Oct. 10, 1944. D. C. RINEHART ET AL 2,359,790

REFRIGERATING MACHINE

Filed Dec. 31, 1942

Fig. 1.

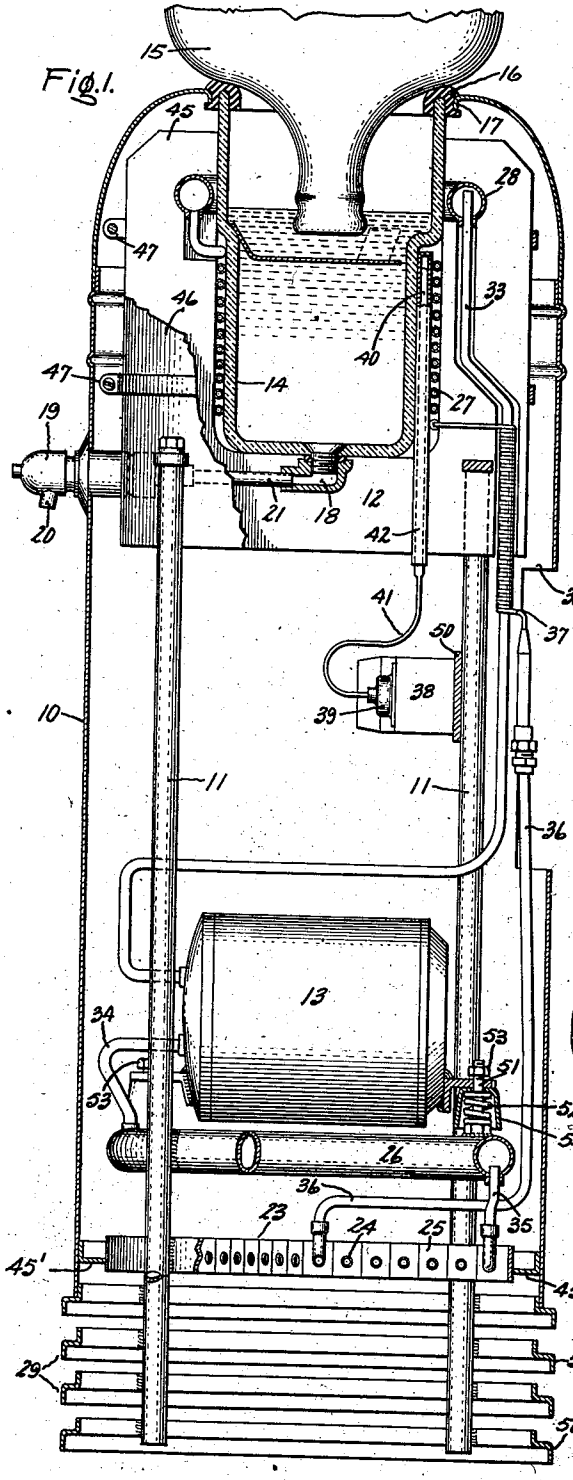
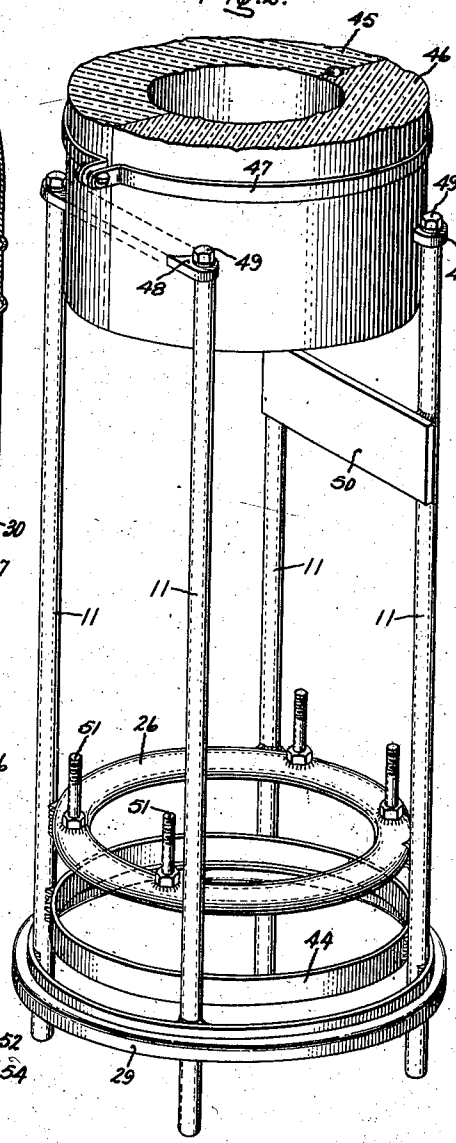


