

Dec. 6, 1938.

G. B. DAVIS, JR

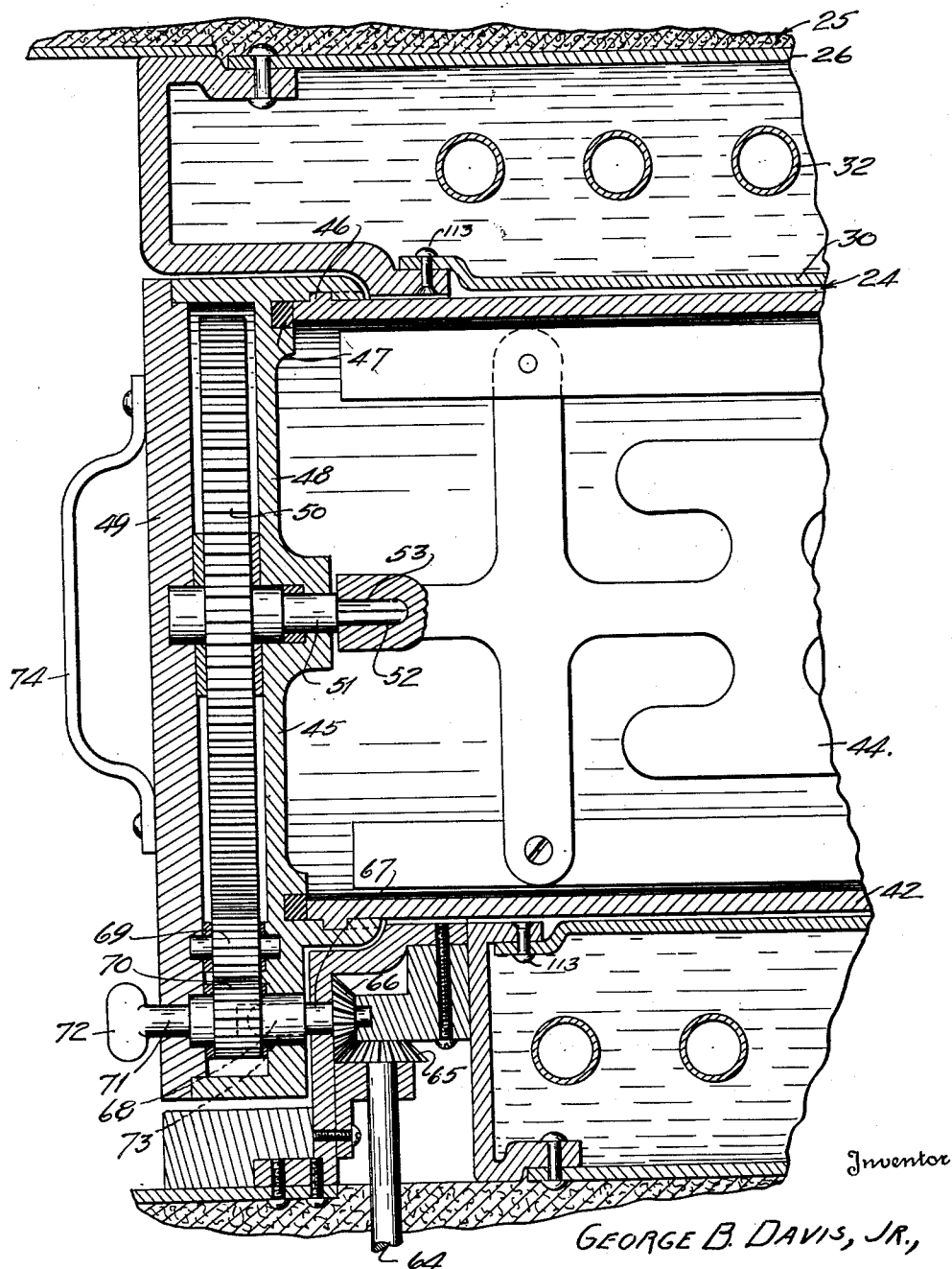
2,139,576

REFRIGERATOR FREEZER ATTACHMENT

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Fig. 2.



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Fig. 4.

