June 4, 1940. C. B. OLIVER 2,203,439

COOLING APPARATUS

Filed July 1, 1938 2 Sheets-Sheet 1

FIG. 1.

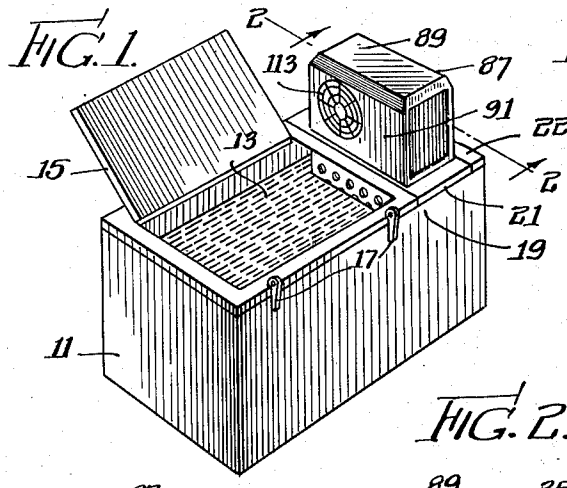


FIG. 3.

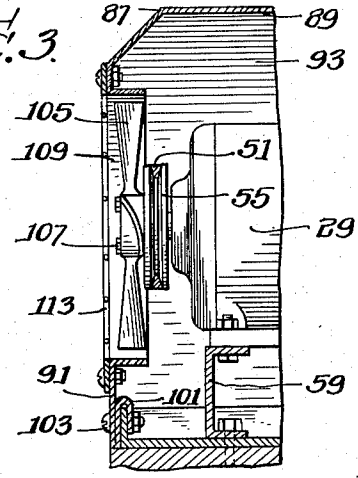
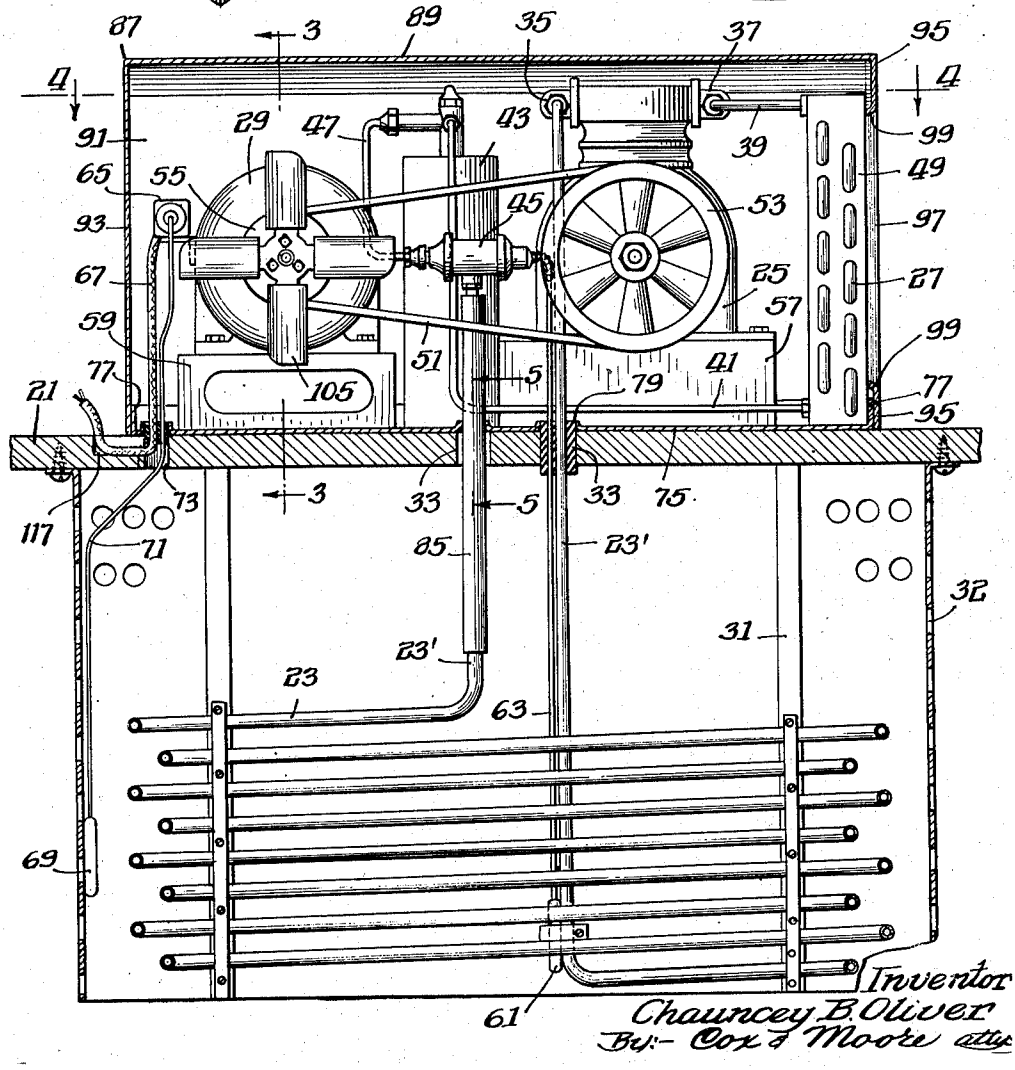


