

May 30, 1939.

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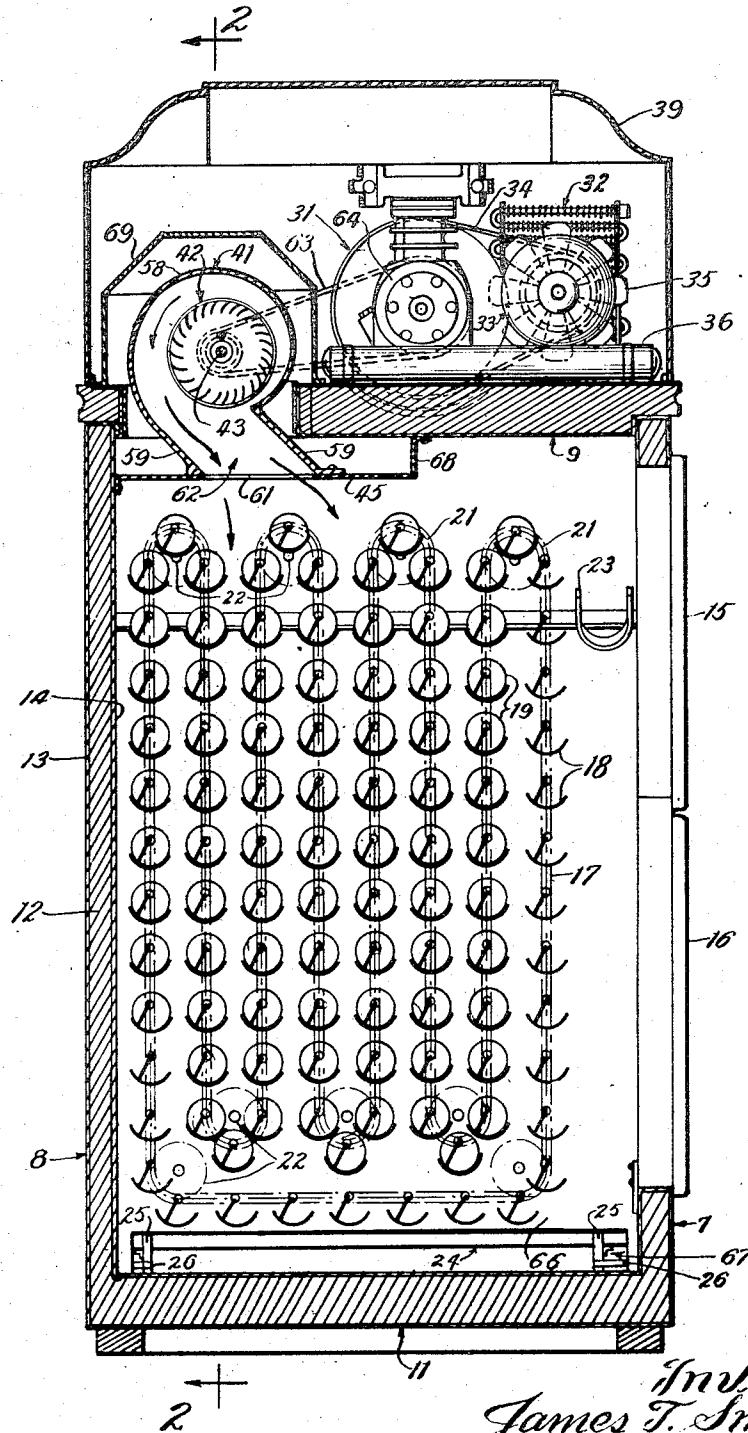
2,160,760

