

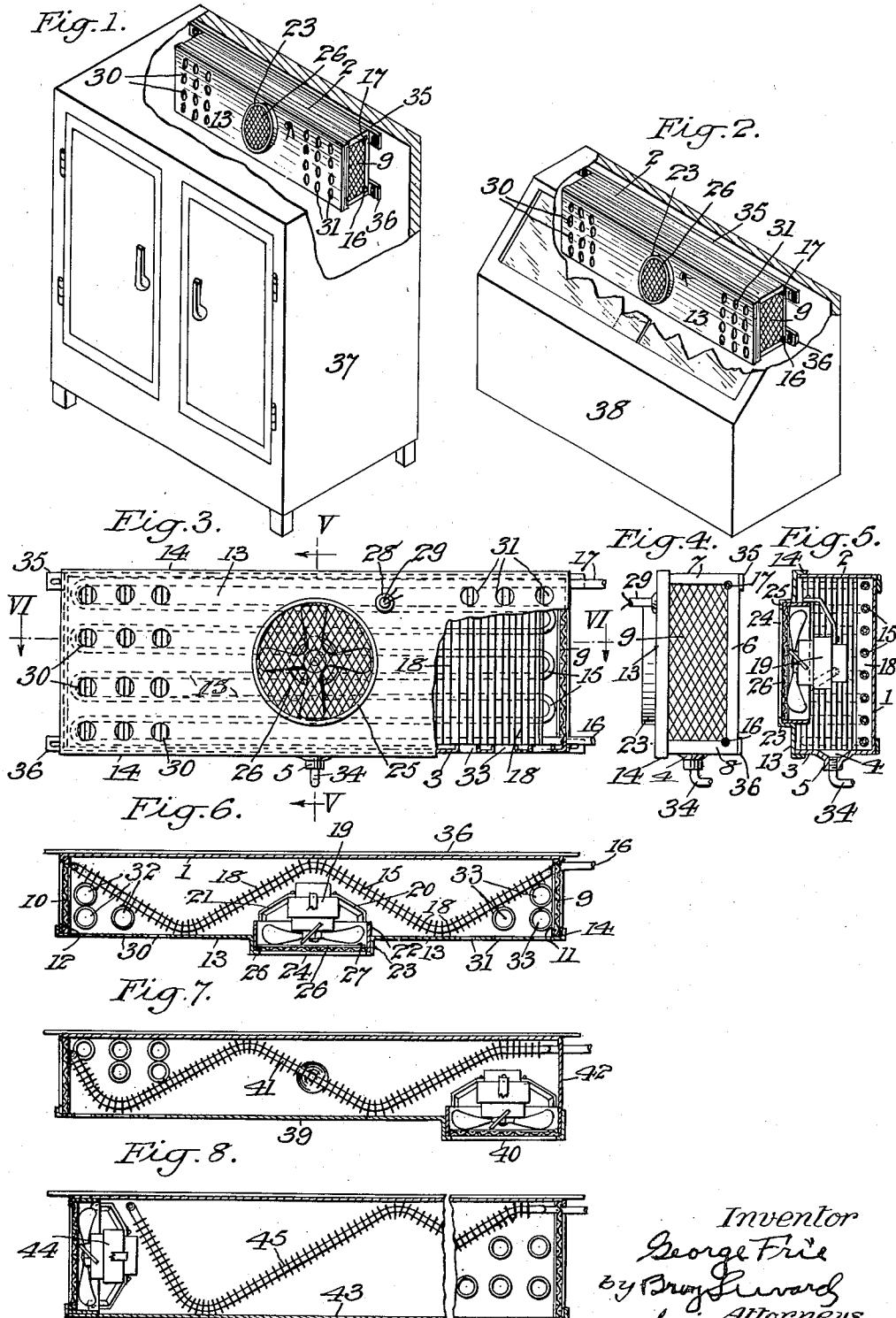
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EVAPORATING UNIT FOR HEAT EXCHANGE APPARATUS

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EVAPORATING UNIT FOR HEAT EXCHANGE APPARATUS

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This invention relates to an evaporator unit for refrigeration apparatus, and has for an object to provide a unit that is particularly adaptable to boxes, counters, chambers, and the like, which have been designed and constructed without regard or allowance for any specific cooling device and in which the space suitable for installation thereof is strictly limited as to height and horizontal depth though not so limited in horizontal width.

Another object is to provide such a unit which is well suited to incorporation in structures such, for instance, as beverage coolers of the reach in or reach down type, where the unit is desirably mounted in the upper rear portion of the chamber or other enclosure.