FIG. 2.



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Filed July 1, 1938 2 Sheets-Sheet 2

FIG. 4.

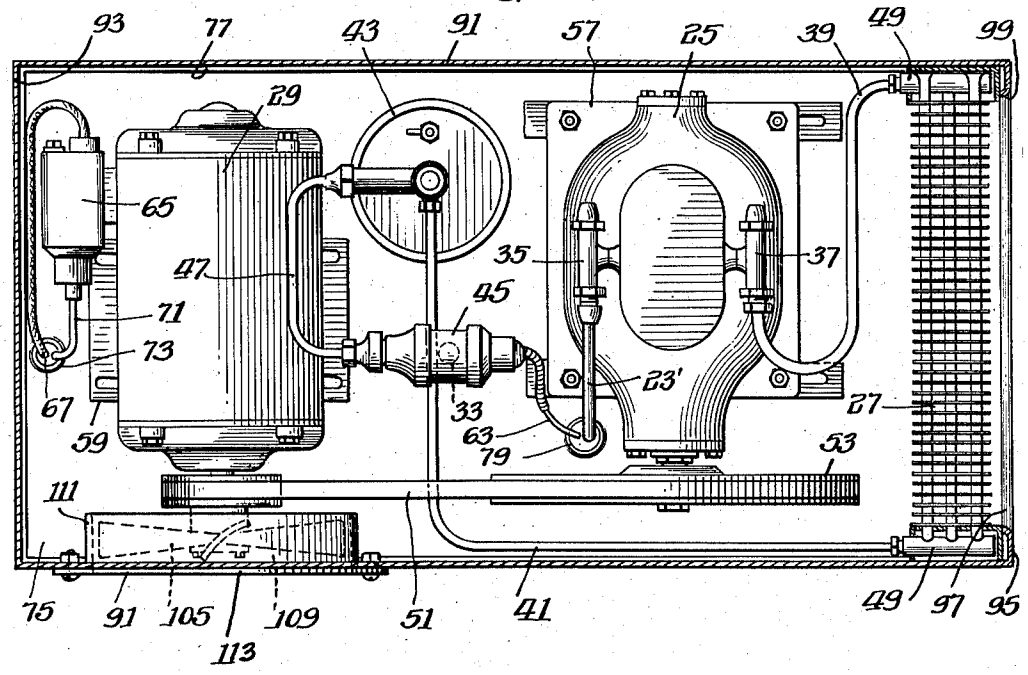
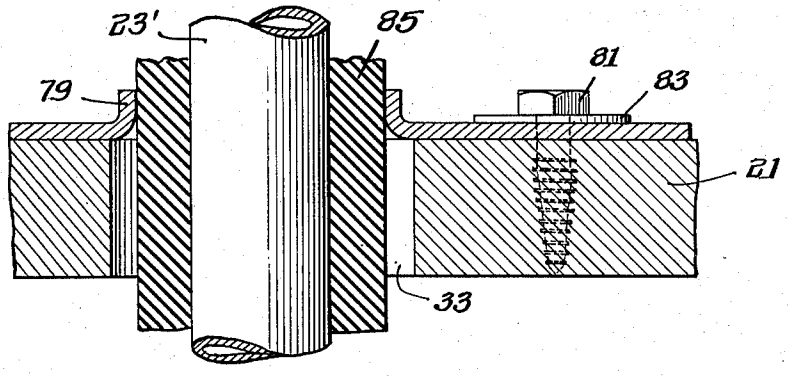


FIG. 5.



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UNITED STATES PATENT OFFICE

2,203,439

COOLING APPARATUS

Chauncey B. Oliver, Las Vegas, Nev., assignor to Babson Bros., Chicago, Ill., a limited partnership of Illinois

Application July 1, 1938, Serial No. 216,863

12 Claims. (Cl. 62—116)

My present invention relates in general to heat exchange apparatus, and has more particular reference to equipment for cooling milk in cans.

