

Feb. 21, 1933.

M. J. AJAM

1,898,804

REFRIGERATING APPARATUS

Filed June 27, 1931

6 Sheets-Sheet 1

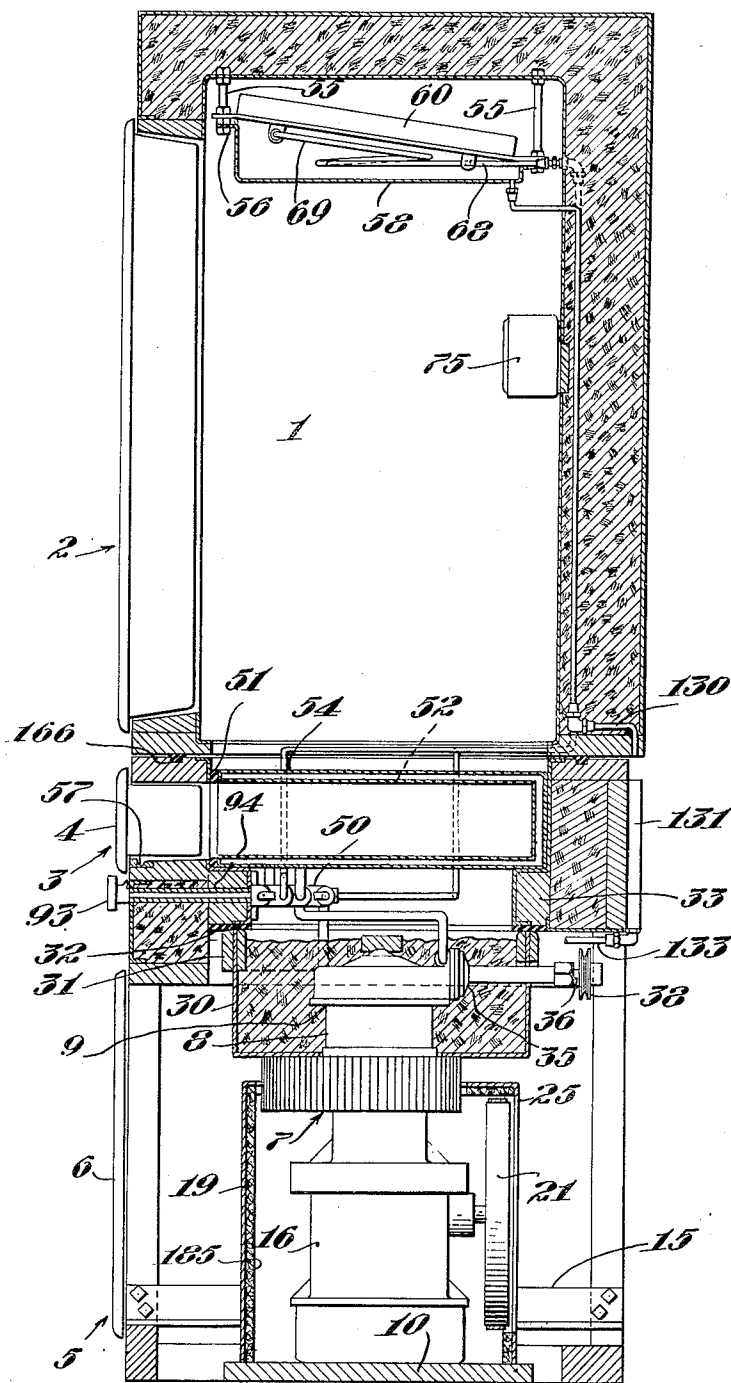


Fig. 1

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6 Sheets-Sheet 2

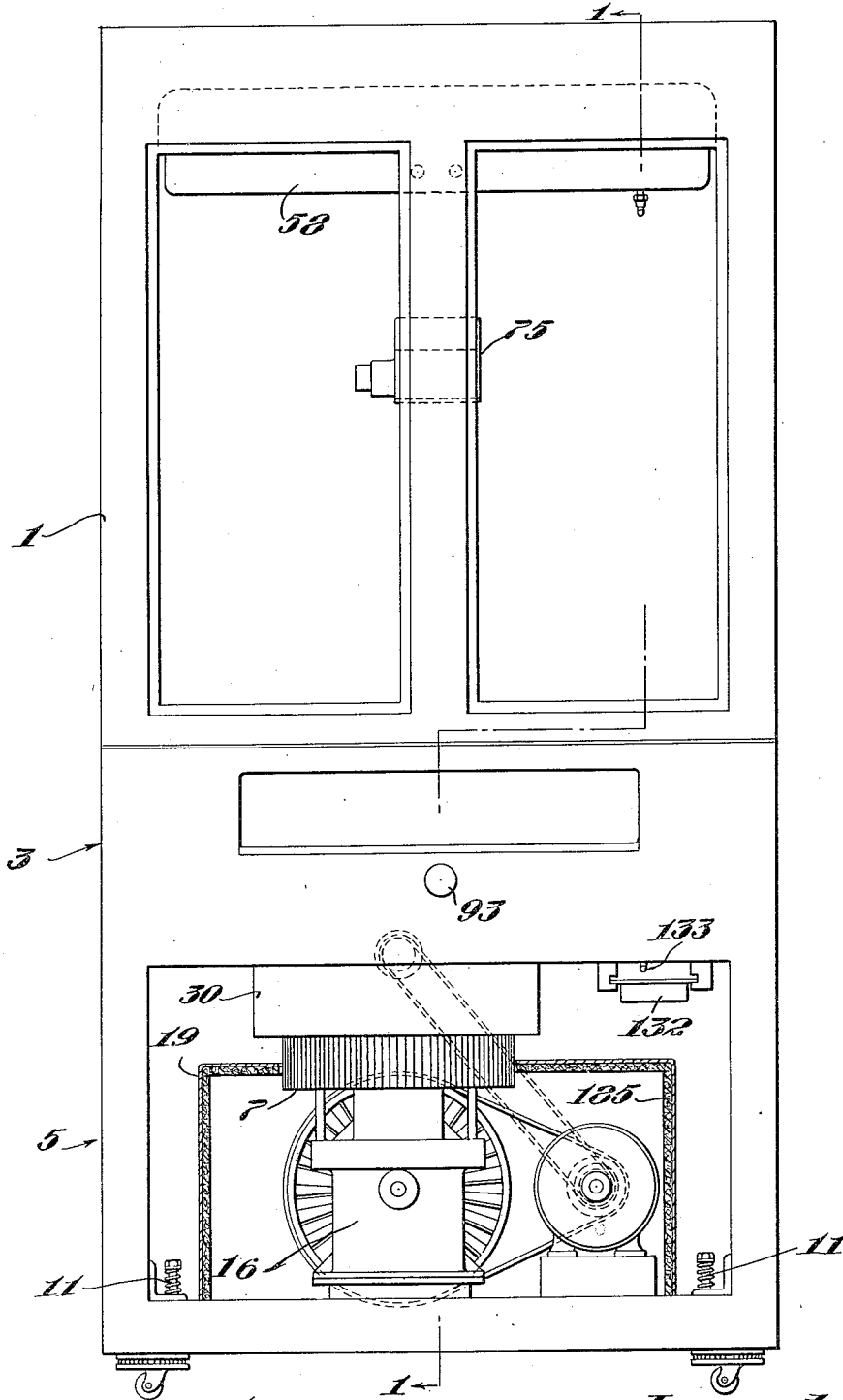


Fig. 2