Fig. 2.



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Patented Oct. 10, 1944 2,359,790

UNITED STATES PATENT OFFICE

2,359,790

REFRIGERATING MACHINE

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Application December 31, 1942, Serial No. 470,814

13 Claims. (Cl. 62—141)

This invention relates to refrigerating machines and particularly to refrigerating machines such as water coolers which includes a closed casing and a supporting frame within the casing on which is mounted the refrigerating apparatus.

Water coolers commonly comprise a cabinet or supporting structure in which is arranged a mechanical refrigerating machine including a condensing unit and evaporator and connections for supplying liquid refrigerant from the condensing unit to the evaporator. Water or other liquid to be cooled is supplied to the apparatus either from an inverted bottle or container mounted on the apparatus or from a source of supply under pressure, and a suitable reservoir is provided within the apparatus to maintain a body of water or other liquid in heat exchange relation with the evaporator so that it is cooled. Water coolers of this type are provided for use in offices and public places and it is desirable that the complete unit occupy as little space as possible commensurate with required capacity of the cooler. Accordingly it is an object of this invention to provide a refrigerating machine such as a water cooler which is of simple construction and compact and which includes an improved arrangement for supporting the several working parts of the apparatus.

It is another object of this invention to provide an improved supporting structure for refrigerating machines and the like.

Further objects and advantages of this invention will become apparent as the following description proceeds and the features of novelty which characterize this invention will be pointed out with particularity in the claims annexed to and forming a part of this specification.

For a better understanding of this invention reference may be had to the accompanying drawing in which Fig. 1 is an elevation view, partly in section, of a water cooler embodying the invention; and Fig. 2 is a perspective view of the frame-work of the cooler shown in Fig. 1 with portions of the apparatus removed.

Briefly the water cooler shown in the drawing comprises a closed casing within which is mounted a supporting structure for a refrigerating machine including a motor-compressor unit and a water cooling unit. The supporting structure or framework comprises a plurality of upright posts secured to each other by portions of the cooler and refrigerating apparatus which perform other functions in addition to their function as a part of the supporting structure. The cooling unit includes a water cooling chamber constructed of ceramic material and preferably supported within blocks of rigid molded insulation.

Referring now to the drawing, the water cooler shown in Fig. 1 comprises a casing 10 and a framework including a plurality of upright posts 11 supporting a cooling unit 12 at their upper ends and a motor compressor unit 13 at the lower portion of the casing. The cooling unit 12 includes a ceramic container or cooling chamber 14 on which an inverted glass bottle or other suitable vessel 15 is supported in an opening 17 in the top of the cabinet, a suitable gasket 16 of rubber or other resilient material being provided between the container 14 and the bottle to prevent the admission of dust to the container and also to seal the space between the container and the sides of the opening 17. A suitable air vent (not shown) is provided as usual for communication between the atmosphere and the cooling chamber 14 so that water may be withdrawn from the chamber through an outlet 18 in the bottom thereof. A removable push button valve 19 having a spot 20 for discharging the water is connected to the outlet by a conduit 21. In addition to the motor-compressor unit 13 the refrigerating machine includes a horizontally mounted condenser 23 comprising a spirally wound tube 24 and suitable heat transfer or radiating fins 25 attached to the tube. The refrigerating machine also includes an annular refrigerant container or surge chamber 26 and an evaporator coil 27 connected to an annular header 28. Air for cooling the condenser 23 and the motor-compressor unit 13 is admitted to the interior of the casing 10 through spaces between a plurality of annular louvers 29 which surround the posts 11 and constitute a grille for the inlet opening; the air, after circulating over the motor-compressor unit, being discharged from the casing through an opening 30 a substantial distance above the louvers 29. During the operation of the water cooler, refrigerant vapor is withdrawn from the header 28 through a suction conduit 33 by operation of the motor-compressor unit 13. The withdrawn vapor is compressed and is discharged from the compressor through a conduit 34 and enters the surge chamber 26 from which it passes through a connection 35 to the tube 24 of the condenser 23. The hot compressed refrigerant entering the tube 24 is cooled by air passing over the fins 25 and the tube 24 and is liquefied. The liquid refrigerant flows to the evaporator coil 27 through a liquid line 36 and an elongated re-