Another object is to provide such a unit in which the form of the coil increases the chilling effect on the air.

Another object is to provide such a unit in which the fan may be located centrally or at either end, and which serves to improve the air circulation through the coil and throughout the chamber or enclosure in which the unit is positioned.

Another object is to provide such a unit which is compact and simple to manufacture and install, while possessing high efficiency and having a long operative life.

A further object is to provide certain improvements in the form, construction and arrangement of the several parts whereby the above-named, and other objects inherent in the apparatus, may be attained.

Practical embodiments of the invention are represented in the accompanying drawing, in which

Figure 1 represents a perspective view, partly broken away, showing the unit installed in a reach in type of beverage cooler.

Figure 2 represents a similar view with the unit installed in a reach down type of beverage cooler.

Figure 3 represents a front elevation partly broken away, on an enlarged scale, of the evaporator unit by itself.

Figure 4 represents an end view of the unit shown in Figure 3;

Figure 5 represents a transverse vertical section taken in the plane of the line V-V of Figure 3, looking in the direction of the arrows;

Figure 6 represents a horizontal section taken in the plane of the line VI-VI of Figure 3, looking in the direction of the arrows;

Figure 7 represents a view similar to Figure 6 but showing a modified form; and

Figure 8 represents a similar broken view showing a second modified form.

Referring to the form of the invention shown in Figures 1 to 6 inclusive, the unit includes a boxlike casing which has a rear wall denoted by 1, a top marked 2 and a bottom indicated by

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3; which said parts may be composed of any suitable material such, for instance, as sheet iron or steel. The said parts are preferably formed from a single piece of sheet material bent to shape, and the bottom is provided with a water sump 4 that has a threaded female pipe connection 5. The ends of the said back, top and bottom are bent to form flanges which are alike at both ends, the same being illustrated in Figure 4 and marked 6, 7, 8, and end members for the casing, preferably composed of metal grill, are fitted against the inner faces of the last named flanges, as well shown in Figure 6, the said end members being denoted by 9 and 10. Any suitable procedure may be followed for the purpose of securing the said end members in position but I have found that elongated cleats placed at the top and bottom of each end member and secured to the flanges 7, 8 by screws are satisfactory and facilitate assembly and disassembly of the unit. Two of the said cleats are shown in Figure 6, where they are marked 11 and 12.

The said casing of the unit is completed by a face plate 13, preferably composed of sheet iron or steel, which is provided with a peripheral flange 14 that embraces the bottom, top and side members just as a box cover fits over the main body of a box. Screws, not shown, traversing the flange 14 and the casing parts it embraces may be employed to removably secure the face plate 13 in position.

Located within the casing and, of course, placed in position before the casing is fully assembled, is an evaporator coil which is denoted generally by 15, the said coil being composed of a plurality of parallel runs of tubing united at their ends by bends or curved portions of the said tubing, and forming a continuous conduit with an inlet 16 for the refrigerating fluid coming from the usual expansion valve of refrigerating apparatus and an outlet 17 for the fluid moving from the coil into the usual suction line to the compressor of the refrigerating apparatus. The coil, which may be composed of copper tubing, is fitted with the customary fins, which may be composed of sheet copper or aluminum, and are indicated as a whole by 18, and may be of any well known or approved form and be secured to the coil in any desired and suitable manner, all of which is well understood in this industry and calls for no further description.

A characteristic feature of this invention is the bending of the coil in a vertical plane so as to cause it to assume the shape of a flattened W, as is well illustrated in Figure 6; the ends and central apex of the W being adjacent the back 1 of the casing and the base or bottom apexes of the W being adjacent the face plate 13. This formation of the coil 15 increases its length and the number of its fins as compared with what

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would be the case if the coil were not bent; it also insures more thorough and efficient circulation of air through the coil; and it additionally provides space for reception of a fan motor 19, which is carried by three bracket arms, two of which are well shown in Figure 6 and marked 20, 21; the said bracket arms being fastened in any suitable manner to a circular fan housing 22 that is set and fixed in a circular collar 23 which surrounds an aperture 24 that is centrally formed in face plate 13. The collar 23 is provided with a peripheral flange 25 against which is seated a fan shield 26, that is preferably composed of metallic grill, and is held against flange 25 by a corresponding flange 27 formed on housing 22. An aperture surrounded by a grommet 28 is formed in the face plate 13 to permit the in lead of power wires 29 for the motor 19.