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6 Sheets-Sheet 3

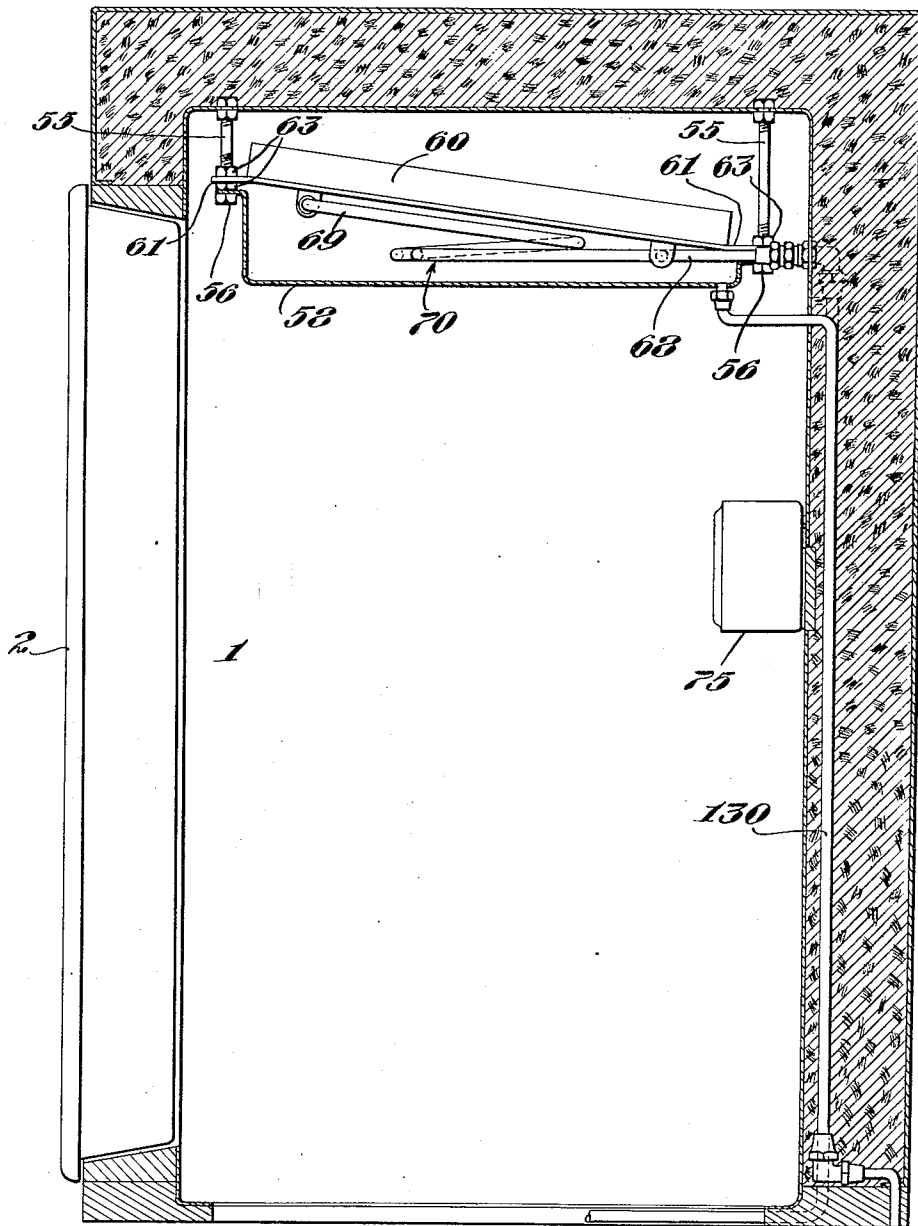


Fig. 3

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6 Sheets-Sheet 4

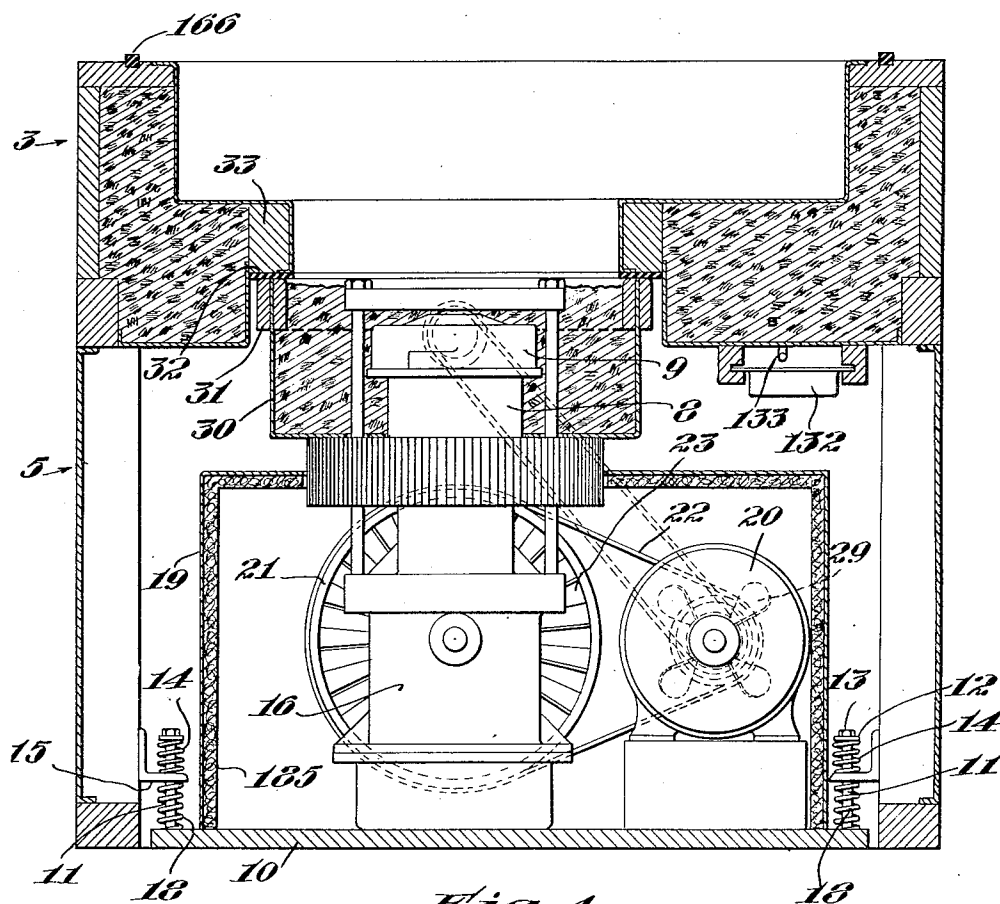


Fig. 4

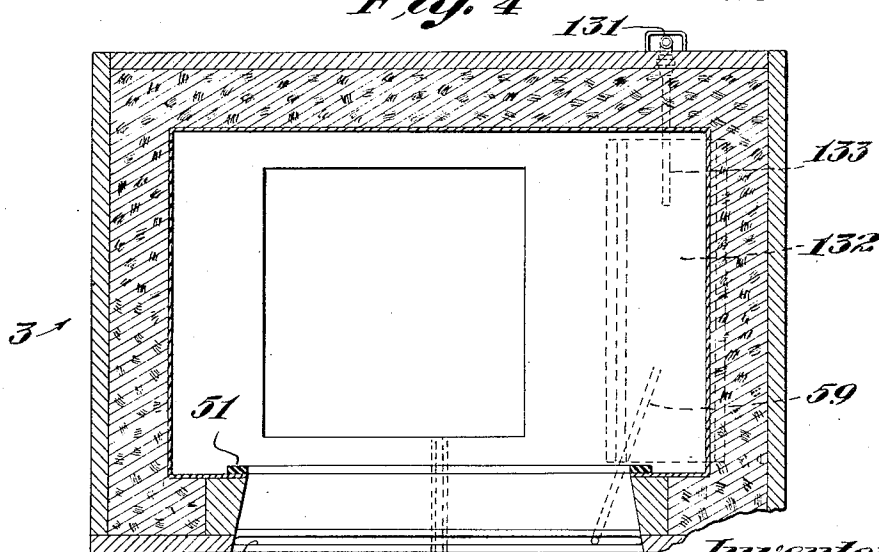


Fig. 12

