March 2, 1954 H. N. HUSE 2,670,612

REFRIGERATING AND ICE DISINTEGRATING APPARATUS

Filed Jan. 17, 1951 2 Sheets-Sheet 1

Fig. 1

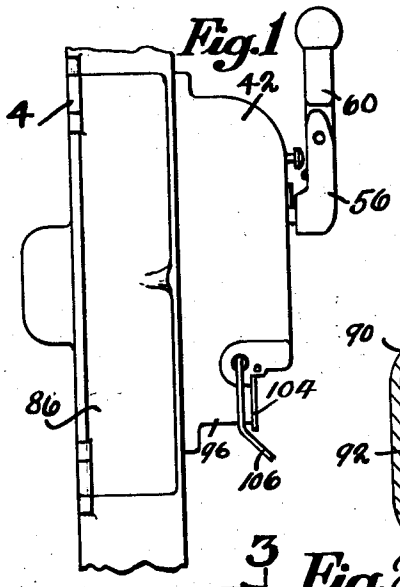
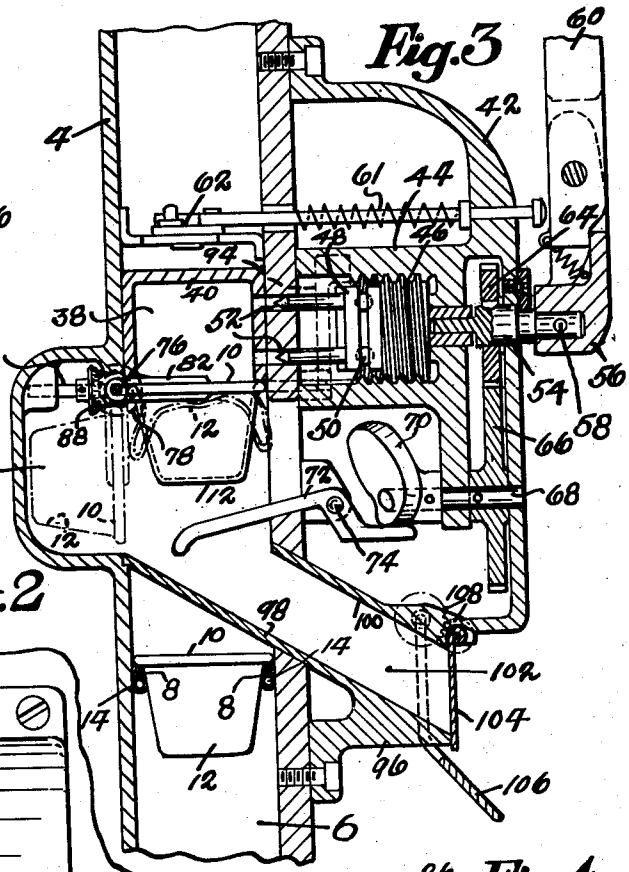


Fig. 3



3 Fig. 2

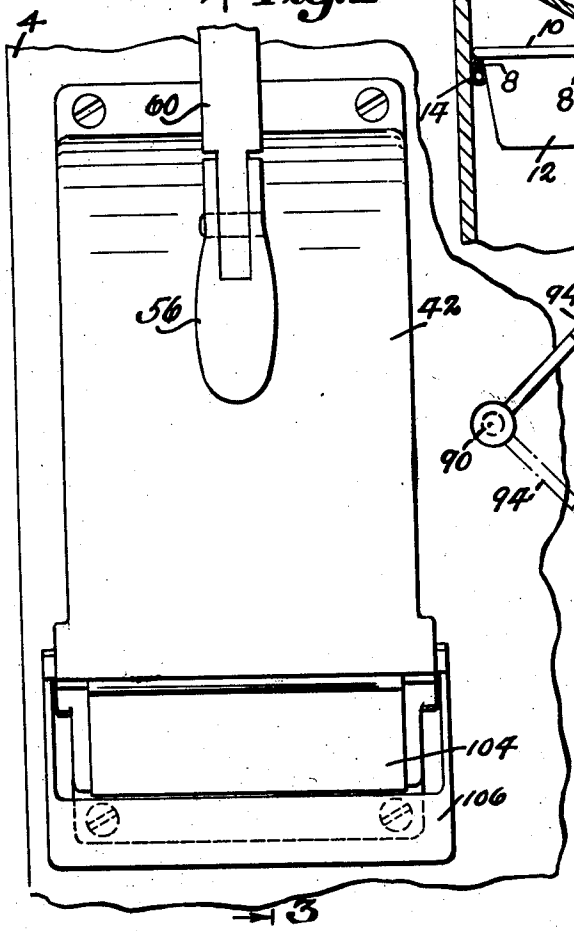
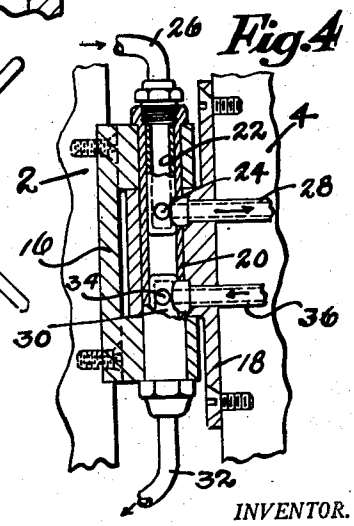


