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Wilcox

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[54] **ICE MAKER AND ICE SERVICE DRAWER ARRANGEMENT**

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[52] **U.S. Cl.** **62/344,** 62/377

[51] **Int. Cl.** **F25c 5/18**

[58] **Field of Search** 62/344, 377, 441, 62/420, 340, 353; 312/214, 236, 296, 330

[56] **References Cited**

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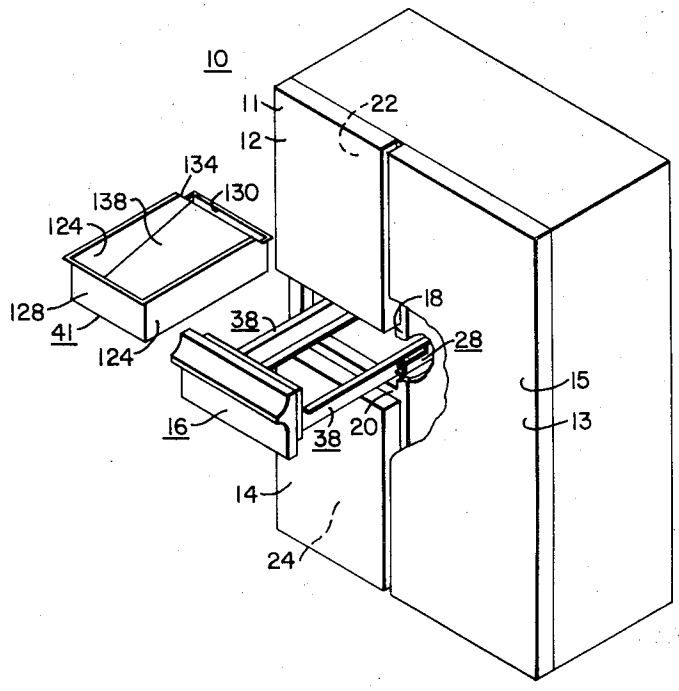
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Assistant Examiner—William E. Tapolcai, Jr.
Attorney—F. H. Henson et al.

[57] **ABSTRACT**

The invention provides an ice maker and ice receiving and dispensing drawer combination which is disposed within a freezer or the freezer compartment of a refrigerator, with the ice maker placed adjacent the rear wall thereof so that cool air moving in a duct contained in the rear wall may efficiently freeze the water within the ice maker. The receiving drawer is disposed on runners affixed to the freezer compartment inner walls for movement inwardly and outwardly, and extends from front to back a sufficient distance so that its rearward portion is disposed under the dispensing means for the ice maker unit while its forward portion is at the front of the freezer refrigerator. The ice maker drawer includes a bottom member which is slanted from rear to front so that ice deposited within the receiving drawer is urged by gravity towards the front portion of the drawer for easy access by the user. The forward portion of the receiving drawer includes a front piece arrangement which forms a front panel of a refrigerator or freezer of which it is a part. The receptacle portion for the drawer is removable from the remainder of the drawer so that it may be utilized as a separate dispensing means when situated outwardly of the refrigerator or freezer.