An important object of the invention is to provide improved means for cooling freshly drawn milk in an efficient, economical manner, and to provide equipment of the character mentioned which is easy to operate, inexpensive, compact and substantially portable to facilitate the operation and repair thereof.

Another important object is to provide cooling apparatus, including a cooling element connecting the equipment for delivering a cooling medium to the element, wherein the equipment is compactly arranged to occupy a minimum amount of space; a further object being to arrange the several elements of the mechanical equipment as an aligned assembly within a casing through which a cooling medium, such as air, may be drawn to most expeditiously cool the equipment.

Another important object is to provide a housing removable to entirely expose the equipment to facilitate inspection and repairs or replacement of parts.

Another important object is to arrange the mechanical equipment, including the housing, on a support, with the cooling element suspended beneath the support and interconnected therethrough with the mechanical equipment in order that the same may be applied in position to cool liquid in a tank merely by positioning the assembly with the support carried by the top of the tank, with the cooling element immersed in the liquid therein, and the mechanical equipment extending above the tank; a further object being to provide a tank adapted to contain a heat transfer medium, such as brine, and having a portion adapted to receive articles, such as milk containers, to be cooled, and another portion forming a mount for the cooling apparatus.

Another important object resides in arranging the mechanical equipment on a pan arranged in the support in position to catch drippage, such as oil, from the equipment, and thus prevent the same from falling into the liquid being cooled; a further object being to provide improved and simplified connections through said pan from the mechanical equipment on one side of the support, with the cooling element and controls located on the other side.

Another important object is to provide mechanical cooling equipment, including a compressor, a condenser, and a compressor motor, in aligned position within a housing, including means for drawing cooling medium, such as air, through the casing to cool first the condenser and then the other elements of the mechanical equipment in succession; a further object being to arrange the casing so that air is drawn in at one end of the casing through the condenser and expelled through a lateral wall of the casing, preferably adjacent the other end thereof; a still further object being to form the air-forcing element as a fan directly on the compressor motor, with the fan disposed directly in the air outlet from the casing, and to form the casing with an inwardly extending fan housing enclosing the fan to improve its efficiency.

Numerous other objects, advantages and inherent functions of the invention will become apparent as the same is more fully understood from the following description, which, taken in connection with the accompanying drawings, discloses a preferred embodiment of the invention.

Referring to the drawings:

Figure 1 is a perspective view of a cooling device embodying my present invention;

Figure 2 is a sectional view taken substantially along the line 2—2 in Figure 1; and

Figures 3, 4 and 5 are sectional views taken substantially along the lines 3—3, 4—4 and 5—5, respectively, in Figure 2.

To illustrate my invention, I have shown on the drawings a tank 11 which is preferably insulated and lined with liquid-tight material to serve as a container for a liquid 13 to be cooled; and when the invention is embodied in a milk cooler, the tank 11 is preferably filled with water or brine serving as a heat transfer medium in which articles, such as milk containers, to be cooled may be set.

The tank 11 is preferably covered by means forming a lid or cover 15 that may be secured in closed position as by the latches 17 and which may be opened to the position illustrated in Figure 1, in order to permit milk cans or other articles to be loaded into or removed from the container 11. The top of the container also comprises means forming an opening 19 adapted to receive a support 21 which, when positioned in the opening 19, is adapted to close the same.

This support may conveniently comprise a wooden board and affords a mounting for mechanical cooling equipment by means of which the liquid 13 may be refrigerated.

The mechanical cooling equipment preferably comprises a cooling element 23 suspended on and beneath the support 21, and mechanical equipment mounted on the support 21 and extending

above the same. This mechanical equipment preferably includes a compressor 25, a condenser 27 and a preferably electric motor 29 for driving the compressor. The cooling element 23 may conveniently comprise a coil of pipe mounted and supported in hangers 31 which may be suspended on the under side of the support 21. The support 21 also preferably carries a perforated guard or screen 32 which depends from the support 21 in position enclosing at least the sides of the coil 23.

The opposed ends of the coil forming the cooling element are connected through openings 33 formed in the support 21, the lower end of the coil being connected with the suction side 35 of the compressor 25, the discharge side 37 of which is connected, as by means of a pipe 39, with the upper end of the condenser 27. The bottom of the condenser is preferably connected, as by means of a pipe 41, through a receiver 43 and an expansion valve 45 with the upper end of the cooling coil 23, the pipe 41 connecting the condenser with the inlet of the receiver 43, and a pipe 47 connecting the receiver outlet with the inlet side of the expansion valve, the outlet side of which is connected directly with the end of the coil 23 preferably above the support 21.