Fig. 4



INVENTOR.
HIRAM N. HUSE
BY James G. Bethell
ATTORNEY

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REFRIGERATING AND ICE DISINTEGRATING APPARATUS

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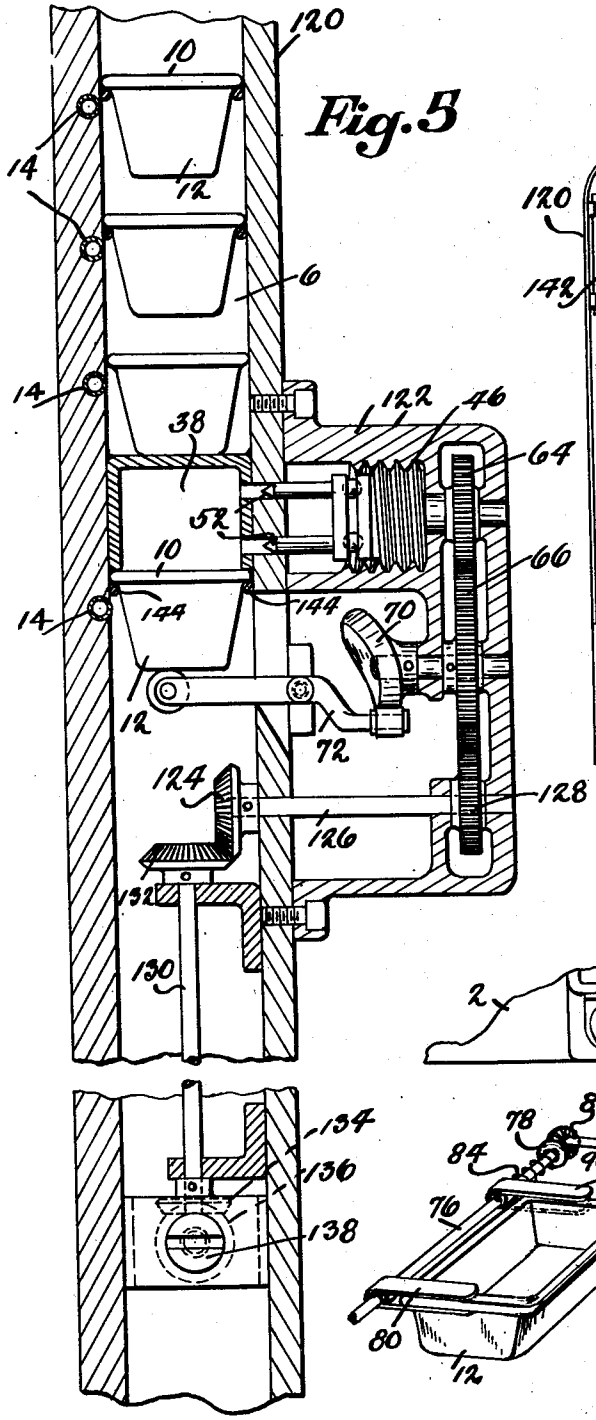
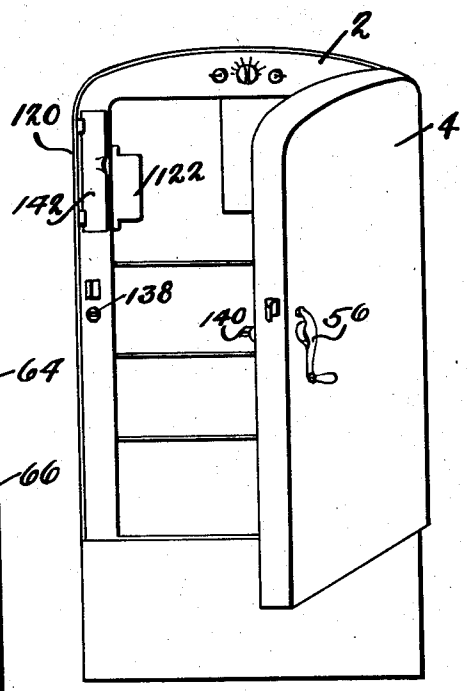