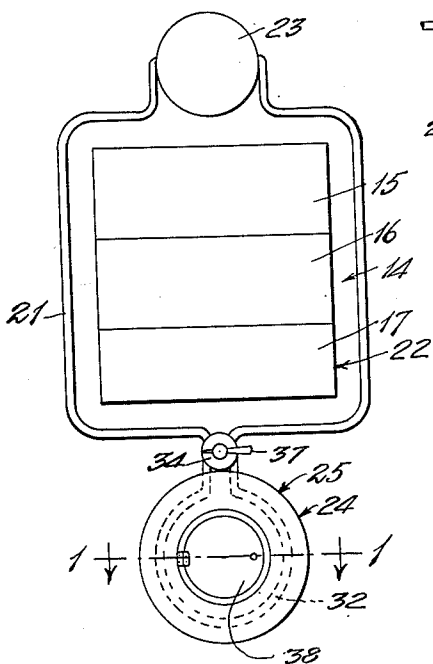


Fig. 5.

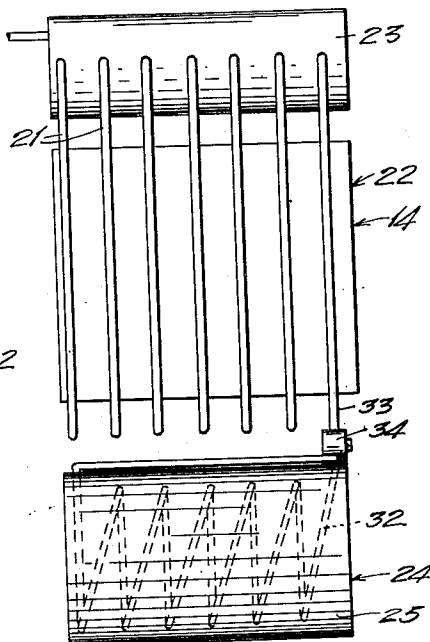


Fig. 6.

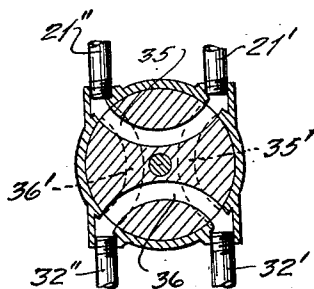
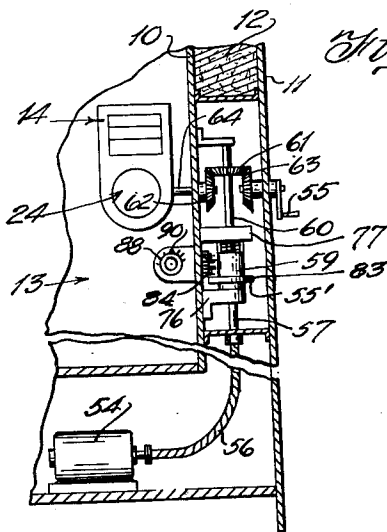


Fig. 7.



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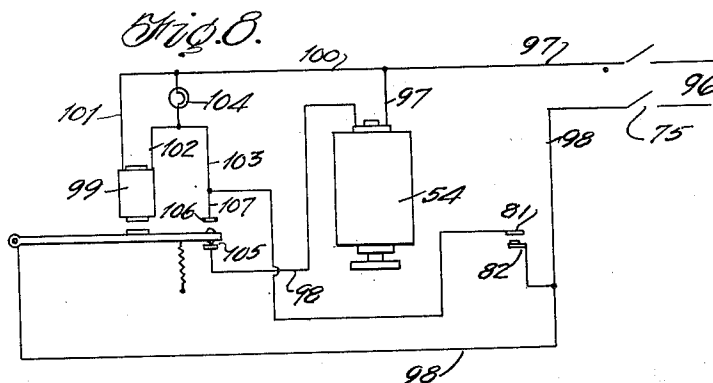
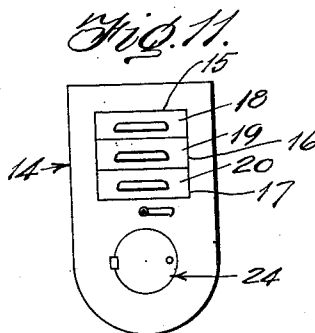
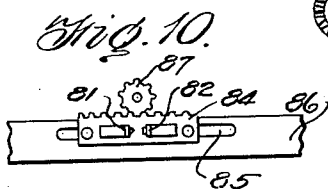
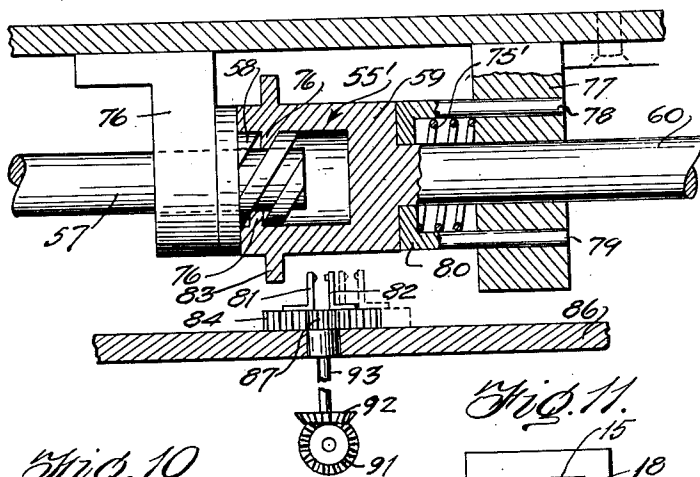


