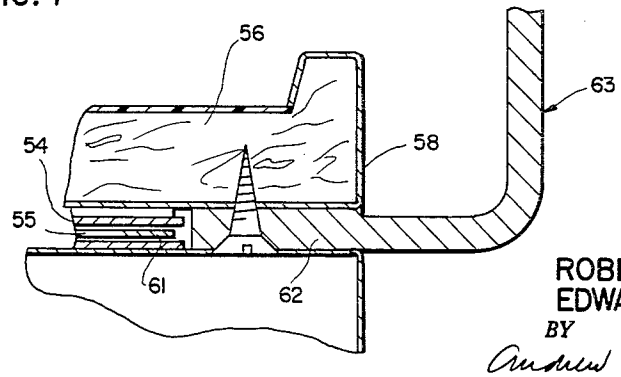


FIG. 7



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MOBILE DOMESTIC REFRIGERATOR HAVING FRONT AND TOP ACCESS

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5 Claims. (Cl. 62—443)

This invention relates to refrigerators, and in particular to a refrigerator which is adaptable to conventional food storage service in a fixed location, while being mobile for easy movement from one room to another.

Contemporary refrigerator art has numerous examples of small capacity refrigerators mounted on carriages or wheeled sub-structures intended to render them mobile. However, these presently known appliances are usually of very small storage capacity, and while suitable for beverages, party foods and the like, could not be considered to be the equivalent of conventional domestic refrigeration.

It is a principal object of our invention to provide a refrigerator which is useful for food storage in the manner of conventional domestic refrigerators, while having mobility enabling it to be moved to a patio or other location to serve as an hospitality center.

It is another object of our invention to provide a refrigerator having a cabinet in which a top insulated wall accommodates a removable bin or tub, and additionally has top panels which normally conceal the bin, but may be withdrawn to render it accessible.

It is a further object of our invention to provide a mobile refrigerator in which the cabinet rests on a rigid structure housing the refrigeration apparatus, said structure being equipped with wheels or casters for mobility, and so arranged as to place the center of gravity of the refrigerator to afford a maximum stability as it is wheeled over door sills, low steps or the like.

In a presently preferred embodiment of our invention we provide a refrigerator cabinet which is equipped with shelves which afford exceptional facilities for the accommodation of bottles and the various jars and other containers in which foods are placed for storage in the usual domestic refrigerator. A refrigeration system including a conventional compressor and condenser, is located on the base wall of a ventilated sub-structure which serves as a support for the cabinet. This base wall is substantially smaller than the length and width of the cabinet exterior, but is preferably of substantially the length and width of an area defined by a projection of the interior side wall surfaces of the cabinet. This arrangement disposes the relatively heavy refrigerator mechanism so as to place the center of gravity of the complete refrigerator adjacent the base and substantially in the center area thereof. End walls of the sub-structure have wheel equipped foot portions extending transversely of the longitudinal axis of the cabinet; the axle mountings of the wheels are arranged to be always exterior of the load within the cabinet.

An important aspect of our invention resides in the construction of the top wall of the cabinet. We provide a top wall opening which is arranged to accommodate a storage pan or bin having a bottom wall in heat transfer relation to an evaporator plate forming a part of the heat absorption system within the cabinet, and further provide panels arranged to slide on rails extending longitudinally of the top wall. The top panels cooperate with other structure to establish a dead air space which gives a supplemental insulation for the top cabinet wall and for the insulated cover of the bin. The panels may be withdrawn to expose the bin cover for access.

A latching device is provided to secure the panels in their "home" or covering position, and in a position exposing the bin cover; in this latter position the panels form convenient surfaces for plates of food, glasses, and the like. At least one of the panels is equipped with a handle by means of which the refrigerator may be wheeled about.