Fig. 5

Fig. 6



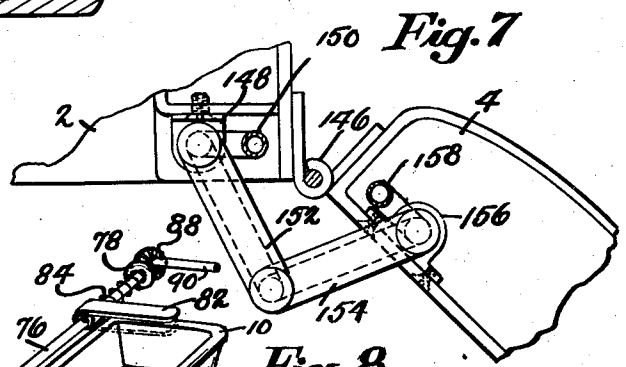


Fig. 7

Fig. 8

INVENTOR.
HIRAM N. HUSE
BY
James G. Bellue
ATTORNEY

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REFRIGERATING AND ICE DISINTEGRATING APPARATUS

Hiram N. Huse, North Scituate, R. I.

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9 Claims. (Cl. 62—111)

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My invention relates to refrigerators and one of its objects is to provide a refrigerator for producing and dispensing ice in disintegrated form.

While it is common practice to freeze liquid in a refrigerator in the form of ice cubes of various sizes, it has been a problem satisfactorily to dispense the cubes. Various constructions have been suggested, all of which involve a compartment tray in which the liquid is frozen in cube form. It is often difficult to remove the trays from the refrigerator, and it is always difficult and unsatisfactory to remove the ice cubes from the trays themselves.

The present invention provides a construction which is much more convenient than the prior constructions in that the ice does not have to be handled, and the dispensing of the same presents no problem at all.

Appreciating that crushed or cracked ice, owing to the tremendous increase in cooling area as compared with ice cubes, has a much faster cooling rate than cubes, I provide that the ice shall be dispensed in disintegrated form, this term to cover crushing, cracking, shaving, etc.

My construction provides that the liquid be frozen in the refrigerator in any desirable or convenient form, that it be disintegrated as needed, and then dispensed in this condition from the refrigerator.

No handling of the ice is required, inasmuch as it may be disintegrated and then dispensed directly into a container, or the ice may be disintegrated and then the receptacle containing the disintegrated ice may be removed from the refrigerator.

In the accompanying drawings, I have illustrated two embodiments of my invention. In one of the embodiments shown, the ice is frozen and disintegrated in the door of the refrigerator, while in the other, the ice is frozen and disintegrated in the body of the refrigerator.

In the first instance, the dispensing outlet has been illustrated as in the refrigerator door, while in the other instance, it has been illustrated in the refrigerator body to one side of the refrigerator door. As will be pointed out more fully hereinafter, the location of the dispensing outlets is more of a matter of choice than necessity, that is to say, whether the ice is dispensed from the refrigerator door or from the body of the refrigerator. However, for purposes of illustration I have elected to show constructions wherein the ice is dispensed from some point in the refrigerator front.

Generally speaking, in the constructions illustrated I have provided for disintegration of the ice by manipulation of the handle of the refrigerator door, and my construction is such that the ordinary and usual operation of the door handle is not interfered with in any way.