When the compressor is in operation, the refrigerating medium, in gaseous condition, may be drawn from the coil into the compressor through the inlet 35 and discharged in gaseous condition and at relatively high pressure, to the condenser 27, in which the refrigerating medium liquefies at high pressure, being delivered thence to the liquid receiver 43. From the receiver 43 the refrigerating medium in liquid condition is delivered at a regulated rate through the expansion valve 45 and into the coil 23 in which the refrigerating medium expands and absorbs heat from the liquid in which the coil is immersed in the tank 11.

The condenser 27 may be of any suitable or preferred form and may conveniently comprise a coil of pipe arranged in horizontal courses and provided with fins to improve the heat transfer efficiency of the condenser. The coils and fins of the condenser are preferably arranged in a rectangular frame 49.

The compressor 25 and driving motor 29 likewise may be of any suitable or convenient form. However, I have shown a separate motor and compressor drivingly connected by means of a preferably flexible driving element 51, the compressor having a fly-wheel 53 comprising a pulley, and the motor having an axle carrying a pulley 55. The driving element 51 preferably comprises a belt carried by and interconnecting the pulleys 53 and 55. With this arrangement, the motor and compressor may be arranged adjacently on the base 21, with the axes of the pulleys 53 and 55 parallel, the motor and compressor being in substantial alignment with the condenser; and I prefer to arrange the compressor between the driving motor and the condenser.

In the interests of compactness, I prefer to mount the receiver 43 and the expansion valve 45 on the support 21 between the motor 29 and the compressor 25. The compressor 25 and motor 29 also are preferably supported, respectively, on mounting blocks 57 and 59 which in turn are secured to the base 21.

The expansion valve 45 is preferably normally closed to prevent flow of liquid from the receiver 43 to the cooling coil 23, the valve 45 being preferably thermostatically controlled to open the same and permit the refrigerant to pass to the coil when the coil or the liquid to be cooled is above a predetermined temperature. To this end, I provide a heat responsive element 61 of any suitable or preferred construction, which is disposed in position to be influenced by the temperature prevailing at the coil 23 or in the liquid being cooled.

The responsive element 61 is preferably secured in heat exchange relationship with the coil 23 at the outlet end thereof and is connected with the valve 45 as by the connecting means 63 comprising a conduit extending from the element 61 to the valve 45 preferably through one of the openings 33 in the support 21. The element 61 is of a character adapted to control the valve 45 and cause the same to open when the temperature at the lower end of the cooling coil 23 and/or in the surrounding liquid to be cooled rises above a predetermined value.

I also provide means for controlling the operation of the compressor motor 29. Any suitable or preferred control mechanism may be used for this purpose, although I prefer to employ means forming a control switch 65 suitably connected on the frame of the motor and connected, as by the electrical conducting means 67, with a suitable source of electrical power preferably through a master control switch (not shown), in order to permit the apparatus to be selectively connected for operation or disconnected to render the same totally inactive.

The switch 65, however, is preferably controlled by thermo-responsive means 69 of any suitable or preferred character and disposed preferably in heat exchange relationship only with the liquid to be cooled in the tank 11 at a station remote from the coil 23, the element 69 being preferably suspended on the screen 32. The heat responsive element 69 is operatively connected with the switch 65 by connecting means 71 extending through an opening 73 formed in the support 21.

I prefer to provide, on the support 21 and beneath the mechanical equipment comprising the condenser, compressor and motor, a drip pan 75 to catch and prevent drippage, such as oil, from the operating equipment from falling into the liquid being cooled in the container 11. To this end the pan 75 preferably comprises a rectangular piece of sheet-metal having upstanding, marginal flanges 77 at its peripheral edges and perforations defined by upstanding fillets 79 opposite the openings 33 and 73 formed in the support 21.

The pan 75 may be conveniently secured on the support 21 by means of screws 81 or other suitable fastening means, preferably extending through washers 83, in order to seal the openings in the pan through which the fastening elements extend.

The operating mechanism, including the condenser, compressor, motor and receiver, are secured upon the support in any suitable fashion in position upon and above the drip pan.

At the openings 33 the pipes forming the ends of the coil 23 are preferably fitted with sleeve-like packing means 85 which preferably comprise rubber-like material adapted to fill the openings in the support and in the drip pan and seal the same substantially as shown in Figure 5 of the drawings.

I prefer also to extend the sleeve 85, which encircles at least the coil inlet pipe, both above and below the support 21 in order to insulate the pipe against heat loss between the valve 45 and

the upper end of the coil 23, since this connection, when the device is in operation, will contain the refrigerant in expanded condition having high heat-absorbing capacity, so that, unless the pipe is insulated the refrigerant will absorb a considerable amount of heat while passing the same and before reaching the portions of the cooling element which are submerged in the liquid to be cooled. By thus insulating the low-pressure portions of the cooling element that are not in effective heat exchange relationship with the liquid to be cooled, I am able to eliminate the waste of refrigeration to circumambient air that would otherwise occur.