2 Claims, 4 Drawing Figures



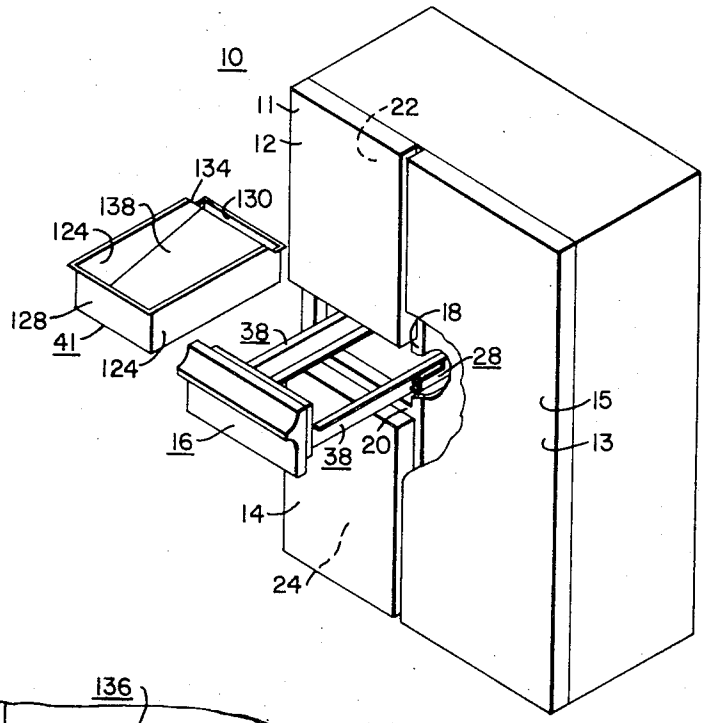

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FIG. 1

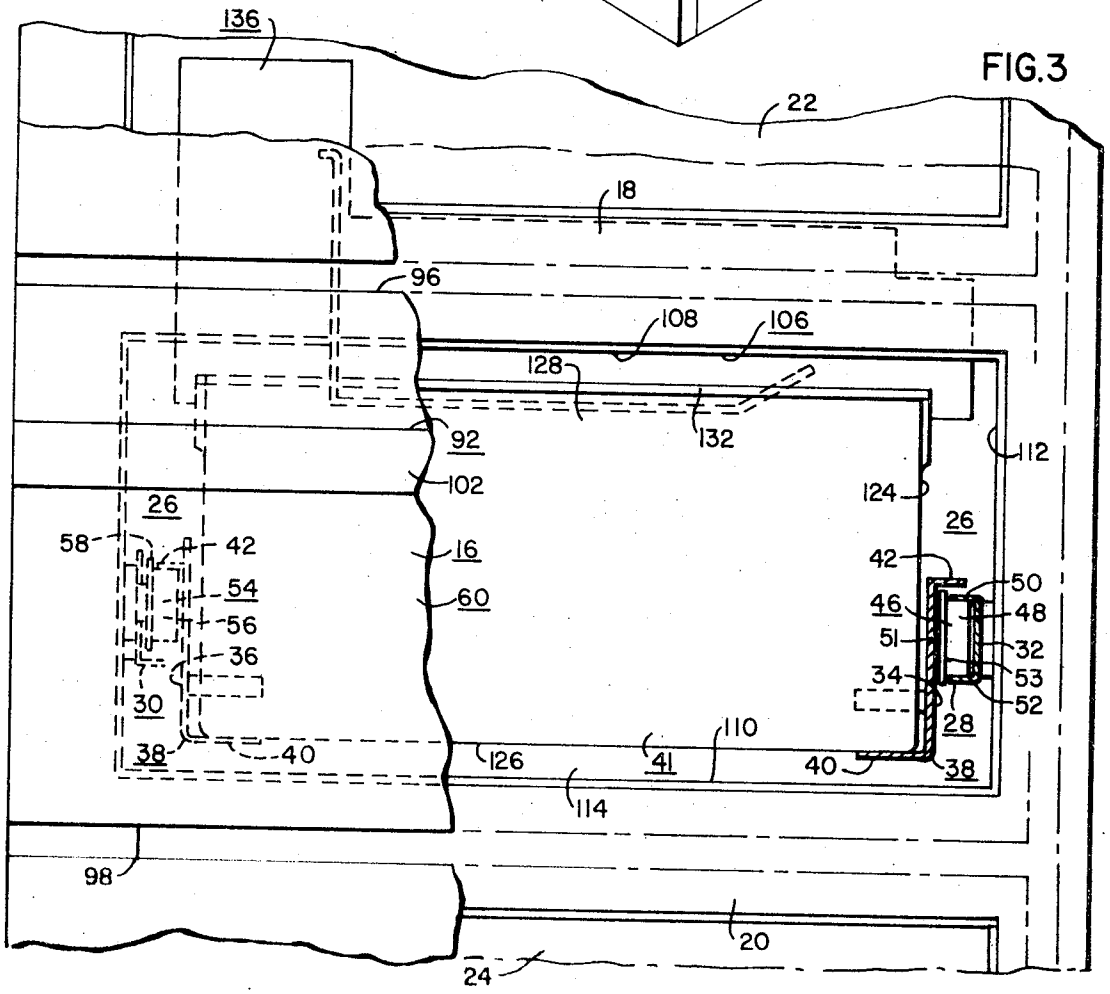

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FIG. 3

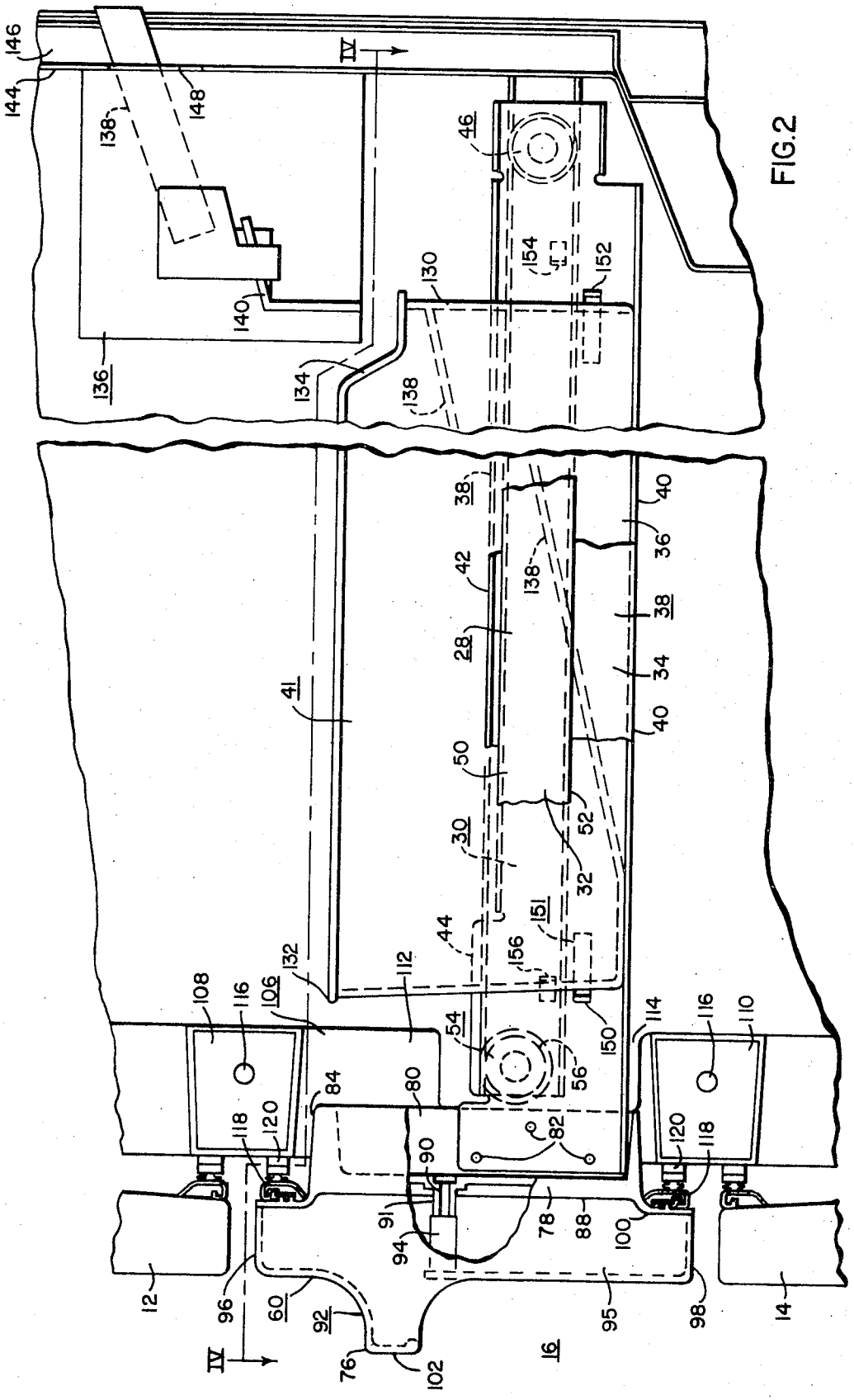

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FIG.2

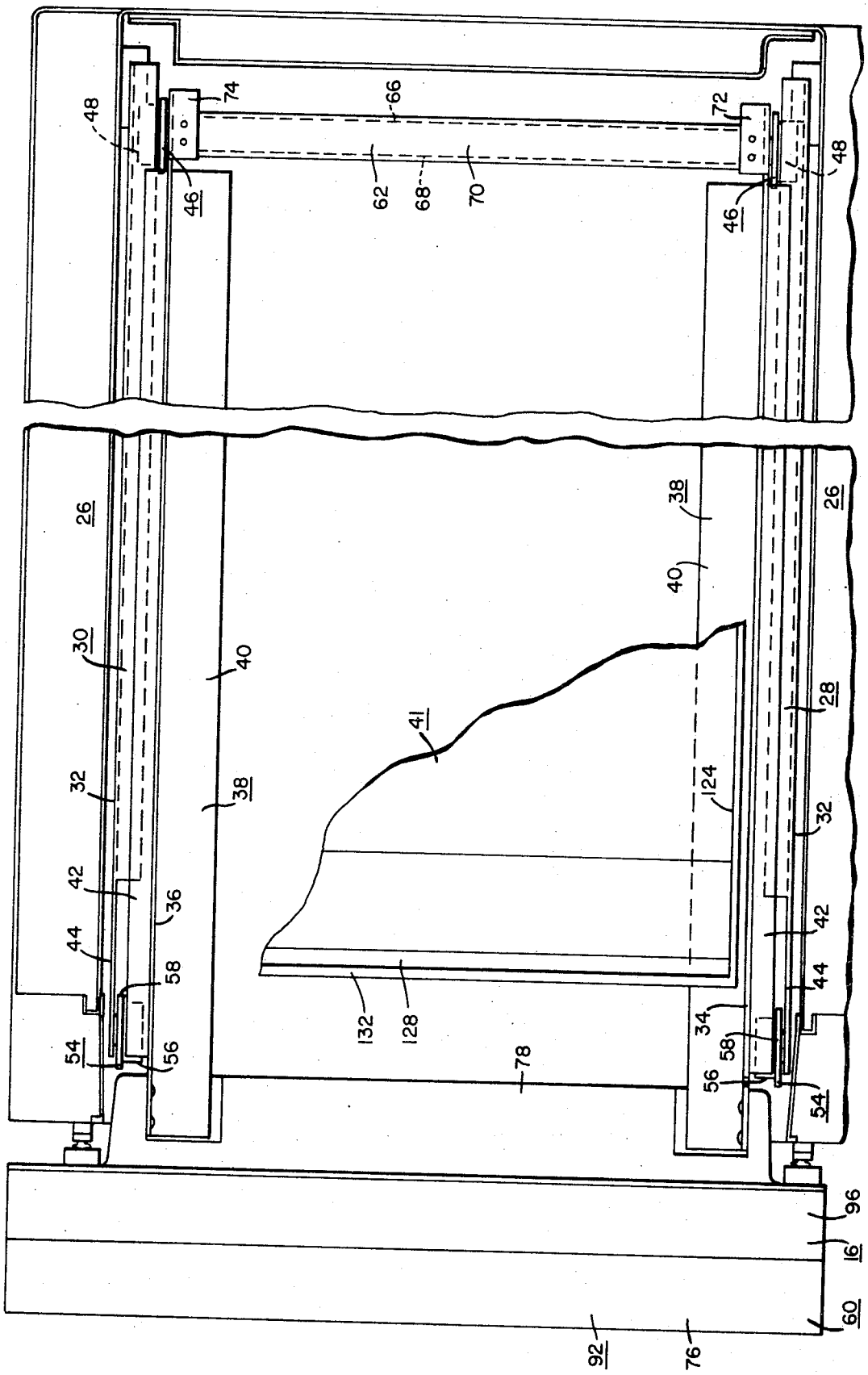

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FIG.4

ICE MAKER AND ICE SERVICE DRAWER ARRANGEMENT

BACKGROUND OF THE INVENTION

1. Field of the Invention

This invention relates to an ice maker and receiving drawer means therefor and, more particularly, relates to an ice maker and receiving drawer arrangement disposed in a freezer compartment of a refrigerator or in a freezer.

2. Description of the Prior Art

The use of an ice maker and ice receiving means utilized therewith is old in the art, such being shown, for example, in U.S. Pat. No. 3,276,225 and U.S. Pat. No. 3,299,656, issued Oct. 4, 1966 