Fig. 9.



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UNITED STATES PATENT OFFICE

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REFRIGERATOR FREEZER ATTACHMENT

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Application June 24, 1937, Serial No. 150,169

6 Claims. (Cl. 62—116)

This invention relates to iceless domestic refrigerators and more particularly to a combination therewith of a removable ice cream freezer attachment.

5 One object of this invention is to provide an iceless domestic refrigerator with an improved ice cream attachment. Another object is to provide such a device which may be operated manually from a point outside of the refrigerator or which
10 may be operated from a power source. A further object is to provide a domestic refrigerator with an ice cream freezing compartment which may be operated without affecting the refrigeration conditions within the refrigerator. Still
15 another object of this invention is to provide an ice cream container having stirring connections which are sealed against the ingress of foreign substances. Further objects of this invention include the provision of signalling means outside
20 of the refrigerator arranged to indicate the consistency of the mixture being refrigerated to provide a freezer compartment controllable independently of the normal refrigerator functions, to provide the necessary control connections with a
25 minimum number of parts inside of the refrigerator, and to provide essential safety devices in connection with the source of power. Other objects and advantages of this invention will appear in the following description when taken in connection with the accompanying drawings.

In the drawings:

Figure 1 is a horizontal section on the line 1—1 of Figure 4; Figure 2 is an enlarged partial section similar to Figure 1 and showing a slight
35 variation in certain details; Figure 3 is a partial section of a domestic refrigerator showing an arrangement including features of my invention; Figure 4 is an enlarged front elevation of the freezer attachment applied to the ice compartment of a domestic refrigerator; Figure 5 is a side
40 elevation of the structure of Figure 4; Figure 6 is an enlarged view of the control valve; Figure 7 is an enlarged detailed view of the power limiting clutch; Figure 8 is a wiring diagram showing one
45 method of applying power to the apparatus; Figure 9 shows a slightly different method of controlling the power means; Figure 10 is a detailed view of certain portions of the mechanism of Figure 7; Figure 11 illustrates the application of the
50 invention to the ice tray structure of a domestic iceless refrigerator.

The invention contemplates the addition in a domestic iceless refrigerator of an ice cream freezing compartment which is thermally insulated from the remainder of the interior of the

refrigerator and which is provided with the necessary means for stirring the solution which is being frozen. The compartment is provided with appropriate power connections so that the cream
5 may be stirred, without having to have the door of the refrigerator opened, by either a source of mechanical power or manually from outside of the refrigerator housing.

In Figure 3 a portion of a domestic refrigerator is shown having inside and outside walls 10 and 11 respectively. These walls are spaced apart and contain appropriate insulation 12 against transmission of heat from the inside to the outside of a box or vice versa. The interior 13 of the refrigerator is cooled by means of the customary
15 refrigerating device 14. This device comprises a plurality of compartments 15, 16 and 17 in which ice trays 18, 19 and 20 may be placed for the formation of cubes of ice. These trays are cooled by means of a plurality of refrigerating coils 21
20 which extend about the ice compartment 22. A suitable refrigerant is allowed to flow from and to the header 23 through the coils 21 whereby the compartment 13 of the refrigerator is cooled as well as the compartment 22 in which the freezing
25 ing of water takes place. Below the ice compartment is provided the ice cream freezing compartment 24 which is a separate thermally insulated compartment contained in the main refrigerator compartment 13. The freezer compartment
30 comprises an outer shell 25 having spaced metal walls 26 and 27 respectively between which is interposed thermal insulation 28. The freezer compartment also includes an inner shell 29 comprising the spaced walls 30 and 26. This forms a
35 sealed space between these two walls which is filled with brine or other liquid refrigerant. Interposed between these walls is a refrigerating coil 32 which extends through the inner shell and which is spaced from the walls defining this shell.
40 This refrigerating coil is arranged to provide a continuation of the refrigerating coils 21 providing the normal refrigerating effect of the iceless refrigerator. The coil 32 may comprise a single loop which is adapted to be connected in series
45 with a single loop 33 by means of the valve 34 or it may comprise a plurality of loops each of which is adapted to be connected to a loop of the coils 21 and each of which may be controlled by a valve or the coil may be a permanent part of
50 the refrigerator system and be always connected as a part of the system. This is a design feature depending upon the production methods and characteristics of the particular iceless refrigerator to which the invention is applied.