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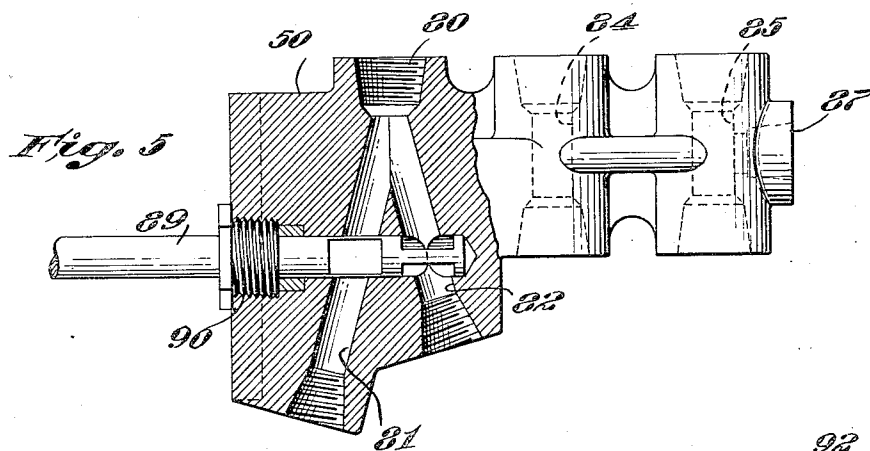
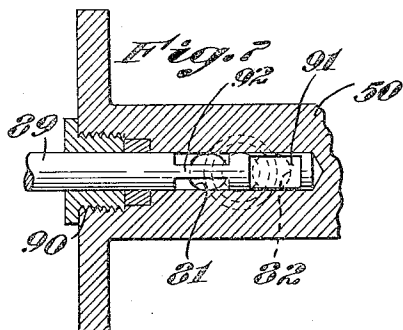
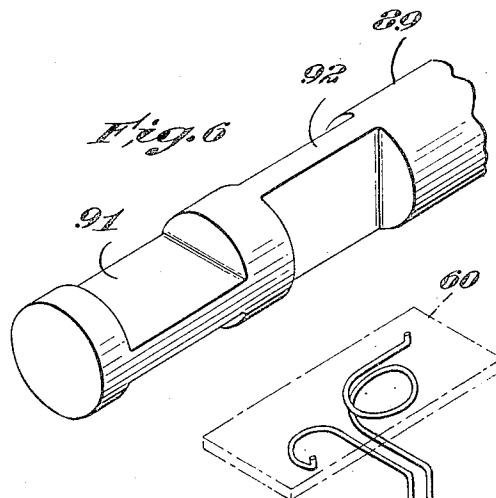
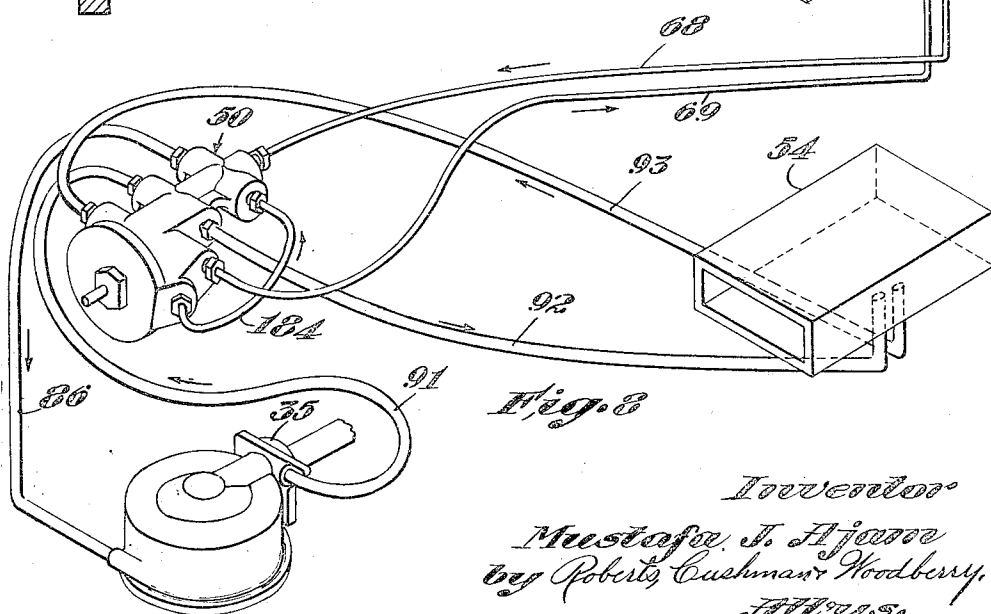
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REFRIGERATING APPARATUS