and Jan. 24, 1967, respectively. However, it can be seen in both of the devices of these patents that the ice maker is situated in a position occupying a forward part of the freezer compartment.

The use of slanted base receiving means is also old, the same being shown, for example, in U.S. Pat. No. 3,264,844, issued Aug. 9, 1966. However, this patent discloses an ice maker disposed from front to back so that this unit also occupies a forward part of the freezer compartment. The use of refrigerator front portions formed from the front face of a sliding drawer is also old and well known. The same being shown, for example, in U.S. Pat. Nos. 3,038,774 and 3,077,749. However, neither of these patents contemplate the use of such a drawer in an ice maker combination having provision for delivery of the ice to the forward portion of the drawer.

Accordingly, it would be advantageous to provide an ice maker and ice receiving means arrangement in which the ice maker was situated adjacent the rear cooled wall of the freezer compartment to provide a good heat transfer relationship therewith and to limit its obtrusive character within the freezer compartment. It would also be advantageous to utilize an ice receiving means that was positively guided in its inward and outward movement and included a positive structural arrangement which lent itself to movement of the ice towards the front of the drawer, and with the receptacle means being removable from its guide arrangement so that it might be used as a separate dispensing means handy to the housewife. It would add still another advantage if such an ice maker and receiving drawer arrangement did not require that the freezer or refrigerator door be opened to obtain dispensed ice. Instead the ice could be conveniently dispensed with the ice receiving means functioning as a drawer or a separate receptacle so that the amount of cold air spilled out of the freezer or freezer compartment was limited to a large degree.