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In the construction shown the coil 32 is arranged so that it becomes a continuation of the coil 33 when it is desired to make ice cream in the compartment 24. In this connection an enlarged view of the valve is shown in Figure 6, in normal position. The refrigerant flows from the leg 21' of one of the refrigerating coils 21 through the port 35 and to the left 21''. It will be readily observed that the coil 32 is connected as a loop by means of a port 36 which in turn connects the upper ends of the legs 32' and 32'' with the valve. In this position the coil 32 is not connected with the source of refrigerant 23. When it is desired to make use of the refrigerator attachment the valve 34 is turned 90 degrees by means of the handle 37 from the full line position in Figure 11 to the dotted position at which time the ports 35 and 36 assume the dotted position 35' and 36' at which time the refrigerant flows from pipe 21' into pipe 32' and out of pipe 32'' into pipe 21''.

It will now be appreciated that the freezing compartment will reach a state of thermal equilibrium with the remainder of the refrigerator after which its operation will not affect the temperature in the chamber 13. The compartment 24 may be used to preserve ice cream which has already been frozen or other materials which it is desired to keep in a very cold condition. The thermally insulated compartment allows this condition to exist without materially influencing the conditions in the remainder of the refrigerator. The front of this compartment is provided with a thermally insulated door 38 which completely seals the freezer inside. This door is similarly constructed with spaced walls 39 and 40 between which there is packed the heat insulation 41.

The freezer itself comprises a container 42 at one end of which is provided an appropriate boss 43 for the stirring device 44 which latter is removably mounted in the container. The other end of the container is sealed by means of a cover 45 which is locked to the container by any suitably arranged, angularly extending abutting members as at 46. These abutting members are provided with web shaped surfaces which interlock and which are so arranged as to readily release the minute it is desired to remove the cover from the container. The cover is provided with an appropriate gasket or other sealing means 47 which prevents fluid from passing into or out of the container. The cover is preferably composed of spaced flat double walls 48 and 49 interiorly of which are mounted driving gears. The inner wall 48 forms a seal for the container and is arranged around its periphery with a projecting flange 48a upon which is seated the outer flat plate 49 as shown in Figure 1. The inner and outer plates form bearings for the axles of gears 50, 58 and 59, and the lower parts both have openings through which project the parts 71 and 73 below described. Any appropriate means may be used for holding the outer cover 49 to the flange. The gear 50 provides the driving means for the stirring device 44 and is mounted upon an axle 51 which extends from the cover into the container and which has a portion 52 which is polygonal in cross section and arranged to engage the correspondingly shaped recess 53 on the stirring device. It will now be appreciated that the container will have the stirring device positioned in it and will then be filled with the appropriate amount of solution after which the cover will be secured to the container. The container will then be mounted in the compartment 24 for freezing.

In order to stir the mixture the refrigerator is

provided with a selective driving arrangement which comprises a power source 54 which is an electric motor and a second power source 55 which is a manually operated crank. The motor 54 is connected to a slip clutch 55' by means of a flexible cable 56. The flexible shaft 56 is connected to the driving shaft 57 of the clutch which in turn is connected to the driving member 58. Power from the electric motor is transmitted to the driven member 59 of the clutch which in turn operates the driven shaft 60. A bevel gear 61 is appropriately splined on the shaft 60 and is placed in mesh with two other bevel gears 62 and 63 respectively. The bevel gear 62 is keyed to the shaft 64 which extends through the inner wall of the refrigerator to provide the driving connection for the stirring device. The bevel gear 63 has a socket member which extends through the outer wall 11 of the refrigerator so that the manual crank 55 may be connected to it. It will now be appreciated that the stirring device 44 can be driven selectively from a power source shown as an electric motor 54 or manually by the handle crank 55. These selective sources of motive power both act to drive the bevel gear 61 which in turn causes the shaft 64 to rotate.