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6 Sheets-Sheet 5



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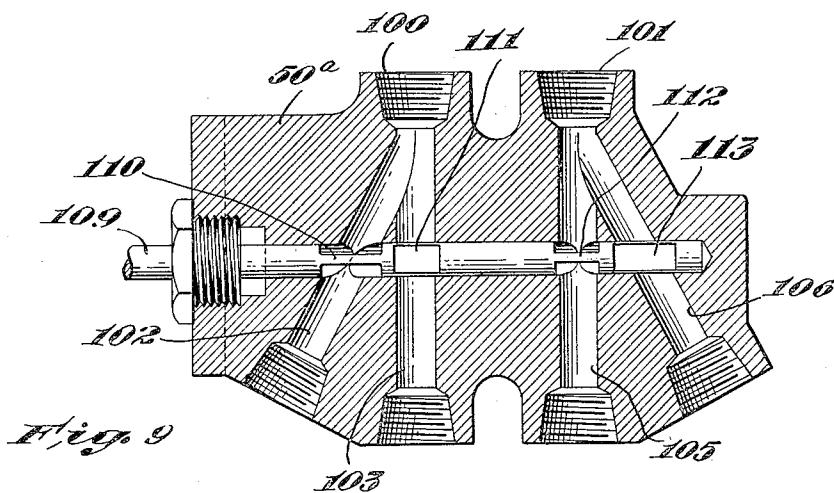
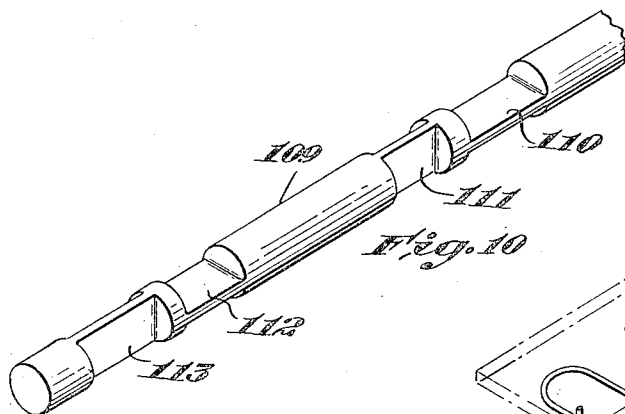
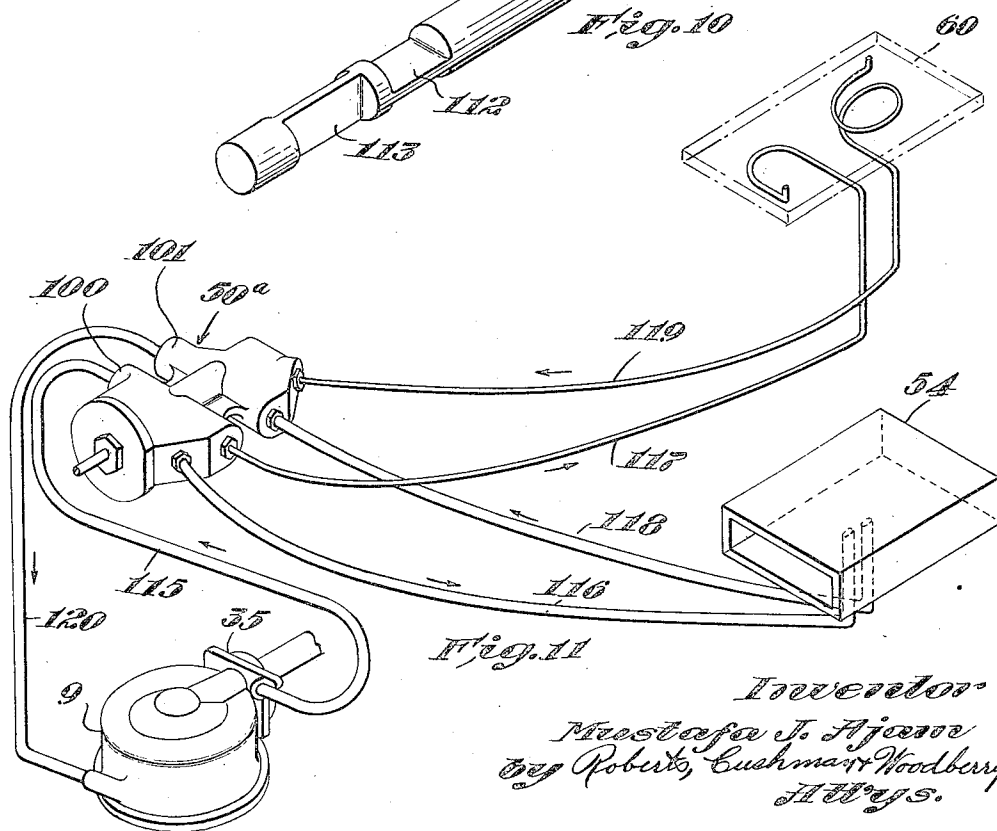
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6 Sheets-Sheet 6



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UNITED STATES PATENT OFFICE

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REFRIGERATING APPARATUS

Application filed June 27, 1931. Serial No. 547,201.