strictor or capillary tube 37. The pressure of the refrigerant flowing through the tube 37 is reduced from the pressure in the condenser to the pressure in the evaporator. The liquid refrigerant at low pressure in the evaporator 27 is vaporized by the absorption of heat from the water within the chamber 14, and the vaporized refrigerant flows upwardly through the coil 27 to the header 28.

In order to control the temperature of the water within the chamber 14 a control 38 is provided which includes a bellows member 39 and a thermal bulb or control element 40 connected to the bellows by a tube or duct 41 in accordance with the usual practice. Suitable connections (not shown) are provided between the control 38 and the motor of the motor-compressor unit 13. The thermal bulb 40 is supported within a tube 42 secured in position between and in contact with the wall of the chamber 14 and the evaporator coil 27.

The construction of the cooling unit including the ceramic cooling chamber 14 and the evaporator 27 is described and claimed in a copending application, Serial No. 477,721, filed March 2, 1943, in the name of Albert A. Ralston and assigned to the same assignee as the present invention.

The supporting framework of the water cooler as shown in Fig. 2 comprises four posts 11 which are rigidly secured together at their lower ends by the louvers 29 only the top one of which has been illustrated in Fig. 2, the several louvers being securely welded to each of the four posts. The posts 11 are further rigidly secured together by the surge chamber 26 to which the posts are welded. This construction provides a rigid base for the water cooler. The condenser 23 is welded or otherwise secured in position within a ring 44 which is welded to the several posts 11; and baffles 45' may be provided between the ring 44 and the casing 10, as indicated in Fig. 1, to prevent the by-passing of air around the condenser 23. The cooling unit including the evaporator 27 and the container 14 is supported within two complementary blocks 45 and 46 constructed of rigid insulating material which may be molded or otherwise fabricated to conform to the contour of the cooling unit and the several connecting portions of the mechanism. The suction line 33, the tube 42 and the outlet 21 and connection 18 are arranged in the same plane in line with the engaging surfaces of the blocks 45 and 46. The blocks are bonded or clamped together by metal bands or hoops 47. Two straps or bars 48 pass through suitable openings in the blocks 45 and 46 and are secured to the tops of the posts 11 by bolts or screws 49. The length of the bars 48 is such that when they are secured in position they hold the upper ends of the posts 11 against the blocks 45 and 46 and prevent lateral shifting of the blocks and also help clamp the blocks together, so that the cooling unit is held rigidly in position with respect to the framework. The blocks 45 and 46 constitute the sole effective support which is in direct engagement with the ceramic container 14 and they surround it on all sides leaving only the top open. A support 50 is welded to two of the posts 11 to carry the control 38. The annular container 26 not only provides a surge chamber or receiver for the refrigerating machine but also constitutes a portion of the rigid supporting structure, and, furthermore, it forms the base for the motor-compressor unit 13 which is supported on the container 26 by a plurality of bolts 51. The bolts act as guides for a resilient mounting including springs 52, shown in Fig. 1. The bolts are provided with nuts 53 which act as stops to prevent unintentional removal of the motor-compressor unit 13, and may also be tightened downwardly on the bolts to lock the motor-compressor unit rigidly in position for shipment, suitable cups 54 being provided to engage the top of the surge chamber 26 when the nuts 53 are tightened.