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In the accompanying drawings,

Fig. 1 is a fragmentary elevation view, illustrating my apparatus installed in the door of a refrigerator;

Fig. 2 is a front elevation of Fig. 1 on an enlarged scale;

Fig. 3 is a section on the line 3—3 of Fig. 2;

Fig. 4 is a sectional view of a hinge construction for the refrigerator door for circulation of the necessary refrigerant;

Fig. 5 is a sectional elevational view showing my apparatus installed in the body of the refrigerator, as distinguished from the refrigerator door;

Fig. 6 is an elevational view of a refrigerator, including the refrigerator door, showing the apparatus installed as in Fig. 5;

Fig. 7 shows another type of construction for the hinge of the door, which may be used instead of the construction shown in Fig. 4; and

Fig. 8 is a detail of supporting mechanism, which may be used for supporting the ice container.

Referring to Figs. 1 to 4, inclusive, and Fig. 8:

The refrigerator body has been designated 2, and the refrigerator door has been designated 4, and in the drawings being described, my improved apparatus has been installed in the door of the refrigerator.

In the edge of the door, I provide one or more freezing compartments 6 of any convenient length, equipped at each side with shelves or ledges 8 for supporting ice trays or ice receptacles. Each of these receptacles or trays is composed of a rigid rim 10 and a flexible body 12. The rims 10 may be of metal, while the bodies 12 are of rubber or other flexible plastic which will retain liquids.

The ice receptacles are positioned one above the other in the freezing compartments 6, and as many receptacles may be employed as may be found practical.

For clarity of illustration and description, I have not attempted to show the freezing coils for the freezing compartments 6 in any detail. It will be understood that they may be comparable to the freezing coils employed in the freezing compartments of conventional refrigerators. The coils have been designated 14 on Fig. 3.

Inasmuch as it is more practical to locate the

compressor of the refrigerator somewhere other than in the refrigerator door 4—in the refrigerator body, for example—I have illustrated in Fig. 4 a construction for circulating the refrigerant from the compressor through the refrigerator door hinge, the freezing coils 14 of the freezing compartments 6, and back through the door hinge to the compressor.

Referring to Fig. 4 of the drawings, 16 designates that part of the hinge which is attached to the refrigerator body 2, and 18 that part which is attached to the door 4. The hinge pintle is hollow and is designated 20.

Extending into the top of the pintle 20 is a sleeve 22, which is closed at its lower end but provided with ports 24 above its closed end. Refrigerant pipe 26 from the refrigerator compressor is in constant communication with the sleeve 22.

Extending through the plate 18, which is attached to the refrigerator door, is a pipe 28, which is in constant communication with the sleeve 22, regardless of whether the refrigerator door is open or closed. This pipe 28, it will be understood, is a part of or connected to one end of the freezing coils 14.

Extending into the lower end of the pintle 20 is a sleeve 30, which is a duplicate of sleeve 22, the lower end of this sleeve communicating constantly with a pipe 32, which leads back to the refrigerator compressor.

The upper end of the sleeve 30 is closed, but ports 34 are provided below this closed end, so that a pipe 36, which at one end is connected to the freezing coils, may be in constant communication with the sleeve, regardless of whether or not the refrigerator door is open or closed.

The construction just described, it will now be apparent, will permit refrigerant to be circulated from a compressor located remote from the door through freezing coils located in the door and back to the compressor.

It will be understood from the description thus far given, that the liquid to be frozen is placed in a plurality of stacked ice receptacles, the freezing coils 14 freezing the liquid directly in these receptacles.

Above the freezing chamber 6, I provide an ice disintegrating chamber 38, closed at the top, as seen at 40, but open at the bottom.

Secured to the outer face of the refrigerator door 4 is a cover plate or housing 42, provided on its inner face with boss 44, into which is threaded a carrier 46, carrying on its inner end ice disintegrating element 48. Ball bearings 50 are provided between the inner end of the disintegrating element 48 and the carrier 46, so that the latter may be rotated for advancing or retracting the same, to advance or retract the disintegrating element 48. The element 48, in the form illustrated, comprises a plurality of pointed members 52, lying abreast of the disintegrating chamber 38 and passing through the outer wall of the refrigerator door 4 and through the wall of the disintegrating chamber.