The shaft 64 terminates interiorly of the freezer compartment and carries a bevel gear 65 arranged to change the direction of the rotation provided by shaft 64. The bevel gear 66 is secured upon a shaft 67 which is polygonal in cross section at the point 68.

In the preferred arrangement of the cover the drive gear 50 meshes with an idler gear 59 which in turn meshes with a gear 70, the latter having a shaft 71 which extends through the upper surface 49 of the cover and which carries the wing nut 72. The gear 70 is recessed having a similar shape as the extension 68 so that when the container is placed in the compartment a person may take hold of the wing nut 72 and turn it until the drive shaft 67 is appropriately recessed within the recess 73. It will now be observed that a power drive to the stirring device 44 is appropriately provided either from the motor 54 or the crank 55. All of the moving parts of this power train are housed either within the walls of the refrigerator itself or within the walls of the freezer compartment. The freezer can be inserted or renewed by handle 74 and when all the parts are properly in place the cover 38 is secured in place. The power switch 75 is then closed providing the necessary power for motor 54.

The motor will now drive the stirring device until the viscosity of the solution or mixture is such that it will stall the motor. To prevent such an occurrence the clutch 55' is so arranged that when the load on the driven shaft 60 exceeds a definite amount the clutch member 59 will move to the right against the action of the spring 75'. The cam teeth 76 on the driven member 59 will ride up the cam surfaces on the driving member 58 until they are entirely free of these surfaces at which time the positive drive between driving and driven shafts 57 and 60 respectively will cease. The characteristics of the spring 75' are appropriately determined so that the clutch will release when the consistency of the ice cream is correct. Shafts 57 and 60 are respectively secured to the walls of the refrigerator by the bracket members 76' and 77. A collar 80 is slidable on the shaft 60 and a pair of diametrically opposed pins 78 and 79 are fixed at one end thereof to the collar 80 and are slidable through the bracket 77 so that the collar 80 will be held 76

against rotation relative to the shaft 60. The spring 75' engages about the shaft 60 and urges the collar 80 against the clutch member 59. When the spring yields to the load as a result of the increased viscosity of the ice cream the pins 78 and 79 slide in the bracket member and allow the shaft 60 to move to the right. This does not affect the power connection between the bevel gears for the reason that the bevel gear 61 is splined to this shaft to allow for this movement.

To provide further safety in connection with the operation of the freezer electrical contacts 81 and 82 are arranged to be operated by a flange 83 carried by the driven member 59 of the clutch. When this clutch member moves to the right the flange 83 engages the contact arm 81 and closes the electrical connections to complete a circuit shutting off the power to the motor. The contacts 81 and 82 are carried upon a rack 84 which is slidably mounted in the slot 85 and a frame member 86 secured to the wall of the housing. The pinion 87 is arranged to engage with the rack in the making of different frozen confections such for example as different kinds of ice cream and different water ices it is desirable to vary the load and in turn the viscosity of the solution which is necessary to shut off the motor. This is accomplished by the small dial 88 which is mounted inside of the refrigerator adjacent the freezer attachment and which carries a pointer arranged to be set by the indicia marks 90. The dial 88 carries a bevel gear 91 which in turn meshes with bevel gear 92, the latter being mounted on the shaft 93 which carries the pinion 87. The adjustment of the dial 88 moves the rack 84 to the right or left thereby moving a set of contacts from the full line position in Figure 7 to one or more positions, one of which is illustrated by the dotted lines. It will thus be seen that the adjustment of the dial 88 in the refrigerator moves the contacts further away from or closer to the flange 83.

When the power switch 75 is closed a circuit from the power source 96 is completed to the motor 54 by means of the lines 97 and 98. When the ice cream has reached the appropriate consistency the contacts 81 and 82 are closed thereby completing a circuit from the power source 96 to the solenoid 99. This circuit is as follows: 96—97—100—101—99—102—103—81—82—98—96. The operation of this circuit energizes the solenoid 99 and at the same time turns on the signal light 104. This signal light is visible at the outside of the refrigerator and immediately apprises the housewife that the ice cream is ready for storage or serving. It will be appreciated that the signal means 104 may partake of other forms, such as an audible signal instead of a visual signal. The operation of the solenoid breaks the circuit at the contacts 105 and completes the circuit at the contacts 106. The breaking of the circuit by contacts 105 opens the power supply to the motor 54. Closing the contacts 106 completes a holding circuit for the solenoid which locks the solenoid in position to prevent the motor from starting up. This locking circuit comes from one side of the power source 96 by the conductors 97, 100, 101 and leaves the other side of the power source by the circuit 102, 107, contacts 106, and conductors 98. Other arrangements may be utilized to prevent the stalling of the motor or burning out the same, one of which is illustrated in Figure 9 wherein the motor 54 is protected by an over-load circuit breaker 110. In this case the solenoid 111 is actuated by an increase of current going in the motor circuit and