The mechanical equipment above the support 21, of course, generates a considerable amount of heat during operation of the apparatus. Not only is it necessary to dissipate the heat abstracted from the liquid to be cooled by cooling the refrigerating medium, after compression, in the condenser 27, but it is also desirable to cool the compressor in order to dissipate the heat of compression and the heat generated as a result of the mechanical operation of the compressor. Likewise, it is desirable to maintain the motor 29 at a safe operating temperature by dissipating the heat resulting from the operation thereof.

The substantially aligned arrangement of the condenser, compressor and motor, is well adapted to facilitate cooling of the parts. In order to most efficiently cool the condenser, compressor and motor, I provide for forcing a draft of air successively through the condenser, which is the part requiring the maximum cooling effect, and then successively over the compressor and motor. To this end, I provide a casing or closure for the parts, said closure preferably comprising a shell or hood 87 which may conveniently be formed of a sheet-metal plate having a top wall 89 and lateral side walls 91.

The hood is closed at one end by an end wall 93. At the other end the shell is formed with inwardly extending flanges 95 defining an opening 97 of substantial area and configurated in conformity with the shape of the condenser 27, the edges of the opening 97 being filleted, as at 99, to snugly fit against the marginal frame of the condenser when the housing is applied.

The lower edges of the walls 91 are preferably formed, as at 101, for interfitting engagement with the upstanding, marginal edges of the drip pan 75, and the housing may be secured in place by the preferably threaded fastening screws 103 at intervals along said edges. The housing may be applied merely by dropping the same in place upon the edges of the drip pan in position enclosing all of the mechanical refrigerating equipment carried by the support 21 with the opening 97 opposite the condenser 27.

It will be noted that the pulley 55 of the motor extends opposite one of the side walls 91 of the casing, and I mount a fan 105 upon said pulley in any convenient manner, as by means of the fastening screws 107. The fan extends in position in an opening 109 in the adjacent side wall 91 of the housing.

In order to increase the air forcing efficiency of the fan 105, I mount in said opening 109 a fan casing 111 conveniently comprising an annular sleeve of sheetmetal enclosing the blades of the fan. The outer end of this sleeve 111 may be mounted on a foraminous cover 113 secured in said opening 109 as by means of the fastening screws 115, so that the sleeve 111 and cover 113 may be removed as a unit from the casing.

In order to avoid forming an opening in the casing or an additional opening in the pan 75 for the reception of the conductors 67, I may form the support 21 with a groove 117 therein beneath the end of the drip pan, said groove 117 communicating with the opening 73 so that the conduit comprising the conductors 67 may extend in said groove 117 from outwardly of the casing, thence through the perforation of the drip pan opposite the opening 73 and into the space within the casing for connection with the switch 65.

It will be seen from the foregoing that when the apparatus is in operation, the motor 29 not only drives the compressor 23 but operates the fan 105 to blow a stream of air outwardly of the casing through the opening 109, thus causing a draft of cool air to enter the casing and pass first through the condenser where a maximum cooling effect is desirable, the air somewhat heated by contact with the condenser passing thence around the compressor to cool the same, and finally passing around and through the motor, being ejected eventually through the opening 109. All of the mechanism is thus adequately cooled. The mechanism, however, is arranged compactly and occupies a minimum of space. Nevertheless, adequate cooling of all operating parts is afforded in a most efficient fashion.

The mechanism likewise is entirely enclosed so that operating parts are protected by the casing 87 which also acts as a guard to prevent the careless operator or accidental visitor from becoming entangled in any of the moving parts. To this end, the fly-wheel of the compressor is entirely enclosed, while the fan 105 is likewise guarded by the ornamental cover 113. The enclosed mechanism, however, may be quickly exposed for examination, repair, or replacement of parts merely by first removing the cover 113 which permits the casing 87 to be lifted from the enclosed mechanism upon removal of the holding screws 103.

The entire equipment also is substantially portable and may be removed as a unit from the container 11 merely by lifting the support 21 from mounted position in the opening 19.

The apparatus is extremely neat, compact and efficient, and all of the parts thereof, including the mechanical equipment, as well as the coil 23 and the thermostatic controls 61 and 69, are protected and guarded against accidental damage, as during transportation of the unit.