Other features and advantages of our invention will best be understood from the following detailed description of a presently preferred embodiment read in connection with the accompanying drawings in which:

FIG. 1 is a front elevation of the refrigerator, with a portion of the ventilation grille of the sub-structure broken away to reveal certain refrigerator components;

FIG. 2 is a top plan view with the top panels in closed position;

FIG. 3 is a side sectional elevation taken on lines 3—3 of FIG. 2;

FIG. 4 is a fragmentary plan section taken on lines 4—4 of FIG. 1;

FIG. 5 is a detail of a latch suitable for immobilizing the top panels;

FIG. 6 is an enlarged sectional detail taken on lines 6—6 of FIG. 2, and

FIG. 7 is an enlarged sectional detail taken on lines 7—7 of FIG. 2.

Referring first to FIGS. 1 and 3, the refrigerator **1** comprises an insulated cabinet 2 and a base or sub-structure 3 on which the cabinet is permanently mounted. The base 3 has end walls 4 which are of a hollow construction but imperforate; a suitably braced deck **5** extending therebetween serves to support refrigerator system components such as the compressor **6** and condenser 7. The compressor is of the integral motor hermetically sealed type well known in the art, and may be internally or externally suspended; illustratively, it is externally sprung with the spring members **8** between the hermetic casing 9 and the deck 5. The condenser 7 is preferably of a conventional fin and tube type, arranged in an inclined position to provide maximum heat exchange area to be traversed by air passing through the grilles **10** and **11**, forming the front and rear walls of the sub-structure 3. The electrical "cord" 12 for connecting the compressor motor to an electrical outlet may pass through a grille opening.

The bottom, side and rear walls of the cabinet **2** may be of conventional construction, defined exteriorly by a sheet metal casing 14 and interiorly by an inner liner or wall 15 of suitable plastic material. The thermal insulation 15.1 is preferably of the high efficiency type, such as polyurethane foam, providing optimum insulation value in a relatively thin wall. The top wall **16** is conventional except for the stepped opening **17** within which removably fits a bin or deep pan 18. Said pan is provided with an insulated cover 20 having a stepped formation complementing that of the opening **17**, and thus providing for a resilient gasket 21 to reduce heat transmission. It will be observed in FIG. 3 that the top of the cover 20 is below the plane of the upper surface of top wall 16, and that the bottom of the cover is above the top of the bin. This latter aspect provides maximum capacity for the bin while insuring that the cover is in position in which the insulating gasket **21** engages the cover about its periphery.

The door 22 has a front wall 23 and a marginal wall 24 of metal, and an insulation structure **25** which affords an integral shelf 26. Appropriate wire-form or equivalent shelves and racks 27 are affixed to the door interior to accommodate bottles, jars and the like. At intervals along its length the shelf **26** has cut-out portions 28 to accommodate the neck portions of tall bottles

which may rest on the lower rack or shelf 27. The shelf areas between the portions 28 are available for accommodation of jars, etc. (not shown) and an appropriate guard rail structure 30 is affixed to the forward wall of shelf 26. It will be noted from FIG. 4 that the door structure is recessed within the bounding walls of the cabinet. The door is side-hinged on concealed hinges and has any appropriate handle 31. The gasket 32 is preferably of the continuous magnetic type, thus eliminating the need for specific door latching mechanisms, as well understood in the art.