immediately trips the circuit breaker 110, thereby leaving the motor de-energized. The circuit breaker must be manually reset to place the motor in operation again.

The walls of the refrigerator have been indicated as secured together by rivets such as 113 although it will be readily appreciated that wherever it is desired to make fluid-tight joints these joints may be made by welding, riveting or many other appropriate methods.

Figure 11 shows the housing in front of the ice tray and Figure 1 shows the driving gear 50 meshing with the gear 70 instead of having an intermediate gear 69 positioned between these two gears. This is a slight variation in arrangement but is equally contemplated as within the scope of the invention.

Variations coming within the true spirit and scope of this invention are covered by the appended claims.

I claim:

1. In a refrigerator having a refrigerating system, a stationary housing supported interiorly of the refrigerator having a receptacle chamber opening through the front wall thereof, a refrigerating coil in said housing about said chamber, means connecting said coil to the refrigerating system, a receptacle engaging in said chamber, a drive shaft, a coupling member laterally of said receptacle chamber rotatably connected to said shaft and having the longitudinal axis thereof parallel with the axis of said chamber, a stirrer engaging in said receptacle, a coupling member carried by said stirrer, a hollow lid for said receptacle, reduction gears in said lid, and a pair of coupling members carried by said gears engageable with said shaft, and stirrer coupling members whereby positioning of said lid on said receptacle in said housing will operatively connect said stirrer with said drive shaft.

2. In a refrigerator having a refrigerating system, an insulated housing supported interiorly of the refrigerator, said housing having a receptacle chamber opening through a wall thereof, a refrigerating coil in said housing about said chamber, means connecting said coil to the refrigerating system, a cooling brine disposed in said housing about said chamber and said coil, a receptacle engaging in said chamber, a drive shaft, operating means remote from said housing for said drive shaft, a coupling member laterally of said receptacle chamber rotatably connected to said shaft and having the longitudinal axis thereof parallel with the axis of said chamber, a stirrer engaging in said receptacle, a coupling member carried by said stirrer, a hollow lid for said receptacle, reduction gears in said lid, and a pair of coupling members carried by said gears engageable with said shaft and said stirrer coupling members whereby positioning of said lid on said receptacle in said housing will operatively connect said stirrer with said drive shaft.

3. In a refrigerator having a refrigerating system, a housing supported interiorly of the refrigerator having a receptacle chamber opening through a wall thereof, a refrigerating coil in said housing about said chamber, means connecting said coil to the refrigerating system, a receptacle removably engaging in said chamber, a drive shaft, operating means for said drive shaft remote from said housing, means supporting an end of said drive shaft adjacent the opening in said chamber, a driven shaft, means rotatably supporting said driven shaft adjacent the chamber

and at a point laterally thereof, means connecting said driven shaft with said drive shaft, a coupling member carried by said driven shaft, a stirrer engaging in said receptacle, a coupling member 5 carried by said stirrer, a hollow lid for said receptacle, gears rotatably carried by said lid, and a pair of coupling members carried by certain of said gears engageable with said driven shaft and stirrer coupling members whereby positioning 10 of said lid on said receptacle in said housing will operatively connect said stirrer with said drive shaft.

4. A refrigerator comprising a food compartment, an evaporator within said compartment, 15 an insulated housing within said compartment, a shell arranged within said housing and having a wall spaced from the adjacent wall of said hous-

ing, a freezing element arranged within said space and connected to said evaporator, a congelation receptacle removably arranged within said shell and including an agitating device, a closure 5 removably carried by said receptacle, a closure for said housing, and operating means extending through the wall of said housing for operating said agitating device.

5. A refrigerator as set forth in claim 4 in which the receptacle closure carries means for 10 coupling the operating means with the agitating device.

6. A refrigerator as set forth in claim 4 in which the freezing element consists of a coil connected to the evaporator and engaging about the 15 shell.

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