It will be noticed that by providing the inlet opening 97 of substantial area and configuration in conformity with the shape of the condenser 27 and by forming the air outlet opening 109 in the fan relatively remotely from the air inlet opening when the fan is in operation, it will draw the current of air through the housing in a manner so as to cause substantially all of the air entering through the port 99 to pass through in an evenly distributed column across the entire cross sectional area of the condenser whereby to evenly cool the condenser. After this air has passed through the condenser it will thus pass in a continuous, substantially evenly distributed column across the compressor and thence will pass across the motor to cool the motor, whence it is discharged through the air outlet opening 109. By this arrangement the efficiency of this refrigeration apparatus is greatly increased since the body of cool air first entering the housing is utilized immediately to cool the compressor which is not as hot as the condenser, and is finally used to cool the motor for the fan and water which drives

the fan and the compressor. It is important that substantially all of the air entering the casing be drawn across the entire cross sectional area of the condenser in an evenly distributed flow and this is accomplished by forming the air inlet of the same cross sectional area as the condenser and shrouding the margins of each so that the air will not by-pass around the condenser but will pass therethrough, and it is also accomplished by placing the fan discharge outlet remotely from the inlet and the condenser whereby to cause the draft of air to be evenly distributed as it passes across the condenser.

It is thought that the invention and numerous of its attendant advantages will be understood from the foregoing description, and it is obvious that numerous changes may be made in the form, construction and arrangement of the several parts without departing from the spirit or scope of the invention, or sacrificing any of its attendant advantages, the form herein described being a preferred embodiment for the purpose of illustrating the invention.

The invention is hereby claimed as follows:

1. Apparatus of the character described, comprising a support frame, mechanical refrigerating means on said frame and comprising elements including a cooling element extending on one side of said frame, a condenser, a compressor and a driving motor therefor on the opposite side of the frame, means interconnecting said elements to form a refrigerant circulating system, including conduit means extending through and on opposite sides of said frame, said condenser, compressor and motor being arranged in alignment on said frame with the compressor at one end thereof, the axles of said motor and compressor being drivingly interconnected and one of said axles carrying an air circulating fan, a drip pan on said frame extending between it and the condenser and motor and having an upstanding marginal flange at the edges of the pan, a cover for enclosing said compressor, condenser, motor and fan, comprising a shell having top, side and end walls and having bottom edges adapted to interfit with the marginal flange of said drip pan, means to secure said cover to said marginal flange, said cover having a lateral air outlet opening in a side wall thereof in position to register with said fan, and an air inlet in a wall of said cover opposite said condenser, and means removably secured on said cover at said outlet opening comprising a fan housing.

2. Apparatus of the character described, comprising a support frame, mechanical refrigerating means on said frame including a cooling element suspended on one side of said frame, a condenser, a compressor and a driving motor therefor supported on the opposite side of the frame, conduit means including portions extending through and on opposite sides of the frame and interconnecting said condenser, compressor and cooling element in a refrigerant circulating system, said condenser, compressor and motor being in alignment on said frame with the condenser at one end thereof, the axles of the motor and compressor being drivingly interconnected and one of said axles carrying a laterally facing air circulating fan, a cover for enclosing the condenser, compressor and motor on one side of said frame comprising a shell having top, side and end walls and having bottom edges adapted to interfit with said frame, means to secure said edges on said frame, said cover having a lateral air outlet in a side wall thereof adapted to register with said fan, and an air inlet in a wall of the cover in position to register with said condenser whereby air may be expelled by said fan from said casing through the lateral outlet opening and drawn into the casing through the inlet opening whereby the air passes in succession through said condenser and around and in heat exchange relationship with the compressor and motor.

3. Apparatus of the character described, comprising a support frame, mechanical refrigerating means on said frame comprising a condenser, a compressor, and a driving motor therefor on said frame, with the condenser, compressor and motor mounted in alignment with the compressor at one end of the frame, the axles of the motor and compressor being drivingly interconnected, and means forming a laterally facing air circulating fan drivingly connected with one of said axles, means comprising a shell demountably secured on said frame and providing top, side and end walls and an open bottom adapted to be secured removably on said frame in position enclosing the condenser, compressor, motor and fan, said shell having a lateral air outlet opening in a side wall thereof in position such that said fan is disposed at said opening when the shell is in place on said frame, and an air inlet in an end thereof registering with said condenser whereby a draft of air may be drawn by said fan through said shell successively in heat exchange relationship with said condenser, said compressor and said motor, and expelled by the fan directly through said opening.