REFRIGERATING APPARATUS FOR VENDING MACHINES AND THE LIKE

Filed Dec. 21, 1935

2 Sheets-Sheet 1

Fig-1



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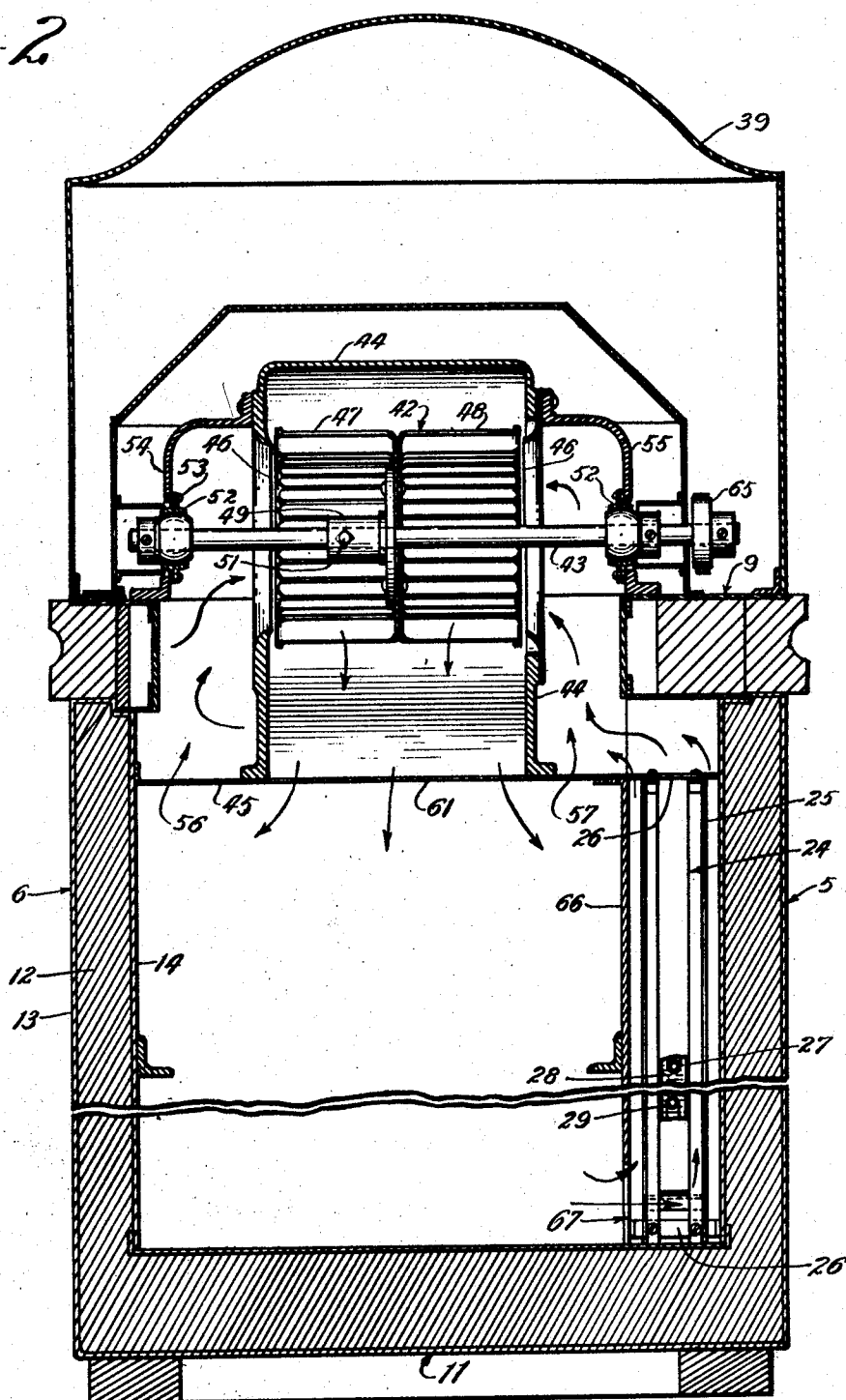
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Filed Dec. 21, 1935

2 Sheets-Sheet 2

Fig. 2



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UNITED STATES PATENT OFFICE

2,160,760

REFRIGERATING APPARATUS FOR VENDING MACHINES AND THE LIKE

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Application December 21, 1935, Serial No. 55,531

8 Claims. (Cl. 62—102)

This invention relates to refrigerating apparatus which may be used to refrigerate cabinets which are adapted to hold perishable commodities, or other goods which should be maintained in cool condition. The apparatus is particularly well adapted to the cooling of the merchandise storage compartments of vending machines of the type which are equipped to handle bottled or packaged goods.