In order to further the circulation of air, the face plate 13 has a plurality of holes 30 there-through located near one end of the said plate and a similar group of holes 31 near the other end thereof; while the bottom 3 is also provided with groups of holes 32 and 33 adjacent its opposite ends. The said bottom 3 serves as a drip pan for water resulting from the customary periodic defrosting of the coil 15 and its sump 4 is connected with a drain pipe 34 leading to the sewer or any other suitable disposal point.

For the purpose of positioning the unit in a cooler, box, counter, or the like, straps 35, 36, preferably composed of metal, are secured, as by rivets, to the upper and lower edges of the back 1. The extremities of said straps protrude beyond the end members 9, 10 and are apertured to receive screws, or the like, which may be threaded into a wall of the cooler, etc., as illustrated in Figures 1 and 2, where a reach in cooler is denoted generally by 37, a reach down cooler by 38, and the unit is located near the top of the rear wall which is a preferred position.

The W or multiple V formation of the coil 15 not only promotes compactness by providing space for the fan motor and associated parts, but it also lends the structure to more thorough and efficient air circulation, which latter is promoted by the elongated form of the unit and the location of the air escape apertures at and near the ends of the casing. As the air is drawn into the casing by the fan it will be forced rearwardly through the adjacent parts of the coil and then, impinging upon the walls of the casing, it will flow toward the ends thereof, passing through the extremities and out by way of the grill end members 9, 10 and the holes 30, 31, 32 and 33. Should occasion make it desirable, the number of the said holes may be increased or decreased; their size may be varied; and they may be omitted from either the bottom 3 or the face 13. Regardless of such variations, this form of the invention provides for the outflow of chilled air at both ends of the casing, and for simultaneous circulation in opposite directions through the cooler, or the like, in which this evaporator unit is installed.

Referring now to the modified form of the invention shown in Figure 7, the construction of the casing for the unit is generally the same as in the form shown in Figures 1 to 6, but the face plate, here marked 39, has the fan opening, here marked 40, located at one end thereof, and the shape or formation of the coil, here marked 41, is slightly different from the form shown in Figure 6, although the general multiple V formation is maintained. In this modi-

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fied form of the invention the end member of the casing adjacent the fan, marked 42, is solid and there are no perforations in the bottom of the casing corresponding to perforations 33 illustrated in Figure 6.

This modified form of the invention illustrated in Figure 7 is intended to be installed in the same way as the form shown in Figures 1 to 6 but, in its operation, the air is sucked into the casing at one end thereof and ejected at the other end, thus providing what might be defined as one way air circulation for the cooler or the like in which this form of unit is used. The formation of the coil insures thorough and efficient air contact therewith, as in the form of the invention shown in Figures 1 to 6, and the sharper bend of the coil adjacent the outlet end of the casing cooperates with the adjacent perforations.

The second modified form of the invention shown in Figure 8 has its casing again constructed in general as hereinbefore described, but the face plate of this form, marked 43, has no opening for the fan which latter, together with its motor, is positioned within the left hand end of the casing, as viewed in Figure 8, and as indicated generally by 44. This positioning of the fan and its motor requires some increase in the cross sectional size of the casing in order to accommodate a fan and motor of adequate size, but it does not require any change in the general construction of the casing. In this second modified form of the invention the end members are composed of metallic grill, as in the form shown in Figures 1 to 6, and the face plate and bottom are provided with holes corresponding to the holes 31 and 33, but there are no holes in the face plate and bottom corresponding to holes 30 and 32. The formation of the coil, here marked 45, is similar to that represented in Figure 7. The operation of this form of the invention shown in Figure 8 is substantially the same as that of the form shown in Figure 7 except that the air is drawn in by the fan of Figure 8 directly in line with the longitudinal axis of the casing instead of being drawn in at right angles thereto. This form of Figure 8 provides one way circulation of the air through the cooler, as in the case of the form shown in Figure 7, and the fact that the air moves from right to left in the form of Figure 7 and from left to right in the form of Figure 8 is a matter of consequence only as either form may better suit the particular shape or arrangement of the cooler or the like in which the unit is installed.

Referring to both forms of the invention shown in Figures 7 and 8 it will, of course, be clear that the position of the fan and air outlets and the arrangement of the coils can be reversed so as to cause the air to move from left to right in the form of Figure 7 and from right to left in the form of Figure 8, in case construction or installation requirements should so dictate.

In the case of the form of the invention shown in Figures 1 to 6, the coil 15 could be reversed in position so as to have its central apex adjacent the face plate 13 and two fans with their motors could be located within the hollows of the V's of the coil, two openings for the fans being provided in the face plate. This arrangement would serve to increase the force of air circulation and/or would enable the use of smaller fans and motors with consequent reduction in cross sectional size of the casing. As this modification would cause no material change in construction it is deemed unnecessary to illustrate the same.