The carrier 46 for the disintegrating element 48 is rotated through the medium of a stub shaft 54, which is keyed to 46 and projects through the cover plate 42 to the exterior thereof.

56 is the door handle, which is rigidly secured to the outer end of stub shaft 54 by pin 58. By simply pushing the handle 56 to one side about the axis of stub shaft 54, the latter can be rotated.

The upper end of the handle 56 carries a pivoted extension 60, and if the upper end of this extension is pulled outwardly away from the door, the lower part of this extension will push rod 61 inwardly and through linkage 62 unlatch the door. It will be understood that this operation has no effect upon the ice-disintegrating mechanism.

It will be apparent from the description thus far set out that the refrigerator door may be operated in conventional fashion without operation of the ice-disintegrating mechanism.

Mounted on the stub shaft 54, within the casing 42, is a gear 64, meshing with a gear 66, mounted below it within the casing 42, this gear being mounted on stub shaft 68, on the inner end of which is fixed a cam 70 for operating a lifting lever 72, pivoted at 74 within the casing 42.

Referring particularly to Figs. 3 and 8 of the drawings, it will be seen that at the bottom of the disintegrating chamber 38, at the rear thereof, I provide a short shaft 76, mounted in bearings in the refrigerator door, this shaft, at its inner end, carrying a bevel gear 78. The shaft 76 also carries a pair of forked brackets 80 and 82. These brackets are fixed to the shaft, so far as rotation of the shaft relatively thereto is concerned, but the bracket 82 has sliding movement on the shaft against the action of spring 84, also carried by the shaft. This arrangement provides for mounting a receptacle of ice in the arms when the ice is to be disintegrated. A receptacle has been illustrated, so mounted, in Figs. 3 and 8.

In placing a receptacle in the brackets 80 and 82, the inner end of the receptacle, which contains the ice to be disintegrated, is inserted between the two arms of bracket 82. The receptacle is then pushed forward against the action of the spring 84 until the outer end of the receptacle clears the bracket 80. Then the outer end of the receptacle is aligned with the space between the arms of bracket 80 and the spring 84 allowed to expand again to lock the receptacle in the brackets.

The gear 66 has approximately double the number of gear teeth as gear 64. Consequently, in the ice-disintegrating operation, if the rear arm of lever 72 initially is set at the rise of the cam 70, two simultaneous movements will result from turning the handle 56 clockwise, bearing in mind that the handle is keyed to the carrier 46 for the disintegrating elements. The points or ends of the disintegrating elements 52 will advance along the holes in the wall of the refrigerator door, and the lever 72 will rise against the bottom of the ice receptacle mounted in the brackets 80 and 82, due to the rise of the cam, to push the ice from the receptacle into the ice-disintegrating chamber 38. At this stage, as the ends of the disintegrating elements have advanced to the entrance of disintegrating chamber 38, continued turning of 56 will advance the disintegrating elements into the chamber to disintegrate the ice therein. The cam 70 continues to rotate, of course, but at that time the rear end of lever 72 will be riding on the dwell of the cam, so that no motion is being imparted to lever 72 while the ice is being disintegrated. The handle 56 is then reversed to its original position, so that the disintegrating elements are retracted, and the lever 72 will pivot to its initial position. The disintegrated ice will then fall by gravity into the receptacle, the body of the receptacle, due to its flexibility, returning to its original shape, the lever 72 having been returned to its initial position.

The edge of the door abreast of the freezing and disintegrating chambers 6 and 38 is provided

with a closure or door 86, which, during the operations just described, is in closed position. This door may now be opened, and the ice receptacle containing the disintegrated ice may be removed.

Provision has been made, however, for disintegrating the ice and discharging it through the face of the door directly into a container and with the refrigerator door closed.

From Figs. 3 and 8 of the drawings, it will be seen that the gear 78, heretofore referred to, which is carried by the shaft 76, mounting the brackets 80 and 82, meshes with a gear 88, carried by a shaft 90, which, at its rear end, is supported in a bearing on the inside of a dispensing chamber 92, provided at the inner face of the refrigerator door 4. The outer end of the shaft 90 projects through the outer face of the refrigerator door and is equipped with operating lever 94. By depressing the lever 94 from the full-line position in the same view, it will be apparent that the receptacle of disintegrated ice will be swung from the full-line position of Fig. 3 into the dispensing chamber, where it has been shown in broken lines, due to the meshed gears 78 and 88.