10 An important object of the invention is to provide a refrigerating apparatus for a vending machine, or the like, which effects cooling of the articles contained in the machine in such a way that no appreciable moisture will come into contact with said articles, thereby enabling the purchaser to obtain a cool dry article.

Another object of the invention is to provide a refrigerating apparatus of the type specified, in which dry cooling of the storage compartment in the cabinet is accomplished by circulating therethrough a stream of air which is cooled by being brought into heat exchanging relation with a refrigerating element, the latter being disposed in a portion of said compartment which is suitably partitioned or divided from the main portion thereof.

A further object of the invention is to provide a refrigerating apparatus of the character referred to, in which the refrigerating system for cooling the air includes a refrigerating element which may be surrounded with a body of liquid which is capable of being solidified at the approximate temperature to which said element is to be cooled, the solid thus formed being melted during periods of peak demand to thereby cool the air more efficiently than would be possible with a non-freezing solution.

Other objects and advantages of the invention will be apparent from the following detailed description, taken in connection with the accompanying drawings wherein I have shown the preferred form in which I have thus far contemplated applying the principles of the invention.

Referring to the drawings:

Fig. 1 is a vertical sectional view through a vending machine cabinet having the improved refrigerating apparatus embodied therein, the section being taken just inside of the front wall of the cabinet; and

Fig. 2 is an enlarged broken vertical sectional view through the cabinet, the section being taken on line 2—2 of Fig. 1.

The apparatus is contained in a cabinet consisting of a back wall 5, a front wall 6, side walls

7 and 8, a top wall 9 and a base 11, all of which are suitably interconnected to form a rigid frame unit. The compartment formed by these walls is designed to serve as a cooling compartment, and each of said walls is, therefore, preferably made up of a layer of heat insulating material 12, which is faced by sheet metal plates 13 and 14. The side wall 7 is provided with a hinged door 15 which permits of free access to the upper part of the cooling compartment. A removable panel 16 is also provided in side wall 7 immediately below the door 15. In the particular embodiment shown the cooling compartment of the cabinet is adapted to enclose the vending mechanism of a machine for dispensing merchandise in bottled or package form. Only such portions of this mechanism are shown as are necessary to illustrate the manner in which the bottles or packages are cooled by the novel refrigerating mechanism. Complete details of construction of a bottle or package vending mechanism which may be used in a cabinet of this type are shown in application Serial No. 56,367 filed by Bert E. Mills under date of December 27, 1935. The vending mechanism includes an endless chain conveyor 17 having a series of holders 18 arranged in spaced relation thereon, the latter serving to support bottles or packages 19. The conveyor is arranged in the cabinet so as to efficiently utilize the space in the cooling chamber, the conveyor chains 17 taking over sprockets 21 which are rotatably supported on a suitable frame (not shown) in the upper portion of the compartment, the lower runs of the chain taking over sprockets 22 which are suitably supported at the bottom of the cooling chamber. The conveyor is moved in a direction to carry the holders 18 downwardly toward a discharge mechanism (not shown) which is supported on the conveyor frame adjacent a discharge trough 23 (Fig. 1), the latter serving to direct the bottles through a discharge port (not shown) in the front wall 6 of the cabinet.

In accordance with my invention, the compartment or chamber formed by the cabinet walls 6, 7, 8, 9 and 11 is cooled by circulating therethrough a stream of air which is brought into heat exchanging relation with a refrigerating element. The refrigerating element, indicated generally by the numeral 24, is supported in the cooling compartment adjacent the rear cabinet wall 5, said element being supported in said compartment between vertically disposed bars 25, the opposite ends of which are bolted to brackets 26, the latter being in turn rigidly

secured to side walls 7 and 8. As shown in Fig. 2, the cooling element 24 comprises a comparatively flat liquid-tight receptacle, the walls 27 of which may be made of sheet metal. This receptacle is filled with a body of liquid 28 which is cooled by a cooling coil 29 through which a suitable refrigerant such as methyl chloride is circulated.