The heat absorption means within the cabinet may advantageously comprise a five-sided evaporator structure 34 of aluminum or other metal of good thermal conductivity to the exterior of which is brazed runs of tubing 35 arranged sinuously along the bottom of the evaporator structure, and along such side and end wall portions thereof as are necessary to provide the required heat absorption capacity. As is well known in the art, high pressure gaseous refrigerant is pumped from compressor 6 through tube 36 to condenser 7, and the condensed liquid refrigerant leaves by way of tube 37 to a convenient point of connection to a restrictor or "capillary" tube 38 which feeds into an end of the evaporator tubing 35. An opposite end of the evaporator tubing 35 connects to a suction tube 40 which communicates with the intake of the compressor 6. The hollow end walls of the base structure 4 accommodate portions of the tubing 37 and 40; the capillary tubing 38 and adjacent suction tube 40 are run within the side wall insulation, and are in heat exchange relation one with the other. It will be understood that the refrigerator system may include an accumulator and a thermostatic control device for cycling the compressor to maintain the desired cabinet temperature. Neither of these devices has been shown, as each is well known in the art. Also, the use of evaporator tubing 35 is by way of illustration only; the structure 34 may be of the familiar "roll-bonded" type in which the passages for refrigerant are wholly within the walls of the evaporator structure. The evaporator structure is provided with appropriate interior shelves 42 which of themselves may have runs of evaporator tubing fastened thereto, if desired, to provide facility for supporting a group of ice cube trays 43. The bottom of the evaporator structure accommodates other ice cube trays or other receptacles in which liquids are to be frozen. The evaporator is completed by an insulated door 44.

An important aspect of our invention resides in providing an opening 45 in the top wall of the evaporator to accommodate the tub or bin 18 which is designed to have a relatively large base in direct heat exchange relation with the bottom of the evaporator; the bin also has large side areas. As a result the base of the bin will be exposed to temperatures of the order of 10° F., and the side walls of the bin to air temperature of about 18° to 20° F. The thermostat (not shown) cycles the compressor to prevent the temperatures of the evaporator structure and its interior from rising above 32° for a a time sufficient to cause any melting of the ice in the various trays 43, or ice cubes which may have been stored in the bin 18.

A defrost tray 46 is suitably supported below the evaporator; said tray is provided with guide rails or the like (not shown) to removably accommodate a drip pan 47 into which the defrost water will drain. Also, the refrigerator will include a suitable shelf 50 supported by side wall fixtures such as 51, FIG. 3; advantageously the shelf is L-shaped, as indicated in FIG. 2, to provide an area within which may be stored articles which could not fit below the shelf. In an L-shaped shelf structure it may be necessary to use a leg support as shown at 52.

It has been noted that a feature of the invention related to the utility of the ice bin 18 is the arrangement of sliding top panels which afford access to the bin cover.

As best shown in FIGS. 3 and 5, along the front and rear edges of the top cabinet wall 16 we apply the metal trim strips 54 which are of relatively heavy metal stock; for example, one-quarter inch stock. These strips extend to about one and one-half inches from the side walls of the cabinet. As best shown in FIG. 6, these trim strips have a deep slot 55 extending from the inner edge thereof. Each of the top panels 56, 57 has a marginal facing 58 about the four sides thereof. The panels themselves may be of wood with the upper surface 60 of decorative plastic, such as the familiar countertop surfacing material. The facing 58 is of metal, and is carried beneath the panel, and then recurved to provide the slide member 61 which rides freely within the slot 55. At the outer end of the respective panels 56 and 57 we apply the base portion 62 of the handle 63, said handle being of angle form, as best shown in FIG. 7. Said handle base portion abuts the trim strips 54 so as to provide a visual continuity when the panels are in the fully closed position of FIG. 2.

By extending the handle base portions 62 the full width of the associated panel, we provide, in conjunction with the trim strips 54, a "dead" air space 64 between the bottom of each panel and the upper cabinet wall 16. This air space is effective as additional thermal insulation, especially when the panels are in their closed position, as they will be when the cabinet is being used for normal refrigeration storage.

The panels 56 and 57 may be immobilized in their closed position, or in an open position which exposes the bin cover 20, by any suitable latching devices 65, FIG. 5. There may be four of said devices, disposed as indicated in FIG. 2. Each said device 65 includes a shaft 66 extending through the respective panels, and of sufficient length to penetrate nearly to the bottom of the trim strips 54. As shown, the shaft penetrates the slide portion 61 of the panel facing 58 as well. The latches have suitable decorative knobs 67, and are spring biased toward their locking position by means of the coil spring 68, bearing against the washer 70 fixed to the shaft. It is understood, of course, that the apertures in the trim strip 54 are located at the position or positions in which the panels are to be immobilized; there may be one set of openings establishing the panels in closed position, and another set or sets at other desired positions. Obviously, the spherical bottom of the shaft 66 permits it to ride freely on the surface of a trim strip, once the shaft has been lifted from the aperture, and the panel manually displaced in the desired direction of movement. An advantage of securing the panels in a position exposing the cover 20 is that under some conditions the bin 18 may be used to chill bottles or other glassware which would extend above the plane of the panels, and the latches will prevent a panel from being accidentally slid against such glassware.