4. Apparatus of the character described, comprising a support frame, mechanical refrigerating means on said frame comprising elements including a cooling element suspended on and extending beneath said frame, a condenser, compressor and a driving motor for the compressor on and extending above said frame, means forming a drip pan on said frame beneath the condenser, compressor and motor, conduit means including portions extending through openings in said frame and drip pan and interconnecting the condenser, compressor and cooling element on opposite sides of said frame, a sleeve-like seal of resilient material in said openings for packing and sealing the same around the conduit means extending therein, said drip pan having annular, upwardly filleted portions surrounding the openings therein to protect said resilient material from such drippage as may collect in the pan, and a shell comprising a cover for said condenser, compressor and motor secured on said drip pan whereby to entirely enclose the compressor, condenser and driving motor in the closure provided by said cover in cooperation with said drip pan.

5. Apparatus of the character described, comprising a support frame, mechanical refrigerating means on said frame comprising elements including a cooling element suspended on and extending beneath said frame, a condenser, compressor and a driving motor for the compressor on and extending above said frame, means forming a drip pan on said frame beneath the condenser, compressor and motor, conduit means including portions extending through openings in said frame and drip pan and interconnecting the condenser, compressor and cooling element on opposite sides of said frame, a sleeve-like seal of resilient material in said openings for packing and sealing the same around the conduit means extending therein, and a shell comprising a cover for said condenser, compressor and motor secured on said drip pan whereby to entirely enclose the

compressor, condenser and driving motor in the closure provided by said cover in cooperation with said drip pan, said drip pan having a perforation therein adjacent an edge thereof and said frame having a slot communicating with said perforation and opening upwardly on the frame at a point therein outwardly of said drip pan, and electrical conductors extending in said slot and through the perforation for connecting said enclosed motor with an external source of electrical power.

6. Apparatus of the character described, comprising a support frame, mechanical refrigerating means on said frame comprising elements including a cooling element suspended on and extending beneath said frame, a condenser, compressor and a driving motor for the compressor on and extending above said frame, means forming a drip pan on said frame beneath the condenser, compressor and motor, conduit means including portions extending through openings in said frame and drip pan and interconnecting the condenser, compressor and cooling element on opposite sides of said frame, a sleeve-like seal of resilient material in said openings for packing and sealing the same around the conduit means extending therein, and a shell comprising a cover for said condenser, compressor and motor secured on said drip pan whereby to entirely enclose the compressor, condenser and driving motor in the closure provided by said cover in cooperation with said drip pan, thermo-responsive means suspended on said frame on the side thereof opposite from said condenser, compressor and motor, and connections placing the mechanical refrigerating means under the control of said responsive means, said connections including portions extending in said frame openings and on opposite sides of the frame.

7. Apparatus of the character described, comprising a support frame, mechanical refrigerating means on said frame comprising elements including a cooling element suspended on and extending beneath said frame, a condenser, compressor and a driving motor for the compressor on and extending above said frame, means forming a drip pan on said frame beneath the condenser, compressor and motor, conduit means including portions extending through openings in said frame and drip pan and interconnecting the condenser, compressor and cooling element on opposite sides of said frame, a sleeve-like seal of resilient material in said openings for packing and sealing the same around the conduit means extending therein, and a shell comprising a cover for said condenser, compressor and motor secured on said drip pan whereby to entirely enclose the compressor, condenser and driving motor in the closure provided by said cover in cooperation with said drip pan, and a fan on said frame and drivingly connected with said motor, said shell having a lateral port in a side wall thereof opposite said fan, and an opening in an end wall thereof in position registering with said condenser, and a sleeve forming a fan housing removably mounted on said shell at said port.

8. An apparatus of the character described, comprising a support frame, mechanical refrigerating means on said frame comprising a condenser, a compressor, and a driving motor therefor on said frame, with the compressor disposed immediately behind the condenser and with the axles of the motor and the compressor drivingly connected, means forming a laterally disposed air circulation fan driven by said motor, means comprising a shell demountably secured on said frame and providing top, side and end walls and an open bottom adapted to be secured removably on said frame in position enclosing said condenser, compressor, motor and fan, said shell having an inlet opening corresponding in cross sectional area with the cross sectional area of the condenser and having an outlet opening registering with the fan, there being means to cause all of the air entering the inlet opening to pass through the entire cross sectional area of the condenser and said fan and its outlet opening being arranged to cause a substantially even distribution of the air passing through said inlet and across said condenser whereby a draft of air may be drawn by said fan through said shell successively in heat exchange relationship with said condenser and thence across said compressor and said motor and expelled by the fan directly through said fan opening.