With reference to all three forms of the invention, the evaporator coil could have a single V formation instead of the multiple V or W formation shown, or it could have a formation embodying three or more V's, or it could have a formation embodying one and a half or two and a half V's, etc., depending upon the desired design and/or requirements in refrigerating effect. Also, all the holes formed in the bottom of the casing should have internal flanges, as illustrated in Figures 6, 7 and 8, at their peripheries in order to prevent the passage therethrough of water which drips from the coil.

It may be stated that the hereinabove mentioned objects, as well as other advantages characteristic of this invention, are attained to a marked degree and that the unit adapts itself to highly efficient air circulation and effective cooling of various sizes and shapes of enclosures whether or not the latter were originally designed for the reception of the unit. Furthermore, the compactness of the unit materially improves the useful capacity of the cooler or the like in which it is installed.

I desire it to be understood that various changes may be resorted to in the form, construction, arrangement and material of the parts without departing from the spirit and scope of the invention, and hence I do not intend to be limited to details herein shown or described except as they may be included in the claims or be required by disclosures of the prior art.

What I claim is:

1. An evaporator unit for refrigeration apparatus designed for installation in coolers of the reach in or reach down type comprising, a horizontally elongated casing adapted to be bodily incorporated in such coolers, a face plate therefor, an evaporator coil having tubular runs arranged in vertical alignment positioned within the casing, said coil being bent into a formation of W shape when viewed in plan with two apices of the W adjacent the face plate and one apex and two ends of the W adjacent the back of the casing, said face plate having an opening located between the said apices of the coil that are adjacent the face plate, a fan mounted at said opening and supported by said face plate, a fan motor also supported by said face plate within the casing, and an air outlet at at least one end of said casing.

2. An evaporator unit for refrigeration apparatus designed for installation in coolers of the reach in or reach down type comprising, a horizontally elongated casing adapted to be bodily incorporated in such coolers, a face plate therefor, an evaporator coil having tubular runs arranged in vertical alignment positioned within the casing, said coil being bent into a formation of W shape when viewed in plan with two apices of the W adjacent the face plate and one apex and two ends of the W adjacent the back of the casing, said face plate having an opening located between the said apices of the coil that are adjacent the face plate, a fan mounted at said opening and supported by said face plate, a fan motor also supported by said face plate within the casing, and air outlet at both ends of said casing.

3. An evaporator unit for refrigeration apparatus designed for installation in coolers of the reach in or reach down type comprising, a horizontally elongated casing adapted to be bodily incorporated in such coolers, a face plate therefor, an evaporator coil having tubular runs arranged in vertical alignment positioned within

the casing, said coil being bent into a formation of W shape when viewed in plan with two apices of the W adjacent the face plate and one apex and two ends of the W adjacent the back of the casing, said face plate having an opening located between the said apices of the coil that are adjacent the face plate, a fan mounted at said opening and supported by said face plate, a fan motor also supported by said face plate within the casing, and air outlets at both ends of said casing for permitting outflow of air through both the ends and bottom thereof.

4. An evaporator unit for refrigeration apparatus designed for installation in coolers of the reach in or reach down type comprising, a horizontally elongated casing adapted to be bodily incorporated in such coolers, a face plate therefor, an evaporator coil having tubular runs arranged in vertical alignment positioned within the casing, said coil being bent into a formation of W shape when viewed in plan with two apices of the W adjacent the face plate and one apex and two ends of the W adjacent the back of the casing, said face plate having an opening located between the said apices of the coil that are adjacent the face plate, a fan mounted at said opening and supported by said face plate, a fan motor also supported by said face plate within the casing, and air outlets at both ends of said casing for permitting outflow of air through the ends, bottom and face plate thereof.

5. An evaporator unit for refrigeration apparatus designed for installation in coolers of the reach in or reach down type comprising, a horizontally elongated casing having a front and a back and being adapted to be bodily incorporated in such coolers, an evaporator coil having tubular runs arranged in vertical alignment positioned within the casing, said coil being bent into a formation that includes at least one V when viewed in plan with the apex of the said V adjacent the back of the casing and the two ends of the said V adjacent the front of the casing, the front of the casing having an opening located between the said ends of the said V of the coil that are adjacent the front of the casing, a fan mounted at said opening and supported by a portion of the casing adjacent said opening, a fan motor also supported by a portion of the casing adjacent said opening and located within the said V of the coil, and an air outlet at at least one end of the casing.

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