The several louvers 29 constitute a continuation of the casing or cabinet 10 and the top louver supports the casing, the bottom end of which rests thereon and may be secured thereto by screws or other suitable means (not shown). The casing 10 may easily be removed by first removing the bottle 15 and the gasket 16 and then disconnecting and removing the valve 19; whereupon the casing can be disconnected and lifted from the machine leaving the parts of the machine readily accessible for inspection or repair. The louvers are provided with downwardly turned flanges 56 and the flange 56 of the lowermost louver forms the supporting base or foot for the entire cooler, since the posts 11 terminate short of the lower edge of the flange of the bottom louver and are supported by it. This construction provides a wider base in all directions than if the four posts rested on the floor to provide a square base area.

It is readily apparent that this invention provides an extremely simple supporting structure for water coolers and similar apparatus, and that the supporting structure which maintains the cooling unit rigidly in position with respect to the condensing unit includes only the upright posts in addition to the functional parts of the mechanism necessarily present. As a result the water cooler may be constructed so that it occupies a minimum space and so that all parts of the operating mechanism are readily available for inspection, repair, and replacement.

While this invention has been described in connection with a water cooler of round cross-section and including a compression type refrigerating machine, other applications will readily be apparent to those skilled in the art, and, therefore, it is not desired that the invention be limited to the particular construction shown and described; and it is intended in the appended claims to cover all modifications within the spirit and scope of the invention.

What we claim as new and desire to secure by Letters Patent of the United States, is:

1. A refrigerating machine or the like including a frame comprising a plurality of upright posts, a casing surrounding said posts and having its bottom end open and spaced from the bottom ends of said posts and having an air outlet opening a substantial distance from its bottom end, a plurality of louver members rigidly secured to said posts near the bottom ends thereof and spaced apart longitudinally of said posts to provide openings for admitting air to the interior of said casing, each of said louver members having a configuration conforming to the cross section of said casing, said louver members and said posts constituting a rigid supporting structure for the rest of said machine, and a heat exchange apparatus within said casing and supported by said posts in the path of air between said louver members and said air outlet.

2. A refrigerating machine or the like including a frame comprising a plurality of upright posts, a casing surrounding said posts and hav-

ing its bottom end open and spaced from the bottom ends of said posts and having an air outlet opening a substantial distance from its bottom end, a plurality of louver members rigidly secured to said posts near the bottom ends thereof and spaced apart longitudinally of said posts to provide openings for admitting air to the interior of said casing, each of said louver members having a configuration conforming to the cross section of said casing, said louver members and said posts constituting a rigid supporting structure for the rest of said machine, the top one of said louver members providing a support for the bottom of said casing.

3. A refrigerating machine or the like including a frame comprising a plurality of upright posts, a casing of round cross section surrounding said posts and having its bottom end open and spaced from the bottom ends of said posts and having an air outlet opening a substantial distance from its bottom end, a plurality of annular louver members rigidly secured to said posts between the bottom end of said casing and the bottom ends of said posts and spaced apart longitudinally of said posts to provide openings for admitting air to the interior of said casing, said louver members constituting a continuation of said casing and the lowermost one of said members having an annular portion extending beyond the bottom ends of said posts to provide a base for said machine, said louver members and said posts constituting a rigid supporting structure for the rest of said machine, and a heat exchange apparatus within said casing and supported by said posts in the path of air between said louver members and said air outlet.

4. A refrigerating machine or the like including a frame comprising a plurality of upright posts, a casing surrounding said posts and having a first opening for admitting air to the lower portion thereof and a second opening above said first opening for discharging air therefrom, means for securing the upper ends of said posts rigidly in position with respect to one another, a refrigerating apparatus arranged within said casing and including a horizontal annular refrigerant container, said container being arranged in the lower portion of said casing and being rigidly secured to said posts and constituting a rigid structural portion of the framework of said machine.