9. An apparatus of the character described comprising a cabinet having its walls provided with heat insulating material and having a relatively large chamber adapted to hold liquid to be cooled, the top of said cabinet being provided with a closure which is relatively small as compared to the entire superficial area of the top of the cabinet, the upper surface of said smaller closure forming a support, mechanical refrigeration means mounted on said support and including on the upper surface thereof a condenser and a compressor, there being an evaporator mounted on the under surface of said support and adapted to project downwardly into said chamber and into the liquid therein for cooling the liquid, said refrigeration means including piping interconnecting the evaporator, the compressor and the condenser and passing through said support, driving means for said compressor, a fan on said support, means for driving said compressor and fan, and a housing mounted on the upper surface of said support and enclosing said condenser and said compressor, said housing having an inlet the marginal walls of which are substantially in registration with and directly adjacent the marginal walls of the condenser, said housing having an outlet in registration with and directly opposite the fan whereby said housing forms a conduit through which air may be drawn by the operation of the fan successively across the entire area of said condenser, said air thereafter passing across said compressor and being thence expelled by the fan directly through the fan discharge outlet.

10. An apparatus of the character described comprising a cabinet having its walls provided with heat insulating material and providing a relatively large chamber adapted to hold liquid to be cooled, the top of the cabinet being provided with a plurality of closures, one of which closures is adapted to give access to said tank, another of said top closures being relatively small as compared to the entire superficial area of the top of the cabinet, the upper surface of said smaller closure forming a support, mechanical refrigeration means mounted on said support and including on the upper surface thereof a condenser, a compressor and a driving motor, there being an evaporator mounted on the under surface of said support and adapted to project downwardly into said tank and into the liquid therein for cooling the same, said refrigeration means including piping interconnecting the evaporator, the compressor and the condenser and passing through said support, driving means between said

motor and said compressor for operating said compressor from said motor, a casing enclosing said condenser, said compresor and said motor, said casing having an inlet opening of cross section corresponding substantially with the entire cross sectional area of the front face of the condenser, there being means to seal the walls of the casing at said opening with the marginal walls of the condenser, said compressor being disposed in said casing at the rear of the condenser, said casing having a discharge opening disposed relatively remotely from said first-mentioned air inlet opening substantially registering with and disposed in front of the fan, whereby upon rotation of said fan substantially all of the air entering the casing is drawn by said fan in substantially even distribution first across the entire cross sectional area of the condenser, evenly to cool the same, and thence across the compressor, and thence discharged by the said fan outside of said casing.

11. An apparatus of the character described comprising a cabinet having its walls provided with heat insulating material and providing a relatively large chamber adapted to hold liquid to be cooled, the top of said cabinet being provided with a plurality of closures, one of which closures is at the end of said cabinet and is relatively small as compared to the entire superficial area of the top of the cabinet, another of said closures being relatively large and when opened permitting access to the liquid in the cabinet for cooling, the upper surface of said smaller closure forming a support, mechanical refrigeration means mounted on said support and including on the upper surface thereof a condenser, a compressor and a driving motor, there being an evaporator mounted on the under surface of said support and adapted to project downwardly in said tank and into the liquid therein for cooling the same, said refrigeration means including piping interconnecting the evaporator, the compressor and the condenser and passing through said support, driving means between said motor and said compressor for operating said compressor from said motor, said condenser and said compressor and said motor being disposed in sequential alinement on said support, a fan mounted on the end of said motor shaft to be driven by said motor with its axis extending parallel with the longitudinal axis of said cabinet, and a housing mounted on the upper surface of said support and enclosing said condenser, said compressor and said motor and readily removable from said support to expose them, said housing having an inlet having its marginal walls in registration with and directly adjacent and opposite the marginal walls of the condenser and having a relatively remotely disposed outlet in registration with and directly opposite the fan, whereby said housing forms a conduit through which all the air entering said inlet is drawn by the operation of the fan successively across and through the entire area of said condenser, and thence past said compressor and motor, said resultantly heated air being thence expelled by the fan directly through the fan discharge outlet.

12. An apparatus of the character described, comprising a support frame, mechanical refrigerating means on said frame comprising a condenser, a compressor and a fan, with the compressor disposed immediately behind the condenser, means for driving said compressor and fan, means comprising a shell on said frame and providing top, side and end walls adapted to be secured on said frame in position enclosing said condenser, compressor and fan, and an evaporator mounted below the under surface of the support and connected to said compressor and condenser, said shell having an inlet opening corresponding in cross sectional area with the cross sectional area of the condenser and having an outlet opening registering with the fan, there being means to cause all of the air entering the inlet opening to pass across the entire cross sectional area of the condenser, said fan being arranged on said support and relatively to said compressor so that said draft of air passing through said inlet is drawn by said fan through said shell sequentially in heat exchange relation with said condenser and thence across said compressor and expelled through said fan outlet opening.

CHAUNCEY B. OLIVER.