This invention relates to improved refrigerating apparatus and in some aspects provides an improved arrangement of the general type disclosed in the copending application of Ivar Lundgaard, Serial No. 389,641, filed August 31, 1929. More particularly the present invention relates to refrigerating circuit arrangements and to the arrangement of the component parts of a refrigerating system in a suitable refrigerating cabinet.

One important aspect of the invention pertains to control means to permit the regulation of coolant flow to an ice forming compartment and to a food cooling unit. This invention is more especially advantageous in conjunction with a system employing a cooler for freezing purposes and a separate cooler for refrigerating food, which may normally be maintained at a temperature above the frosting point to avoid the necessity for defrosting.

The circulating cooling medium may be distinct from the refrigerating medium in the compression-expansion apparatus itself. Thus, for example, the refrigerating machine may be of the type disclosed in Patent No. 1,240,862 to Ivar Lundgaard, which employs air as a mediating fluid, this air being compressed and cooled in a compression chamber and passing through a regenerator to an expansion chamber which is maintained at a low temperature. As disclosed in copending application Serial No. 389,641, the cold head or expansion chamber may be surrounded by a body of suitable liquid such, for example, as ethylene glycol. In accordance with this invention the cold liquid may not only surround the ice freezing compartments or trays but it also is circulated to a cooler for the food compartment, while control means are provided to vary the amount of liquid supplied from the cold head to the ice compartment and to the food cooling unit so that different freezing and refrigerating conditions may be obtained as desired.

A further aspect of the invention relates to the arrangement of a cooling unit in the top of the food compartment where it is out of the way and where it may maintain a very

uniform temperature throughout the food compartment. Thus in practice the food chamber of a refrigerator of this character may have a uniform temperature of within two or three degrees. The cooling unit preferably has a relatively large surface area and contains a comparatively small body of the cooling liquid so that the temperature of its surface may remain above the frost point, although the temperature of the food compartment is at the usual refrigerating temperatures, i. e., between 35 and 50° F. The cooling unit preferably is tilted to enhance the natural thermal circulation of the air in the compartment, thus permitting the maintenance of more effective cooling conditions and more uniform temperatures. Preferably the angle of inclination of the cooling unit may be adjusted to permit variation in the circulating tendency of the air.

Preferably condensate from the cooler may be collected and directed to an evaporating tray adjoining the refrigerating machine. A fan operating in synchronism with this machine causes the circulation of air past the evaporating tray. A part of the machine may be enclosed in a suitable baffle housing, and the compression chamber of the machine preferably has cooling fins which are disposed in an opening in this housing, the fan being arranged to cause a draft of air to pass through this opening and to sweep over the surfaces of the fins.

In the accompanying drawings:

Fig. 1 is a vertical sectional view of an improved refrigerator embodying the principles of this invention;

Fig. 2 is a front elevation of the refrigerator;

Fig. 3 is an enlarged vertical sectional view of the food compartment and related parts;

Fig. 4 is a similar view of the lower part of the refrigerator;

Fig. 5 is a plan view in the parts in section, showing one type of junction assembly employed in conjunction with one form of control means;

Fig. 6 is a perspective view of a portion of the assembly shown in Fig. 5;

Fig. 7 is a vertical section through a portion of the assembly shown in Fig. 5;

Fig. 8 is a schematic view of the cooling liquid ducts, the junction assembly, the ice compartment, and the cold head and related parts as the same are arranged with a cooling system such as may be employed with the junction assembly of Fig. 5;

Fig. 9 is a horizontal section view of a different form of junction assembly;

Fig. 10 is a perspective view of a part of the control shaft employed with the assembly shown in Fig. 9;

Fig. 11 is a schematic view similar to that of Fig. 8 but showing the arrangement of the connections with a junction assembly of the type disclosed in Fig. 8; and

Fig. 12 is a horizontal section through the portion of the lower housing which contains the freezing chamber.

Referring to the accompanying drawings, and first more particularly to Figs. 1 and 2, a refrigerator embodying the principles of this invention may be provided with an upper rectangular housing or food compartment 1 having doors 2 to afford access thereto. This food compartment is disposed above an ice compartment, which is designated in general by the numeral 3 and forms the upper part of a lower housing. A door 4 permits withdrawal of ice trays. A suitable sealing gasket 166 may be disposed between the lower surface of the food compartment 1 and the upper part of the ice compartment. Below the ice compartment the lower housing provides a machine chamber 5 to which access is afforded by a door 6.

The machine in the lower compartment, which effects the compression and cooling of a suitable refrigerating medium and then its expansion to afford refrigeration, may be of the type disclosed in the above-identified Patent No. 1,240,862, being provided with a crank case 16, a compression chamber 7 having cooling fins thereon, a regenerator portion 8 and a jacketed cold head 9.

The machine preferably is supported on a planar base 10, Fig. 4, which is provided with upstanding studs 11 carrying washers 12 and nuts 13 at their upper ends, the former resting on compression springs 14 that engage angles 15 extending along the sides of the refrigerator. Suitable springs 18 are disposed below the angles 15 and between the same and the planar support 12. Thus the machine is mounted on cushioned supports to avoid transmittal of vibration to the cabinet.

A sheet metal housing 19, lined with sound-absorptive material 185 rests upon the planar support 10 and encloses the lower part of the machine and the electric motor 20. Electric motor 20 may be disposed beside the refrigerating machine, being connected to the flywheel 21 by a suitable belt

22. The flywheel preferably is provided with fins 23 and thus acts as a slow speed fan, the wall of the sheet metal housing 19 being cut away, as designated by numeral 25, to permit the fan thus provided to draw air downwardly about the fins of the compression chamber 7, and out of the housing 19. The upper parts of the fins on the compression chamber are in an opening in the top of housing 19 and project there above the housing 19, and thus permit downward circulation of air from the machine compartment 5. Preferably spaces are left in front of and at the rear of the planar support 10 to permit the circulating air to pass into the machine chamber 5. The back of chamber 5 is left open so that air may freely pass out of the same. A small fan 29 on the motor shaft preferably acts as a second stage blast inducing factor to aid the circulation of air past the fins on the compression chamber.