5. A refrigerating machine or the like including a frame comprising a plurality of upright posts, a casing arranged about said posts and having its bottom end open and spaced from the bottom ends of said posts and having an air outlet opening a substantial distance from its bottom end, a plurality of louver members surrounding and rigidly secured to said posts between the bottom end of said casing and the bottom ends of said posts and spaced apart longitudinally of said posts to provide openings for admiting air to the interior of said casing, said louver members constituting a continuation of said casing, a refrigerating apparatus arranged within said casing and including a horizontal container rigidly secured to said posts and cooperating with said louver members to provide a rigid supporting structure for the rest of said machine.

6. A refrigerating machine or the like including a frame comprising a plurality of upright posts, a casing arranged about said posts and having its bottom end open and spaced from the bottom ends of said posts and having an air outlet opening a substantial distance from its bottom end, a plurality of louver members surrounding and rigidly secured to said posts between the bottom end of said casing and the bottom ends of said posts and spaced apart longitudinally of said posts to provide openings for admitting air to the interior of said casing, said louver members constituting a continuation of said casing, a refrigerating apparatus including a motor-compressor unit and a horizontal refrigerant container arranged within said casing, said refrigerant container being rigidly secured to said posts and constituting a structural member of the frame-work of said machine, and said motor-compressor unit being supported by said container.

7. A refrigerating machine or the like including a frame comprising a plurality of upright posts, a casing surrounding said posts and enclosing said machine, a refrigerating apparatus arranged within said casing and including a refrigerant evaporator in the upper portion of said casing, means including a plurality of blocks of rigid insulating material for supporting said evaporator and for holding the upper ends of said posts rigidly in position, and means including a member rigidly secured to the lower portions of said posts for providing a rigid base for the rest of said machine.

8. In combination, a refrigerating machine including a refrigerant condensing unit and a cooling unit, means for supporting said refrigerating machine and for maintaining said cooling unit rigidly in position with respect to said condensing unit, said means including a body of rigid insulating material conforming to and surrounding said cooling unit and constituting the sole effective supporting means in direct engagement with said unit for maintaining said cooling unit rigidly in position with respect to said condensing unit.

9. In combination, a refrigerating machine including a refrigerant condensing unit and a cooling unit, means for supporting said refrigerating machine, said means including a plurality of blocks of rigid insulating material conforming to and surrounding said cooling unit, and means for clamping said blocks together and for holding said cooling unit rigidly in position with respect to said condensing unit, said insulating blocks constituting the sole effective supports in direct engagement with said cooling unit.

10. A refrigerating machine or the like including a supporting frame, a condensing unit rigidly secured to said frame, a cooling unit including a container constructed of ceramic material and an evaporator operatively connected with said condensing unit for cooling said container, and means including a plurality of blocks of rigid insulating material conforming to and surrounding said cooling unit for supporting said cooling unit on said frame.

11. A refrigerating machine or the like including a frame comprising a plurality of upright posts, a refrigerating apparatus supported on said frame, a refrigerant evaporator for said apparatus, and means for insulating and supporting said evaporator, said means including a block of rigid insulating material partially surrounding said evaporator for supporting said evaporator and for holding the upper ends of said posts rigidly in position, said means also includ-

ing a strap passing through said block and rigidly connected to two of said posts.

12. A refrigerating machine or the like including a frame comprising a plurality of upright posts, a refrigerating apparatus supported on said frame, a refrigerant evaporator for said apparatus, and means including two blocks of rigid insulating material for supporting said evaporator and for holding the upper ends of said posts rigidly in position, said means including a strap passing through said two blocks and rigidly connected to two of said posts for clamping said blocks together in engagement with said evaporator.

13. A refrigerating machine or the like including a frame comprising a plurality of upright posts, a casing surrounding said posts and having its bottom end open and spaced from the bottom ends of said posts and including an air outlet opening a substantial distance from its bottom end, a grille member surrounding said posts and secured to said posts near the bottom ends thereof and constructed to provide an inlet opening for admitting air to the interior of said casing, said member having a configuration conforming to the cross-section of said casing, said member and said posts constituting a rigid supporting structure for the rest of said machine, and a heat exchange apparatus supported within said casing in the path of the air between said grille and said air outlet.

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