Attached to the outer face of the refrigerator door below the housing 42 is a fixture 96, the door being cut away to accommodate this fixture, so that the top of the fixture extends upwardly diagonally of the door, with its rear end terminating at the bottom of dispensing chamber 92. The upper inclined face 98 of the fixture 96 is spaced a substantial distance below the bottom of the casing 42, which is inclined upwardly also, as indicated at 100, so as to provide a discharge chute, which has been designated 102, for the discharge of disintegrated ice when the ice receptacle is swung into discharge chamber 92.

The mouth or discharge end of the chute is at the outer face of the refrigerator door 4, and, to facilitate placement of a glass or other container into position to catch the disintegrated ice, the fixture 96 is so shaped that it projects a substantial distance out of the face of the door.

The mouth or discharge end of the chute 102 is equipped with a closure member 104. This member is normally closed but can be opened through the medium of closure actuating lever 106, which is geared thereto through gears 108.

Normally, the ice receptacles will be stacked in the freezing compartments 6, and it is quite obvious that, if the ice in these receptacles is not to be disintegrated, it is simply necessary to open the refrigerator door 4 and remove a receptacle, as desired.

On the other hand, when the ice is to be disintegrated, a receptacle of ice is taken from the freezing chamber and placed in position in the suspension brackets 80 and 82 at the bottom of the disintegrating chamber 38; the door 86 and the refrigerator door 4 may then be closed.

The door handle 56 is then given a partial turn, to cause the lever 72 to raise the bottom of the ice receptacle to dump the ice therein into the disintegrating chamber. On continued motion of the door handle, the disintegrating members move into the disintegrating chamber, to disintegrate the ice therein. The actuating threads for the disintegrating members, the gear train for the cam 70, and the shape of the cam itself are such that the handle 56 is only given a partial turn.

The handle is then turned back to its initial position, and the parts will be restored to the full-line positions illustrated in Fig. 3, the disintegrated ice, of course, falling by gravity into the ice receptacle.

The refrigerator door 4 may then be opened and the container of disintegrated ice removed through the edge thereof.

However, if it is desired to discharge the disintegrated ice or any part of it directly into a container without removing the ice receptacle from the brackets 80 and 82, then it is unnecessary to open the refrigerator door. With the door closed, the lever 94 is depressed to the broken-line position of Fig. 2, which will swing the receptacle of disintegrated ice into the dispensing chamber 92. In this movement, the ice receptacle is turned on its side, so that the contents thereof will be dumped into the chute 102. It will be understood, of course, that when only part of the contents of the ice receptacle is to be discharged, then the actuating lever 94 is only depressed for part of its stroke.

The lever 106 is next depressed to open the closure member 104 at the mouth of the chute 102. As above noted, the fixture 96 projects outwardly some distance beyond the face of the refrigerator door, so that the container which is to receive the disintegrated ice may be used to depress the lever 106 and will be in position to receive the disintegrated ice as it falls out of the chute 102.

It will be apparent from the foregoing that I have provided a construction wherein the ice may be disintegrated and dispensed without opening the refrigerator door; on the other hand, after the ice has been disintegrated and allowed to fall into the ice receptacle, the receptacle, filled with ice, may be removed bodily by opening the refrigerator door and removing the receptacle through the edge of the door. Whenever desired, a receptacle of ice which has not been disintegrated may be removed through the edge of the refrigerator door.

In the embodiment of the invention illustrated in Figs. 5 and 6, I provide a construction wherein the ice is frozen and disintegrated in one wall of the refrigerator, as distinguished from the door of the refrigerator.

Referring to Figs. 5 and 6, one wall 120 of the refrigerator is provided with a freezing compartment 6, in which I stack a plurality of ice receptacles, each of which comprises rigid rim 10 and flexible body 12. The freezing coils are designated 14, and, as in the embodiment already described, they will be connected to the refrigerator compressor.

Just below the freezing compartment 6, I provide disintegrating chamber 38.