The refrigerating mechanism which supplies refrigerant to the coil 29 may be of conventional form, the one shown comprising a compressor, indicated generally by the numeral 31, and condenser 32 which is supported on top wall 9 of the refrigerating compartment adjacent the compressor 31. An electric motor 33 drives compressor 31 through a belt connection 34. A fan, 35, mounted on the armature shaft of motor 33, draws air through the condenser 32 to cool the refrigerant which is directed thereto from the compressor 31. A receptacle 36 serves as a receiver for holding a supply of liquid refrigerant. The compressor-condenser unit 31, 32 is enclosed within a cover 39 which rests on the top cabinet wall 9.

Air is circulated through the cooling compartment by a blower indicated generally by the numeral 41. This blower comprises a squirrel cage type rotor 42 which is fixedly secured to a shaft 43, and a housing 44 supported on a frame plate 45, said housing being provided with openings 46 for receiving the rotor 42. The rotor 42 consists of two separate rotor sections 47 and 48, both of which are bolted to the web portion of a coupling 49, the hub portion of the latter being secured to shaft 43 by a set screw 51. The opposite ends of rotor shaft 43 are journaled in bearings 52 which are connected by rivets 53 to intake manifold members 54 and 55, the latter being supported on cabinet wall 9 at the opposite ends of the rotor housing 44. As best shown in Fig. 2, the cabinet wall 9 is provided with an opening which is somewhat wider than the blower housing 44, thereby providing intake passageways 56 and 57 which communicate with the intake manifold sections 54 and 55, respectively. The portion 58 (Fig. 1) of the blower housing 44 is substantially cylindrical in shape to conform to the contour of rotor 42. This portion 58 of the housing connects with wall portions 59 which extend downwardly to connect with plate 45, the latter being provided with an opening 61 which registers with the discharge passageway 62 formed by the portions 59 of said housing.

The blower rotor 42 is driven from the compressor 31 by a belt 63 (Fig. 1) which takes over a pulley 64 on the crank shaft of the compressor and a smaller pulley 65 (Fig. 2) on the end of shaft 43. The rotor is driven in a counterclockwise direction, viewing Fig. 1, air being sucked into the opposite sides thereof through manifold sections 54 and 55, the air being discharged from housing 44 into the upper portion of the cooling compartment through passageway 62 and opening 61. Air which is forced into the upper end of the cooling compartment through opening 61 is directed downwardly over the bottles 19 by a vertically disposed baffle plate 66 which is positioned just inside of, and substantially parallel to, the refrigerating element 24. The upper edge of plate 66 connects with plate 45 and top wall 9, and the lower edge thereof terminates just short of the bottom wall 11 to provide a passageway 67 through which air which is forced downwardly in the cooling compartment may pass from said compartment upwardly in the passage-

way formed between plate 66 and the rear wall 5 of the cabinet. It will be noted from Fig. 2 that the rear edge of plate 45 terminates at the upper edge of the vertical baffle plate 66, thereby establishing communication between the intake passageways 56 and 57 and the vertical passageway formed by baffle plate 66 and the rear cabinet wall 5. The edge of plate 45 which is located approximately midway between the side walls 7 and 8 is bent upwardly as indicated at 68 (Fig. 1) to connect with top wall 9, thereby sealing off the intake passageways 56 and 57 from the cooling compartment.

The portion of manifold which extends above the top cabinet wall 9 is closed by a cover 69 which serves to provide an air chamber for insulating the blower housing from the comparatively warm air which is circulating under the hood 39.

The blower 41 circulates air through the cooling compartment along the path indicated by the arrows. Air is forced downwardly by the blower through the discharge passageway 62 into the upper portion of said compartment and thence passes downwardly and toward the rear of the compartment to the discharge passageway 67 from whence it passes upwardly over cooling element 24, being cooled during the course of its upward passage over the metal walls 27. As the air reaches the level of plate 45 it passes forwardly toward passageways 56 and 57 which direct it to the intake manifold sections 54 and 55 respectively, the latter in turn directing it into the blower housing 44. A continuous flow of air through the cabinet is thus provided, the air being constantly cooled by element 24 to maintain the cooling compartment at a uniformly low temperature. Any moisture in the air becomes condensed on the metal walls 27 of the cooling element and hence there is practically no condensation of water vapor on the bottles or packages supported on the holders 18. This feature of dry cooling is particularly advantageous when the system is used in connection with a bottle vending machine, inasmuch as it insures that the purchaser will always receive a dry cool bottle.