A sheet metal box or container 30 is disposed above the fins of the chamber 7 and contains suitable insulating material, such as granulated cork, which surrounds the regenerator 8 and the jacketed cold head 9. The upper part of the box 30 may be provided with a wooden rim 31 engaging a compressible gasket 32 at the bottom of a rectangular frame 33 in the lower part of the freezing compartment 3. The jacket of the cold head preferably has an extension providing a chamber for a suitable centrifugal pump, designated by the numeral 35, (Fig. 1). A shaft 36 is provided with a pulley 38 for driving this pump, the pulley being connected by a suitable belt with a pulley upon the shaft of the electric motor 20. The rectangular frame 33 encloses a space containing a suitable junction assembly 50 which may be of different specific forms and which includes portions of the circuit for the cooling liquid. Above the frame 33 is the tank 54 having a reentrant portion 52 to receive ice trays, access being afforded to this reentrant portion by the door 4. A rectangular sealing gasket 51 is disposed between the front of tank 54 and the frame of housing section 3, this gasket surrounding the open end of the chamber 52. A trough 57 is disposed below the door 4 (Figs. 1 and 4) and is arranged to collect moisture from the chamber 52 and the region in front of the same. A drain 59 provides an outlet for this trough.

At the top of the food chamber 1, are depending studs 55 which have nuts 56 supporting a tray 58 to collect any moisture which may drop from the inclined cooling unit 60. This unit preferably is in the form of a shallow, closed tank having an extent substantially approaching the area of the bottom of the food box. Accordingly this cooling unit contains a relatively small body of the cooling liquid in proportion to its relatively large surface area. The cooling

unit is provided with outstanding ledges 61 which are perforated and engage the studs 55, being clamped in place in relation to these studs by nuts 63. The latter may be adjusted at different positions on the depending studs in order to vary the inclination of the cooler 60. Liquid flow to and from the cooler is by means of pipes 68 and 69 which are provided with curved or helical portions 70 beneath the cooler, thus providing a certain resiliency in the pipe connections to permit the convenient connection and disconnection of the cooler and its adjustment at various angles.

A drain 130 is connected to the tray 58 and extends downwardly through the back wall of the upper housing section or food compartment 1. The rear of this housing slightly overhangs the lower housing and drain 130 has an open lower end overhanging an exterior receptacle 131 secured to the back of the lower housing. From receptacle 131 a duct 133 extends to an evaporating tray 132 spaced from the top of machine compartment 5 and located adjoining the open back thereof. The drain 59 from trough 57 also extends to tray 132. Accordingly any condensed moisture received from the tray 58, through drain 130, receptacle 131 and duct 132, is readily evaporated due to the flow of air through the housing 29 and past the fins of compression chamber 7 out of the machine compartment, while condensate from trough 57 is similarly evaporated.

A suitable thermostatically controlled switch 75 is disposed in the cooling chamber and is in series with the electric line connected to the motor so that the motor and refrigerating machine are in operation whenever the temperature of the food compartment rises above a predetermined point.

Fig. 5 illustrates one type of junction assembly 50 which may be in the form of a suitable casting having a plurality of threaded outlet and inlet connections which are normally in threaded engagement with the ends of suitable cooling liquid pipes or ducts. As shown, the casting may be provided with an inlet opening 80 which communicates with diverging passages 81 and 82 that extend transversely through the front portion of the casting and are provided with suitable threaded outlet connections. Behind the inlet 80 is a pair of transverse passages 84 and 85 which are provided with suitable inlet and outlet connections, while the inlet connection 87 at the rear of the casting provides a passage communicating with the intermediate part of the passage 85.

A rotatable spindle 89 is provided with a suitable stuffing box 90 and has valve portions 91 and 92 comprising planar sections at right angles to each other disposed in the passages 82 and 81 respectively. Thus, as shown in Fig. 7, the planar portion 92 is ar-

ranged to permit flow through the passage 81, while the portion 91 prevents flow through the passage 82. The spindle 89 is extended to an exterior handle or knob 93, (Fig. 1) a suitable bakelite tube 94 providing a guide for this spindle in the framework of the compartment 3 and the rectangular frame 33.

Fig. 8 diagrammatically illustrates the piping arrangement which may be employed with the junction assembly 50 of Fig. 5. The outlet pipe 91 from the pump 35 is connected with one end of the passage 84, the opposite end of this passage being connected to a pipe 92 extending to the freezing tank 54. The outlet pipe 93 from this tank is received by the connection 80, thus communicating with the diverging passages 81 and 82. The former is connected to by-pass pipe 184 which communicates with one end of the passage 85, while the opposite end of this passage is connected to a return pipe 86 which extends to the lower part of the cold head, thus permitting recirculation of the liquid. The passage 82 is connected by a pipe 69 with the food cooling unit 60 from which the return pipe 68 is connected to the opening 87 at the rear of the assembly 50, so that liquid which flows to the cooling tank may also be received by the return pipe 86. With this arrangement of the piping and control means the spindle 89 is normally positioned so a part of the liquid received by the inlet 80 may flow through the passage 81 to the by-pass 184 and the remainder thereof flow to the tank 60. Thus all of the coolant received from the cold head passes first to the freezing tank 54. From the freezing tank the entire stream of circulating liquid then flows through the pipe 93 then dividing, so that a portion of the same returns to the cold head through the passage 85 and return pipe 96, while the remainder thereof flows through the passage 82 and pipe 69 to the cooler 60, being returned from the latter through the return pipe 68. It is thus evident that with this arrangement all of the liquid circulates through the freezing tank 54 and that thereafter a portion of this liquid may flow to the cooler 60 before returning to the cold head, while the remainder is by-passed directly to the cold head. The relative proportions of the refrigerant streams thus flowing to the unit 60 and being by-passed may be varied by the positioning of the spindle 89. As shown in Fig. 8 the ducts 91 and 86 connected to the cold head 9 and also 92 and 93 connected to chamber 54 may have larger diameters than the remaining pipes connected to assembly 50, preferably each having an interior cross-sectional area substantially twice as great as that of any one of the smaller pipes. Fig. 1 shows in general the specific arrangement of the pipes diagrammatically shown in Fig. 8, it being evident that the space about junction assembly 50 permits ready connection of the

various coolant lines thereto; the pipes connected to the cold head extend downwardly through the cork in pan 30, and the ducts connecting the assembly with tank 54 may extend upwardly to a portion of the tank above the assembly. The lines 68 and 69 may extend upwardly at one side of the tank 54, and then below the bottom of the food compartment 1 to the rear wall of the latter, in which upwardly extending sections of the pipes are enclosed.