SUMMARY OF THE INVENTION

The invention provides an ice maker mounted adjacent to or against the rear wall of a freezer compartment of a refrigerator, freezer or the like so as to obtain a good heat transfer from the cool air ducting contained in this rear wall, and also to limit its obstructive protrusion into the usable volume of the freezer compartment. Disposed below the ice maker and extending forwardly thereof is an ice receiving drawer that is positively mounted to the sides of the freezer compartment by a guide arrangement so as to be slidably guided in its inward and outward movement relative to the freezer compartment. A receptacle means is provided mounted within a generally fixed frame to serve as the drawer so that it and its frame may slidably move relative to the fixed guides of the freezer compartment. The receptacle means of the drawer is removable from its frame, so that the drawer can be slid out and the receptacle means removed with its use then being as a separate container or dispensing means, placed in a more convenient location for access to the ice contained therein. The receptacle means includes a bottom which tilts or slants from back to front so that gravity urging of ice dispensed by the ice maker arrangement and deposited in the rearward portion of the receptacle tends to move forward to be convenient to the user.

The drawer arrangement includes a front piece that forms a front panel for the refrigerator or freezer with mullion means also at the front of the refrigerator or freezer separating the drawer from a door or doors of the refrigerator.

The refrigerator normally utilized for such an arrangment as just described is a side-by-side refrigerator-freezer, wherein the freezer-portion includes an upper and lower door between which is disposed the drawer arrangement However, the described arrangement could be utilized with other types of refrigerators or freezers.

DRAWING DESCRIPTION

For a better understanding of the invention, reference may be had to the preferred embodiment, exemplary of the invention, shown in the accompanying drawings in which:

FIG. 1 is a partial perspective view of a refrigerator arrangement incorporating the principles of this invention;

FIG. 2 is a partial side view of the same refrigerator with a side of the refrigerator and the fixed guide means attached thereto removed and partly in section;

FIG. 3 is a partial front view of the refrigerator showing the drawer arrangement of the instant invention with the front roller on the right side removed; and

FIG. 4 is a plan view of the drawer framework and its guide means.

DESCRIPTION OF THE PREFERRED EMBODIMENT

Referring now most particularly to FIG. 1, a refrigerator 10 is provided with a freezer side 11 having an upper door 12 and a lower door 14, with a receiving drawer 16 disposed therebetween. A fresh food side 13 is also included in the refrigerator 10 having a door 15. Mullions 18 and 20 provide means against which the doors 12 and 14 and drawer 16 abut to seal the front side of the refrigerator 10.

As was indicated, the refrigerator 10 normally is a side by side, although, for purposes of illustration, the food side of the refrigerator has been shown only in outline. It contains the food compartment or compartments. It is to be understood also that the drawer 16 could be advantageously applied to a refrigerator arrangement in which the required width of the drawer between the sides of the refrigerator was not extended to such a great degree as to make the movement and handling of the drawer unwieldy to the user thereof. Thus, it is within the contemplation of this invention that the drawer 16 be utilized in a refrigerator having a relatively narrow width between its sides, whether the

same be a side by side refrigerator or an individual compact refrigerator, such as now is making its appearance in the marketplace. Further, although the doors **12** and **14** would, in the exemplary refrigerator, normally provide closure means for an upper freezer compartment **22** and a lower freezer compartment **24**, it is within the contemplation of this invention that the compartment **24** be a fresh food compartment and a dividing means (not shown) disposed behind the mullion **20** separate the upper freezer compartment **22** from the fresh food compartment disposed therebelow. It is also within the contemplation of this invention that one of the doors and its compartment be dispensed with entirely.

Turning now to FIGS. **2** to **4**, the detailed arrangement of the invention may be more easily seen. Guide means **26** includes a pair of channel means **28** and **30**, which are fixedly attached to the sides of the refrigerator **10** by any conventional means (not shown) and extend for nearly the full depth of the refrigerator **10** from front to rear so as to provide a guidance arrangement for the inward and outward movement of the drawer **16**. The channel members **28** and **30** are disposed with bight portions **32, 32** of each of these channel members abutting the side walls of the refrigerator so that the channel members open inwardly to provide a fixed track for the aforementioned guidance.

Disposed inwardly, relative to the channel members **28** and **30**, are a pair of guide members **34** and **36** of guide means **26** which are fixed in a framework **38** of drawer **16** so that the framework **38** moves relative to the channel members **28** and **30**. The guide members **34, 36**, in front view (FIG. **4**), assume a stepped configuration providing a pair of parallel vertically spaced flats **40** and **42**, with the lower surface of outer flats **42, 42** serving as a tracking means for the guide means **26**, and the upper surface of the inner flats **40, 40** providing support means for a receptacle **41** of drawer **16**. The receptacle **41** is normally disposed within and resting upon the framework **38**.