The disintegrating apparatus is the same as in Fig. 3 and is installed within a housing 122, which is installed on the inner side of the refrigerator wall 120. The threaded carrier 46 for the disintegrator is geared through gears 64 and 66 to the cam 70, but, in this instance, the shaft 54, which mounts the gear 64, is not driven direct from the handle 56 of the refrigerator.

It will be seen from the drawings that within the refrigerator wall 120 I mount a gear 124, which is on a short shaft 126, which has a bearing in the refrigerator wall at one end and in the housing 122 at its outer end. The outer end of this shaft carries a gear 128 in constant mesh with the gear 66.

Within the refrigerator wall 120 and extending vertically thereof is a shaft 130, carrying gear 132 at its upper end, constantly meshing with gear 124. On the lower end of the shaft 130

is a gear 134, in constant mesh with a gear 136, mounted on a coupling shaft 138, which projects through the edge of the refrigerator wall 120 to be coupled to a short coupling member 140, which is an extension of the shank of the refrigerator door handle 56 and projects slightly out of the inner face of the refrigerator door.

Access is had to the freezing and disintegrating chambers through the edge of the refrigerator wall 120, with the refrigerator door closed or opened, simply by opening the closure member 142.

The operation of this embodiment of the invention is similar to that of Fig. 3.

With a receptacle of ice in place upon the ledges 144 at the bottom of the disintegrating chamber 38 and with the refrigerator door closed, so that the coupling elements 138 and 140 are interlocked, the door handle 56 is given a partial turn, to effect deformation of the body of the ice receptacle and discharge of the ice into the disintegrating chamber 38, and disintegration of the ice therein. By reversing the handle 56 to its initial position, the ice receptacle body will restore itself to its original shape, and the disintegrated ice will fall thereinto. By opening the closure member 142, the receptacle of disintegrated ice can be removed.

It will be seen that in this embodiment of the invention the disintegrating mechanism is operated by manipulation of the handle of the refrigerator door and with the door closed, it being necessary, however, to open the door to remove the receptacle of disintegrated ice.

The construction illustrated in Fig. 7 is a possible modification of the hinge construction of Fig. 4. In this embodiment, the hinge 146 is conventional. Secured to the body of the refrigerator is a fixture 148. Secured to this fixture is one end of a pipe 150, in constant communication with one end of a tubular member 152, the other end of which is in constant communication with one end of a similar tubular member 154 pivoted thereto. The free end of 154 is attached to fixture 156, carried by the door 4 and in constant communication with pipe 158. The members 152 and 154 are not only free to pivot on each other but are free to pivot with respect to fixtures 148 and 156. The pipe 150 leads to the discharge side of the refrigerator compressor, while the pipe 158 leads to the freezing coils 14, which may be series-connected, and from thence back to the other side of the compressor.

This arrangement, it will be obvious, provides for the circulation of refrigerant through the freezing coils 14, which are in the refrigerator door, without requiring that the refrigerant pass through the door hinge, as in Fig. 4.

It will be seen from all of the foregoing that I have provided a construction in refrigerators whereby ice may be frozen either in the refrigerator door or in a wall of the refrigerator, charged into a disintegrating chamber and disintegrated, and then returned to its original receptacle by manipulation of simple means, such as the handle of the refrigerator door, from the exterior of the refrigerator and without the necessity of opening the refrigerator door.

In both embodiments of the invention, the disintegrated ice may be removed by removal of its original container or receptacle, while in the embodiment of Figs. 1 to 4 the container or receptacle may be dumped without removing it and the disintegrated ice dispensed directly into a container exterior of the refrigerator. While in Fig. 3 I have shown the dispensing construction embodied in the door of the refrigerator, it is within the contemplation of my invention to apply the same type of dispensing mechanism to the embodiment illustrated in Figs. 5 and 6.

It is to be understood that changes may be made in the details of construction and arrangements of parts herein illustrated and described within the purview of my invention.

What I claim is:

1. A refrigerator comprising a body and a door, a disintegrating chamber in one of said elements, a handle for the door means adjacent the disintegrating chamber for supporting a deformable receptacle of ice, and means operable by manipulation of the door handle from the refrigerator exterior with the door in closed position for deforming said receptacle to discharge its contents into the disintegrating chamber and to disintegrate the ice so charged to the disintegrating chamber.