Fig. 9 shows an optional junction assembly 50^a which is provided with a threaded inlet connection 100 and a threaded outlet connection 101. The inlet connection 101 is connected to diverging passages 102 and 103 which are provided with threaded portions for connection to suitable pipes. Similarly passages 105 and 106 converge adjoining the outlet 101. A suitable spindle 109, corresponding to the spindle 89 of Fig. 5, is provided in this assembly. However, this spindle is provided with four flat portions 110, 111, 112 and 113. Thus the portion 113 may be disposed in the passage 106 while the corresponding portions 112, 111 and 110 are positioned in passages 105, 103 and 102 respectively. The flat portions 113 and 111 are in the same plane and are at right angles to the portions 112 and 110.

With this type of junction assembly cooling liquid from the cold head pump 35 may pass through the pipe 115 to the inlet 100, then flowing into passages 102 and 103. When the spindle 109 is in its normal position, some of the liquid will flow through each of these passages, the liquid from passage 102 passing through pipe 116 to freezing tank 54, while liquid from passage 103 flows through pipe 117 to the cooling unit 60. From the ice tank the pipe 118 conducts the liquid to the passage 105, while the pipe 119 conducts liquid from the unit 60 to the passage 106. The liquid streams join as they flow toward the outlet 110 and are received by the return pipe 120 which is connected to the cold head 9.

It is evident that in this form of the invention, liquid received from the cold head normally divides into parallel streams, flowing to the ice tank and cooling unit respectively, and returning from the latter in parallel streams which join as they pass into the return pipe 120. With this arrangement the spindle 109 may be adjusted so that a corresponding throttling effect is obtained both in the passage directing fluid to the ice tank and in the passage receiving fluid therefrom, or both in the passages directing liquid to the cooler and receiving liquid therefrom. It is evident that an assembly of the general type shown in Fig. 9 may be provided with a spindle such as is shown in Fig. 5 so that the liquid is throttled only as it passes through passages 102 and 103, if desired.

From the foregoing it is evident that I have provided a refrigerator of the household type which has cooling means to maintain a freezing temperature in a low temperature chamber and to maintain a food compartment at a substantially higher temperature; the refrigerating machine is controlled by the thermostat 75 which is responsive to the temperature of the food compartment so that the machine operates and a refrigerating effect is produced whenever the temperature of the food compartment rises above a predetermined point. When the machine operates, liquid coolant from the jacket of the cold head 7 is circulated by the pump 35 to the junction assembly 50 (or 50^a), the relative proportions of the cooled liquid streams then flowing to the freezing tank 54 and to the cooler 60 depending upon the positioning of the valve means or spindle in the junction assembly. For example, this spindle may be adjusted so that a relatively large portion of the liquid flows to the cooler 60, whereby the temperature differential between the cooler and the tank 54 may not be very large, or on the other hand the valve means may be adjusted so that there is a relatively large differential permitting rapid freezing of ice or the like while temperature of the food chamber is thermostatically maintained within a suitable higher temperature range.

The arrangement of the cooler 60 out of the way at the top of the food compartment and particularly its arrangement in an inclined position aids the thermal circulation of air in the food compartment so all parts of the latter may have substantially the same temperature, thus wide local variations in temperature within the food compartment, which are characteristic of many refrigerators, are avoided. The cooler 60 having a relatively large surface although containing a relatively small volume of coolant normally has its surface above the frost point so that necessity for defrosting operations is avoided. The condensate from the cooler 60 as well as the moisture cooling in the trough 57 are fed to the evaporator tray, the constant draft of air in the machine compartment 5 effecting the evaporation of this moisture. The arrangement of the baffle housing 19 in conjunction with the first stage fly wheel fan and the second stage fan is advantageous since substantially all of the air which is drawn through the housing 19 is thus swept past the fins of the compression chamber.

It should be understood that the present disclosure is for the purpose of illustration only and that this invention includes all modifications and equivalents which fall within the scope of the appended claims.

I claim:

1. Refrigerating apparatus comprising a rectangular food compartment with vertical side walls and a horizontal top wall, a

coolant circuit including a cooler tank, said tank having upper and lower surfaces with areas each equal to the major portion of the area of the top wall, said tank having a relatively shallow depth between said surfaces, and means supporting the tank with its upper surface entirely spaced from the top of the compartment to afford space for air circulation therebetween.

2. Refrigerating apparatus comprising a rectangular food compartment with vertical side walls and a horizontal top wall, a coolant circuit including a cooler tank, said tank having upper and lower surfaces with areas each equal to the major portion of the area of the top wall, said tank having a relatively shallow depth between said surfaces, and means supporting the tank with its upper surface entirely spaced from the top of the compartment to permit air circulation therebetween, said cooler having similarly inclined upper and lower surfaces to aid the thermal circulation of air thereabout.

3. Refrigerating apparatus comprising a rectangular food compartment with vertical side walls and a horizontal top wall, a coolant circuit including a cooler, said cooler having upper and lower surfaces with areas each equal to the major portion of the area of the top wall, said cooler having a relatively shallow depth between said surfaces, and means supporting the cooler with its upper surface spaced from the top of the compartment to permit air circulation therebetween, said cooler having similarly inclined upper and lower surfaces to aid the thermal circulation of air thereabout, said supporting means being adjustable to vary the inclination of the cooler upper and lower surfaces.

4. Refrigerating apparatus comprising a rectangular food compartment with vertical side walls and a horizontal top wall, a coolant circuit including a cooler tank, said tank having upper and lower surfaces with areas each equal to the major portion of the area of the top wall, said tank having a relatively shallow depth between said surfaces, means supporting the tank with its upper surface entirely spaced from the top of the compartment to permit air circulation therebetween, a tray below said cooler for catching condensate, a drain connected to said tray, and an open evaporation receptacle exterior of the food compartment receiving liquid from the drain, whereby the liquid may be evaporated.

5. Refrigerating apparatus comprising a food compartment, a refrigerating machine exterior of the compartment having a cold section associated therewith, a liquid coolant containing system having a portion in heat transfer relation to said cold section, said coolant system also including a cooler in the food compartment and a low temperature

chamber exterior of the food compartment, and an impeller associated with said system to circulate coolant.