The unloaded weight of an embodiment of the invention manufactured by our assignee is approximately two hundred pounds. Much of this weight is present in the compressor and condenser. Stability of the refrigerator and facility of movement of it are improved by disposing the center gravity of the base portion 4 within the area bounded by a downward projection of the inner walls of the cabinet and, in fact, substantially centrally of said area. Furthermore, stability is accentuated by placing the casters or wheels 71 on the transversely extending feet 72 which place the axes of the wheels substantially in the plane of the front and rear inner cabinet walls when the wheels are turned at right angles to the illustrated position—as they would be when the refrigerator is to be pushed or pulled in the direction of its length. This places the axes external of the principal loaded area of the refrigerator cabinet. When the refrigerator is being pushed in a sideward direction the wheel axes are external of the cabinet inner walls, thus affording substantial stability against accidental tipping.

While there has been described what is at present thought to be the preferred embodiment of the invention, it will be understood that various modifications may be made therein and it is intended to cover in the appended claims all such modifications as fall within the true spirit and scope of the invention.

We claim as our invention:

1. A refrigerator comprising, in combination, structure providing a base having upstanding support members at each end thereof, a refrigerated storage cabinet mounted on said support members in spaced relation to said base, said cabinet having thermally insulated walls and a principal access door comprehending substantially one entire side wall thereof, the top wall of said cabinet having an opening therethrough, refrigerant translation mechanism including refrigerant pumping means on said base and heat absorption means including a horizontal plate structure exposed within said cabinet intermediate said top wall and the bottom wall thereof, said plate structure being accessible for placement of articles thereon upon opening said principal access door and through said top wall opening, a storage bin removably occupying said top wall opening and being wholly within said cabinet, said bin having a bottom wall of good heat transfer material in heat exchange contact with said plate structure, a thermally insulated cover for said bin, slide rail means along opposite sides of said cabinet top wall, structure providing rigid imperforate panels slidably carried by said rail means, a handle member on each of said panels whereby said panels may be moved to a position completely covering said top wall and said bin cover and to a position exposing said cover to afford access to said bin, latch means for releasably securing said panels in covering position, and casters supporting said cabinet, whereby when said panels are latched the handle portions thereof are immobilized relative to the cabinet and afford means facilitating the mobility of said cabinet.

2. A refrigerator comprising, in combination, structure providing a base having upstanding support members at each end thereof, a storage cabinet mounted on said support members above said base, said cabinet having thermally insulated walls and a principal access door in one of said side walls, the top wall of said cabinet having an opening therethrough, refrigerant translation mechanism including refrigerant pumping and condensing means on said base, a refrigerant evaporator having bottom, side, and end walls and a top wall, said evaporator being openly exposed within said cabinet below said top wall opening whereby to permit placement of articles thereon upon opening said principal access door or passage through the said top wall opening, a storage bin of good heat transfer material removably occupying said cabinet top wall opening, said bin extending through the top wall of said evaporator and resting upon the bottom wall thereof in good heat transfer relation therewith, a thermally insulated cover for said bin, said cover being within the insulated top wall of said cabinet, slide rail means along opposite sides of said cabinet top wall, a pair of rigid panels, trim strips along opposite marginal edges of said panels and slidably mounting said panels on said rail means, a handle member on each of said panels whereby said panels may be moved to a position completely covering said top wall and said bin cover and to a position exposing said cover to afford access to said bin, and latch means for releasably securing said panels in preselected position relative to said bin cover.