2. A refrigerator comprising a body and a door, a disintegrating chamber in one of said elements, means adjacent the disintegrating chamber for supporting a receptacle of ice, means operable from the refrigerator exterior for deforming the body of said receptacle to effect the discharge of ice therefrom into the disintegrating chamber and to disintegrate the ice so charged and to permit the ice receptacle to assume its original shape whereby the disintegrated ice may fall by gravity into the ice receptacle, and means operable from the refrigerator exterior for pivoting the ice receptacle out of its original position into dumping position.

3. In refrigerating and ice disintegrating apparatus comprising a refrigerator door containing a freezing chamber in the door; a disintegrating chamber in the door; means for supporting a receptacle containing ice, which has been formed in the freezing chamber, at the base of the disintegrating chamber; means operable from the outer face of the door for deforming the body of the receptacle to effect discharge of the ice therefrom into the disintegrating chamber and to disintegrate the ice therein, restoration of said means to initial position, permitting the receptacle body to return to its original shape and the disintegrated ice to fall into the receptacle; a dumping chamber in the door; means operable from the door exterior for swinging the ice receptacle into the dumping chamber; and a discharge chute opening to the door exterior, communicating with the dumping chamber, whereby, as the receptacle is swung into the dumping chamber, its contents will be discharged into said chute.

4. In refrigerating and ice disintegrating apparatus comprising a door, a disintegrating chamber in the door, a housing at the door exterior, a disintegrator in said housing, a handle for said door, means for temporarily supporting a receptacle of ice adjacent the disintegrating chamber, a cam-operated element for engaging said ice receptacle to effect discharge of its contents into the disintegrating chamber, and a connection between the said door handle, the disintegrator, and the said cam-operated element, whereby actuation of said handle will cause ice to be discharged from said receptacle into the disintegrating chamber and the disintegrator will effect disintegration of the ice in said chamber.

5. A refrigerator comprising a body and a door therefor; an ice-disintegrating chamber and a non-rotatable, endwise-movable ice-disintegrator in one of said elements; a rotatable carrier for

the disintegrator; a handle for the door, said handle being attached to the said carrier whereby, upon deflection of the handle, the said carrier will be rotated on its longitudinal axis and the disintegrator moved endwise on its disintegrating stroke to disintegrate ice in the said chamber.

6. A refrigerator comprising a body and a door therefor; an ice-disintegrating chamber in one of said elements; means in the same element for supporting a receptacle of ice adjacent the disintegrating chamber; a disintegrator; a rotatable carrier therefor; a handle for said door attached to said carrier; a pivoted member below the bottom of a receptacle mounted in said supporting means; a cam operable to pivot said pivoted member, so that the same will force the ice out of said receptacle into the disintegrating chamber; a driving connection between said cam and the said disintegrator carrier whereby rotation of the door handle will effect discharge of ice from said receptacle into the disintegrating chamber and actuation of the said disintegrator to disintegrate said ice.

7. In refrigerating and ice-disintegrating apparatus the combination of a refrigerator; a door therefor containing a freezing chamber and an ice-disintegrating chamber; ice-disintegrating means within said door; operating means for the disintegrator extending into the door from the exterior thereof and operable from the refrigerator exterior with the refrigerator door closed; and means operable from the door exterior, with the door closed, for initiating discharge of the disintegrated ice from the door to the exterior of the refrigerator.

8. In refrigerating and ice-disintegrating apparatus the combination of a refrigerator; a door therefor, hinged thereto, the door containing a freezing chamber and an ice-disintegrating chamber; ice-disintegrating mechanism within said door exterior; and a connection between the ice-disintegrating mechanism and said door handle for actuation of the ice-disintegrating mechanism through manipulation of the door handle, with the door closed.

9. A refrigerator comprising a body and a door hinged to the body; a freezing chamber and an ice-disintegrating chamber in the door; means, including the door hinges, for effecting circulation of the refrigerant from the refrigerator body through the freezing chamber; ice-disintegrating apparatus within the door; and a handle for the door, connected to the disintegrating apparatus, for effecting transfer of ice from the freezing chamber to the disintegrating chamber and its disintegration in the disintegrating chamber.

HIRAM N. HUSE.

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