6. Refrigerating apparatus comprising a food compartment, a refrigerating machine exterior of the compartment having a cold section associated therewith, a liquid coolant containing system having a portion in heat transfer relation to said cold section, said coolant system also including a cooler in the food compartment and a low temperature chamber exterior of the food compartment, an impeller associated with said system to circulate coolant, and manually controllable means for varying the flow of liquid through said system to the cooler and low temperature chamber.

7. Refrigerating apparatus comprising a food compartment, a refrigerating machine exterior of the compartment having a cold section associated therewith, a liquid coolant containing system having a portion in heat transfer relation to said cold section, said coolant system also including a cooler in the food compartment and a low temperature chamber exterior of the food compartment, an impeller associated with said system to circulate coolant, a junction assembly forming a part of said system and having connections with the said portion of the system, with the low temperature chamber and the cooler, and a manually controllable member to regulate the flow between certain of said connections.

8. Refrigerating apparatus comprising a food compartment, a refrigerating machine exterior of the compartment having a cold section associated therewith, a liquid coolant containing system having a portion in heat transfer relation to said cold section, said coolant system also including a cooler in the food compartment and a low temperature chamber exterior of the food compartment, an impeller associated with said system to circulate coolant, a junction assembly forming a part of said system and having connections with the said portion of the system, with the low temperature chamber and the cooler, said assembly providing passages between said connections, and a manually operated valve means to throttle flow through at least one of said passages.

9. Refrigerating apparatus comprising a food compartment, a refrigerating machine exterior of the compartment having a cold section associated therewith, a liquid coolant containing system having a portion in heat transfer relation to said cold section, said coolant system also including a cooler in the food compartment and a low temperature chamber exterior of the food compartment, an impeller associated with said system to circulate coolant, a junction assembly forming a part of said system and having connections with the said portion of the system,

with the low temperature chamber and the cooler, said assembly having diverging passages between said connections, and manually controllable valve means to vary liquid flow through said passages.

10. Refrigerating apparatus comprising a food compartment, a refrigerating machine exterior of the compartment having a cold section associated therewith, a liquid coolant containing system having a portion in heat transfer relation to said cold section, said coolant system also including a cooler in the food compartment and a low temperature chamber exterior of the food compartment, an impeller associated with said system to circulate coolant, a junction assembly forming a part of said system and having connections with the said portion of the system, with the low temperature chamber and the cooler, said assembly having diverging passages between said connections, and manually controllable valve means to vary liquid flow through said passages, said passages receiving liquid from the connection to the low temperature chamber, one of the passages being connected to the cooler and the other being connected to a duct returning liquid to said portion of the system, whereby some of the coolant from the low temperature chamber flows to the cooler and the remainder returns directly to said portion.

11. Refrigerating apparatus comprising a food compartment, a refrigerating machine exterior of the compartment having a cold section associated therewith, a liquid coolant containing system having a portion in heat transfer relation to said cold section, said coolant system also including a cooler in the food compartment and a low temperature chamber exterior of the food compartment, an impeller associated with said system to circulate coolant, a junction assembly forming a part of said system and having connections with the said portion of the system, with the low temperature chamber and the cooler, said assembly comprising diverging passages between said connections, and manually controllable valve means to vary liquid flow through said passages, said passages having parallel connections to the low temperature chamber and the cooler and having a single connection with said portion, whereby adjustment of the valve means permits variation in the proportions of the liquid streams flowing between the cooler and said portion and between said chamber and portion respectively.

12. Refrigerating apparatus comprising a food compartment, a refrigerating machine exterior of the compartment having a cold section associated therewith, a liquid coolant containing system having a portion in heat transfer relation to said cold section, said coolant system also including a cooler in the food compartment and a low temperature

chamber exterior of the food compartment, an impeller associated with said system to circulate coolant, a junction assembly forming a part of said system and having connections with the said portion of the system, with the low temperature chamber and the cooler, valve means to vary the flow of coolant between said portion and the low temperature chamber and cooler respectively, and a thermostatic regulator responsive to the temperature of the food compartment to control the operation of the machine.

13. Refrigerating apparatus comprising a food compartment, a refrigerating machine exterior of the compartment having a cold section associated therewith, a liquid coolant containing system having a portion in heat transfer relation to said cold section, said coolant system also including a cooler in the food compartment and a low temperature chamber exterior of the food compartment, an impeller associated with said system to circulate coolant, a junction assembly forming a part of said system and having connections with the said portion of the system, with the low temperature chamber and the cooler, said assembly having a pair of outlet connections to direct coolant to the cooler and low temperature chamber and a pair of diverging passages communicating with said connections, an inlet connection communicating with said portion and said passages, a pair of return connections in parallel communicating with a second pair of diverging passages, a return duct extending from the junction of said passages to said portion, and a manually operable valve element extending through said passages and effective selectively to throttle flow both to and from the cooler or to and from the low temperature chamber.

14. Apparatus of the class described comprising a housing providing a food compartment, a cooler in heat transfer relation to said compartment, a housing providing a machine compartment, a refrigerating machine in the machine compartment to maintain a low temperature in the cooler, said machine having a compression portion, cooling elements projecting from said portion, a housing surrounding a portion of the machine and having an opening in which said elements are located and another opening remote therefrom and air draft including means to cause flow of air through said openings and about said elements.

15. Apparatus of the class described comprising a housing providing a food compartment, a cooler in heat transfer relation to said compartment, a housing providing a machine compartment, a refrigerating machine in the machine compartment to maintain a low temperature in the cooler, said machine having a compression portion, cooling elements projecting from said portion, a housing surrounding a portion of the machine and hav-

ing an opening in which said elements are located, a flywheel associated with said machine, said flywheel having fins thereon and thus forming a fan, the housing having an opening
5 adjoining the flywheel, whereby air is blown past said elements and through the housing.

16. Apparatus of the class described comprising a housing providing a food compartment, a cooler in heat transfer relation to said
10 compartment, a housing providing a machine compartment, a refrigerating machine in the machine compartment to maintain a low temperature in the cooler, said machine having a
15 compression portion, cooling elements projecting from said portion, a housing surrounding a portion of the machine and having an opening in which said elements are located, a flywheel associated with said machine, said flywheel having fins thereon and
20 thus forming a fan, the housing having an opening adjoining the flywheel, whereby air is blown past said elements and through the housing, an electric motor driving said machine, and a second fan driven by said motor
25 to aid said air movement.

Signed by me at Boston, Massachusetts,
this 22nd day of June, 1931.

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MUSTAFA J. AJAM.

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