A forwardmost portion **44** of each of channel members **28, 30** has a part of it non-bent to assume a horizontal position similar to the correspondingly parallel extending flats **42, 42** so that the guide arrangement **26** may be disassembled by forward and then upward movement of the framework **38** relative to the channel members **28** and **30**. A more detailed description of this disassembly will be furnished later.

Adjacent the rearward portion of framework **38** and attached to each of the guide members **34, 36** is a roller **46** made of nylon or the like with the axis of these rollers centrally disposed relative to the height of the channel members **28** and **30** so that the rollers **46** can rotate relative to the guide members **34** and **36**. Thus, a roller **46** of guide arrangement **26** is disposed within each of the channel members **28** and **30** so that a smaller diameter portion **48** thereof physically abuts upper and lower leg member **50** and **52** of each of the channel members **28** and **30**. Each of the rollers **46** also includes a larger diameter portion **51** which is disposed inwardly relative to the channel members **28** and **30** with a most outwardly disposed face **53** thereof abutting against the inward terminations of the legs **50** and **52** of each of the channel members **28** and **30** so as to prevent a metal to metal contact between the channel members **28** and **30** and the guide members **34** and **36**. Frame **38** is thereby guided at its rear by the rollers **46, 46** affixed thereto rotating within the channel members **28** and **30** as the frame **38** moves forwardly relative to the front of the refrigerator **10**.

In order to provide support to the front of the frames **38**, guide arrangement **26** includes a pair of rollers **54, 54**, each of nylon or the like and having a small diameter portion **56** and a large diameter portion **58**. These rollers are fixed adjacent the front of the channel members **28** and **30** on the forwardmost portions **44, 44**. The small diameter portions **56** of each roller abuts against the bottom face of the upper horizontal portion **42** of each of guide members **34, 36** so that the front rollers **54** provide a front guidance means for the drawer **16** as it moves inwardly and outwardly of the refrigerator **10**. It should be noted that the large diameter portion **58** of one of the front rollers **54** is disposed between each of the vertically extending portions of guide members **34** and **36** and the terminations of the legs **50** and **52** of the channel members **28** and **20**. This places a relatively easily slidable and low friction surface between the channel members **28, 30** and the guide members **34, 36** to prevent a metal to metal contact. The guide arrangement **26** thereby provides an easily slidable drawer **16** which is positively guided in its inward and outward movements relative to the refrigerator **10**.

The frame **38** of the drawer **16** is completed by a front cap arrangement **60** and a rear transverse extending strengthening member **62** so that the frame **38** comprises a rigid assembly which does not tend to warp or twist when the drawer **16** is loaded or moved inwardly or outwardly relative to the refrigerator **10**. The rear strengthening member **62** is U-shaped in cross section to provide to two downwardly extending legs **66** and **68** and a bight **70** to form a substantially rigid reinforcing arrangement at the rear of the frame **38**. The reinforcing member **62** is mounted with the guide members **34** and **36** by means of inwardly directed bentover tab portions **72** and **74** situated at and integral with the rearward ends of the guide members **34** and **36**, respectively. The tab portions **72** and **74** are, of course, connected to the rear reinforcing member **62** by any conventional means such as riveting or the like, with the rear reinforcing member **62** being disposed beneath the tabs **72** and **74** and having its ends abutting the vertical portions of each of the guide members **34** and **36**.

The front cap arrangement **60** of drawer **16** includes an outer door section **76** and an inner door section **78**. Both the inner and outer door sections **76, 78** are formed from plastic molded pieces, with the inner door section **78** including a pair of side panels **80** (only one shown) which attach at each side by screws **82, 82** or the like to the guide members **34** and **36**. The inner door section **78** also includes top and bottom walls **84** and **86** which integrally join to the side panels **80, 80** and also integrally join to a front piece **88** so that the total configuration of the inner door section **78** is that generally of an open receptacle received over the ends of the guide members **34, 36**.

The front piece **88** of the inner door section **78** also includes a series of three counter bores **90** (only one shown), with these bores extending through the front piece **88** and also extending through a series of three bosses **91** (only one shown) which are integral with the inner door section and serve as an attachment means for the outer door section **76**. The bosses **91** and bores **90**, advantageously, may be aligned and located at the

same vertical distance above the bottom of the drawer **16** so that they provide an attachment means (see below) between the inner and outer door sections **76, 78,** slightly below a handle portion **92** of the outer door section **76.** This arrangement transfers the user pulling force applied to this handle portion directly to the inner door section **78** and from it to a drawer framework **38.**

Abutting with each boss **91** is a mating boss **94** formed on outer door section **76.** These bosses thereby conform with each other so that abuttment of the bosses **91** and **94** and the use of a threaded screw fastening means disposed within them provides a fairly secure condition between the inner and outer door sections.