3. A refrigerator comprising, in combination, structure providing a base having upstanding support members at each end thereof, a storage cabinet mounted on said support members above said base, said cabinet having thermally insulated walls and a principal access door, the top wall of said cabinet having an opening therethrough, refrigerant translation mechanism including refrigerant pumping and condensing means on said base, an enclosed rerigerant exaporator wholly within said cabinet below said cabinet top wall opening, a storage bin removably occupying said opening and removably extending through a top wall of said evaporator into good heat transfer relation with a bottom wall of said evaporator, said bin having a thermally insulated cover removably contained in said cabinet top wall opening, slide rail means along opposite sides of said cabinet top wall, a pair of rigid panels, means on said panels slidably interfitting with said rail means to mount said panels on said rail means above said cabinet top wall, a handle member on each of said panels whereby said panels may be moved to a position completely covering said top wall and said bin cover and to a position exposing said cover to afford access to said bin, latch means for releasably securing said panels in a preselected position relative to said cover, and casters supporting said cabinet for rendering said cabinet mobile.

4. A refrigerator comprising, in combination, structure providing a base having a rectangular support member at each end thereof, each said support member having foot portions extending laterally therefrom, an oblong rectangular storage cabinet mounted on said support members above said base, said cabinet having thermally insulated walls and a principal access door, the top wall of said cabinet having an opening therethrough, refrigerant translation mechanism including refrigerant pumping and condensing means disposed on said base and an evaporator structure wholly within said cabinet, said structure being encolsed and having a refrigerated top wall formed with an opening below said top wall opening and a horizontal evaporator plate providing a bottom evaporator wall within said cabinet below said top wall opening, a bin removably confined within said wall opening and extending into said evaporator structure through the top wall thereof to be exposed to the air temperature therein and in heat exchange contact with said plate, a cover for said bin, said cover being accessible through said cabinet top wall, slide rail members extending along opposite sides of said cabinet top wall in the direction of the longer axis thereof, a pair of rigid panels, said panels having side wall means slidably engaging said rail members and positioning said panels in vertical spaced relation to said cabinet top wall, a handle extending transversely of each said panel, each said handle having wall means extending transversely of said rail members, said panels being slidable into end-to-end abutting relation to form a complete cover for said wall and being movable to expose said bin cover, said handle wall means engaging with end portions of said side rails to provide therewith a dead air space above said cabinet top when said panels form said complete top wall cover latch means on said panels to releasably secure the same in said abutting relation and in said exposing position, and rollers on said support member foot portions to provide mobility for said refrigerator.

5. A refrigerator comprising, in combination, structure providing a base having a rectangular support member at each end thereof, each said support member having foot portions extending laterally therefrom, an oblong rectangular storage cabinet mounted on said support members above said base, said cabinet having thermally insulated walls and a principal access door, the top wall of said cabinet having an opening therethrough, refrigerant translation mechanism including refrigerant pumping and condensing means disposed on said base centrally of an area circumscribed by a projection of the inner surface of the side and end walls of said cabinet, heat absorption means including a horizontal evaporator plate within said cabinet below said top wall opening, a bin removably contained within said wall opening, said bin having a bottom wall of good heat transfer material in heat exchange contact with said plate, a thermally insulated cover for said bin, said cover being within said wall opening, slide rail members extending along opposite sides of said cabinet top wall in the direction of the longer

axis thereof, a pair of rigid panels, means on each of said panels for slidable interfitting engagement with said rail means to position said panels slidably in vertical spaced relation to said cabinet top wall, a handle extending transversely of each said panel, means at an end of each panel cooperating with said slide rail members to provide a dead air space above said top wall, said panels being arranged to be positioned in end-to-end abutting relation to provide a complete cover for said top wall and being movable to expose said bin cover, latch means on said panels to releasably secure the same in said abutting relation, and rollers on said support member foot portions to provide mobility for said refrigerator.

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