I prefer to use water as the liquid which surrounds the cooling coil 29 of the refrigerating element 24. Water is easily frozen to ice at temperatures which are commonly used in refrigerating cabinets and by freezing the water to ice I obtain the additional cooling power represented by the heat of fusion of the ice. In a bottle vending machine, for example, there are ordinarily periods during the day when the machine is subjected to a peak demand due to the purchase of a large number of bottles from the machine over a comparatively short interval of time. By using water in refrigerating element 24 I am able to effectively meet such a period of peak demand. The water will be frozen to ice during the period when there is little demand on the machine, and during the period of peak demand the ice will melt to water to provide added cooling power which would not be obtained by a non-freezing solution. In this manner I am able to more efficiently utilize the capacity of the condenser, making it unnecessary to provide a condenser which would be altogether too large for serving the system during the periods when there is comparatively little demand on the machine. It will be understood, of course, that the use, in conjunction with the element 24, of a liquid which will become solidified at the temperature to which said element is to be cooled, is

optional. A non-freezing solution may be used in cases where it is not desired, or may not be advisable, to reduce the body of liquid 28 to a solid for the purpose of storing up cooling power 5 for a period of peak demand.

The foregoing detailed description has been given for clearness of understanding only, and no unnecessary limitations should be understood therefrom, but the appended claims should be 10 construed as broadly as permissible in view of the prior art.

What I regard as new and desire to secure by Letters Patent is:

1. A refrigerating apparatus for a vending machine or the like, comprising a cabinet having a 15 compartment for holding a supply of bottled or packaged goods, a baffle plate of heat conductive material positioned in said compartment to form with a side wall thereof a substantially vertically 20 disposed passageway located within the outer walls of the compartment but separated from the goods by said baffle plate, said plate terminating a short distance above the bottom of the compartment to provide an opening between the 25 latter and said passageway, a refrigerating element disposed in said passageway closely adjacent said baffle plate, said element including a cooling coil and a fluid tight receptacle disposed around said coil and having a fluid therein ca- 30 pable of being solidified at a temperature to which the coil is to be cooled, means for supplying a refrigerant to said coil to effect cooling thereof, and means for circulating the air in said compartment through said passageway to 35 bring the same into heat exchanging relation with said refrigerating element.

2. A refrigerating apparatus for a bottle vending machine comprising a cabinet having an interior space forming a bottle storage compart- 40 ment and a return air passage, each extending from top to bottom of said space, a baffle plate of heat conducting material forming the dividing wall between said compartment and passage, a refrigerating element positioned in said passage 45 closely adjacent and parallel to said baffle plate and substantially coextensive in area therewith so as to receive heat radiated therefrom, and air-circulating means for causing air to travel downwardly through said bottle compartment 50 to cool the contents thereof and to be initially re-cooled by contact with said baffle plate during such downward travel, to thence pass upwardly through said passage, and to be finally cooled therein, and to thence return to said bottle stor- 55 age compartment, said plate extending from side to side and to the top of said space and being spaced from the bottom of the cabinet to form an opening through which air may pass from said compartment into said passage, but arranged 60 so as to discharge its collected condensate directly upon said bottom.

3. A refrigerating apparatus for a bottle vending machine comprising a cabinet having an interior space forming a bottle storage compart- 65 ment and a return air passage, each extending from top to bottom of said space, a baffle plate of heat conducting material forming the dividing wall between said compartment and passage, a refrigerating element positioned in said passage 70 closely adjacent and parallel to said baffle plate so as to receive heat radiated therefrom, and air-circulating means for causing air to travel downwardly through said bottle compartment to cool the contents thereof and to be initially re- 75 cooled by contact with said baffle plate during

such downward travel, to thence pass upwardly through said passage, and to be finally cooled therein, and to thence return to said bottle stor- age compartment, said plate extending from 5 side to side and to the top of said space and being spaced from the bottom of the cabinet to form an opening through which air may pass from said compartment into said passage, but arranged so as to discharge its collected con- 10 densate directly upon said bottom.