Outer door section **76** includes a pair of side walls **95** (only one shown), and a top piece **96** and a bottom piece **98,** with the side pieces **94,** top piece **96** and bottom piece **98** dimensioned so as to be slightly larger in peripheral dimension than a molded border **100** which extends around and is an integral part of inner door section **78,** this border being displaced slightly forwardly from the front piece **88** of the inner door section **78.** By this arrangement, then, the inner door section **78** and outer door section **76** are connected in a fairly rigid manner with the outer door section **76** covering the outer edges of the border **100** of the inner door section **78** so that the same is not discernible from the front of the refrigerator **10** and a pleasing and attractive appearance is presented. Insulation (not shown) may be provided between inner and outer door sections **78, 76,** respectively, to limit heat transfer in this area of the refrigerator **10.**

The outer door section **76** thereby forms a discernable and integral part of the front of the refrigerator **10** and, as previously mentioned, includes the handle portion **92,** with this part of the outer door section having a curved configuration that merges into a straight vertical portion **102,** that forms the actual handle for drawer **16.**

The mullions **18** and **20** for the refrigerator **10** are formed from an integral, molded plastic frame **106,** including a top hollow wall **108,** a bottom hollow wall **110,** a pair of side walls **112** (only one shown) that form together an opening **114** for reception of the drawer **16.** The hollow wall **108,** of course, also forms the mullion **18** and the hollow walls **110** forms the mullion **20** so that the doors **12** and **14** may close against the same of their lower and upper ends, respectively. The molded frame **106** may be conveniently attached to the sides of the refrigerator **10** through bores **116** formed therein, a series of three of these bores being provided in each of the side walls **112.**

In order to seal the drawer **16** relative to the mullions **18** and **20,** a gasket means **118** is attached to the inner face of the molded border **100** of inner door section **78.** This gasket means may be conveniently formed from polyvinyl chloride in a shape substantially as shown and provided with magnets (not shown) within the gasket means **118** so as to urge the drawer **16** in tight sealing relationship with the mullions **18** and **20,** through the aegis of a magnetic means **120** affixedly mounted on these mullions. The arrangement and connection of such a gasket and its cooperating magnetic means is generally old and well known in the refrigerator art so no further description of the same will now be offered.

To form the receptacle means for the drawer **16,** an open receptacle **41** is mounted within the framework **38** of the drawer **16.** The receptacle **41** includes a pair of side walls **124, 124** which extend vertically and terminate in horizontally extending edges **126.** A front wall **128** and a rear wall **130** are integrally molded with the side walls **124.** The front wall **128** may terminate at its upper end in a lip **132** so as to provide a substantially rounded edge in the area where the user may place his hands. The rear portions of the side walls **124, 124** include a cutout portion **134** which permits the receptacle **41** to be moved beneath an icemaker **136** that provides a supply of ice to the receptacle **41.** The open receptacle **41** has its configuration completed by a bottom panel **138** which extends from the front to the rear of the receptacle **41** in a slanting manner so that rear portions of the bottom panel **138** are considerably higher than its forward portions, thus providing for gravity urging of ice cubes or ice from the rear to the front of the receptacle **41.** The bottom panel **138,** it has been found, insures movement of ice towards the front of the receptacle **41** when the same is disposed at at least an angle of 18° from the horizontal. A larger angle, of course, may be utilized with the limit on this angle being obtained when the bottom panel **138,** at its rearward portion, is at the general height of the rear end of the cutout **134.**

Ice maker **136** is shown only in general outline in the drawings and includes a supply tube **138** for the water supply for the forming of ice. This ice maker may take, conveniently, the form of the ice maker illustrated in either of the aforementioned U.S. Pat. Nos. 3,276,225 or 3,299,656. Other ice makers might also be utilized, with those of a relatively narrow depth being preferred so that the projection forwardly from the rear wall of the freezer compartment is as small as is practically possible. This permits an advantageous use of the remainder of the freezer volume for the storage and cooling of foodstuffs. The mounting of the ice maker on or near the rear wall also yields the advantage of only a short supply tube **138** being required since it may conveniently pass through the rear wall of the refrigerator **10.** Also this location for the ice maker **136** limits damage to it by the user of the refrigerator and lessens the possibility of the user of the refrigerator being damaged by it.

As is illustrated in each of the aforementioned patents, ice delivery from ice maker **136** is by means of a series of rotating fingers (not shown) which move the ice to a ledge arrangement, from which the ice falls into a receptacle disposed therebelow. In a similar manner, ice maker **136** of the instant invention includes a slanted ledge **140** so that ice being dispensed from the ice maker **136** slides down this ledge and drops into the rear portion of the receptacle **41.** As ice is deposited in this rearward portion of receptacle **41,** it slides forwardly thereof until it abuts against the front wall **128** or until it abuts against a pile of ice cubes or ice already positioned against this front wall. Ice maker **138,** of course, includes a sensing means, including a pivoted rod **140** that is disposed so as to be at or near the top of the rear portion of receptacle **122** to indicate to the ice maker **136** when the receptacle **122** is loaded with ice cubes or ice so that the operation of the ice maker **136** may halt.

Ice maker **136** is mounted immediately forward of the rear wall of the freezer compartment. In the embodiment illustrated it is preferred that the ice maker **136** actually mount against a rear wall **144** of the

freezer compartment since the cooling air for cooling of this freezer compartment is carried by a duct **146** within the rear wall. A communicating aperture **148** may be provided in this duct for the direct supply of a quantity of cooling air against the ice maker **136.** The use of the aperture **148,** however, is not mandatory, and it may be dispensed with and the cool air contained in the air duct **146** being depended upon for conduction of the heat load of the ice maker **136.**

As was set out in the beginning portion of the description, the receptacle **41** is removable, this feature being shown most clearly in FIG. **1,** so that a positioning means **151** is provided within the framework **38** to insure that the receptacle **41** is easily positioned properly from front to rear. Each of the guide members **34** and **36** includes a pair of inwardly directed, struck out tabs **150** and **152,** with the tab **150** being the forwardmost tab and the tab **152** being the rearwardmost tab so that the receptacle **41,** when being placed within the framework **38** is set between the struck out tabs **150** and **152.** Thus, quick positioning of the receptacle **41** is had by merely utilizing the tabs **150, 152** as guiding means and permitting the receptacle **41** to move downwardly until it rests upon the horizontal portions **40** of the guide members **34** and **36.**

In order to remove the drawer framework **38** from guiding channel members **28, 30,** the drawer **16** is pulled forwardly until a stop formed on each guide member **34** and **36** by a struck out bent tab **154** abuts against a struck out bent tab **156** formed on each channel member **28, 30.** With the guide members **34, 36** of framework **38** at this forward position, the rollers **46, 46** are in the area of the forward portions **44, 44** of the channel members **28, 30.** The drawer **16** may then be rotated upwardly clearing the stop formed by bent tabs **156, 156** so that bent tabs **154, 154** and then the rollers **46, 46** are free for vertical movement. Drawer **16** may then be lifted from channel members **28, 30.**

It should be clear to one skilled in the art that many modifications may be made to the exemplary embodiment described that would still fall within the spirit and purview of the descrription offered. For example, the inner and outer door sections could be made from an integral element and this element utilized as the front piece for the drawer **16.** Also, instead of the utilization of the magnetic catch arrangement, in conjunction with magnetic carrying gaskets, at the forward portion of the drawer **16,** the same could be provided with an overcenter latch at its rearward end, which could be easily overcome by the user manipulating the drawer to its forwardmost positon to release the latch and its retention of the drawer **16** against the mullions **18** and **20.** Also a slanted bucket could be utilized for the receptacle **41,** with the same being located within the frame **38** slanted relative to it, so that no slanted bottom need be formed.

I claim:

1. In a side-by-side refrigerator-freezer having laterally adjacent, vertically-extending freezer and refrigerator compartments:

a door for said refrigerator compartment;

an upper and a lower door for said freezer compartment, said freezer door being spaced apart at an intermediate height of said freezer compartment to provide an intermediate space therebetween;

a pull-out drawer structure at said intermediate height of said freezer compartment, said drawer structure including an exteriorly finished front member in the plane of said freezer doors occupying said intermediate space when said drawer structure is in a closed position;

an automatic ice cube maker mounted at the rear of said freezer compartment in a generally sideways extending orientation so that its front-to-rear projection is as small as is practically possible;

an ice cube receptacle removably carried by said drawer, said receptacle having a forward end portion adjacent said front member of said drawer and extending rearwardly with the rearward end portion of said receptacle in a position to receive ice cubes dispensed by said ice cube maker;

said drawer and said receptacle being carried in said freezer compartment so that the bottom of said receptacle is sufficiently inclined from front to rear that as ice cubes are built-up in said rearward portion, at least a part of them will move individually and collectively toward the forward end portion of said receptacle by gravity.

2. Structure according to claim **1** wherein said drawer structure further includes a substantially rigid frame for receiving said receptacle and defining means to positively locate said receptacle properly disposed within said frame.

* * * * *