4. A refrigerating apparatus for a bottle vend- ing machine comprising a cabinet having an in- terior space forming a bottle storage compart- ment and a return air passage, each extending 15 from top to bottom of said space, a baffle plate of heat conducting material forming the divid- ing wall between said compartment and passage, a refrigerating element positioned in said pas- sage closely adjacent and parallel to said baf- 20 fle plate and substantially coextensive in area therewith so as to receive heat radiated there- from, and air-circulating means disposed in the cabinet above said space for causing air to travel downwardly through said bottle compartment 25 to cool the contents thereof and to be initially re-cooled by contact with said baffle plate during such downward travel, to thence pass upwardly through said passage, and to be finally cooled therein, and to thence return to said bottle stor- 30 age compartment, said plate extending from side to side and to the top of said space and being spaced from the bottom of the cabinet to form an opening through which air may pass from 35 said compartment into said passage, but arranged so as to discharge its collected condensate directly upon said bottom.

5. In a refrigerating apparatus for a bottle vending machine, a cabinet having an interior space forming a bottle storage compartment and a return air passage, each extending from top to 40 bottom of said space, a baffle plate forming the dividing wall between said passage and compart- ment, a refrigerating element disposed in said passage, comprising a flat coil for conducting cooling fluid, and a casing having parallel, closely 45 spaced, continuous walls between which said coil is disposed, said casing serving as a heat transfer element for transferring heat to said coils from air wiping the external surfaces thereof, and means for forcibly circulating the air in a pre- 50 determined course in said cabinet.

6. In a refrigerating apparatus for a bottle vending machine, a cabinet having an interior space forming a bottle storage compartment and a return air passage, each extending from top to 55 bottom of said space, a baffle plate forming the dividing wall between said passage and compart- ment, and a refrigerating element disposed in said passage, comprising a flat coil for conducting cooling fluid, and a casing having parallel, closely 60 spaced, continuous walls between which said coil is disposed, said casing serving as a heat transfer element for transferring heat to said coils from air wiping the external surfaces thereof, and a 65 body of water filling said casing, serving at times to transfer heat from said walls to said coil, and serving as a holdover adapted to be frozen dur- ing periods of low load, the heat absorbing ca- 70 pacity of the ice being utilized to assist the coil during periods of peak load.

7. In a refrigerating apparatus for a bottle vending machine, a cabinet having an interior space forming a bottle storage compartment and a return air passage, each extending from top to 75 bottom of said space, a baffle plate forming the

dividing wall between said passage and compartment, and a refrigerating element disposed in said passage, comprising a flat coil for conducting cooling fluid, and a casing having parallel, closely spaced, continuous walls between which said coil is disposed, said casing serving as a heat transfer element for transferring heat to said coils from air wiping the external surfaces thereof, and a body of fluid filling said casing, serving at times to transfer heat from said walls to said coil, and serving as a holdover adapted to be reduced to refrigerating temperature during periods of low load, the heat absorbing capacity of said fluid being utilized to assist the coil during periods of peak load.

8. In a refrigerating apparatus for a bottle vending machine, a cabinet having an interior

space forming a bottle storage compartment and a return air passage, each extending from top to bottom of said space, a baffle plate forming the dividing wall between said passage and compartment, a refrigerating element disposed in said passage, comprising a flat coil for conducting cooling fluid, and a casing having parallel, closely spaced, continuous walls between which said coil is disposed, said casing serving as a heat transfer element for transferring heat to said coils from air wiping the external surfaces thereof, and means for causing forced circulation of air downwardly through said bottle storage compartment and upwardly through said return passage whereby cold air is directed upon the bottles in the upper part of the compartment.

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