Oct. 6, 1936. R. MARKLEY, JR 2,056,862

REFRIGERATING COIL

Filed May 6, 1936

Fig. 1.

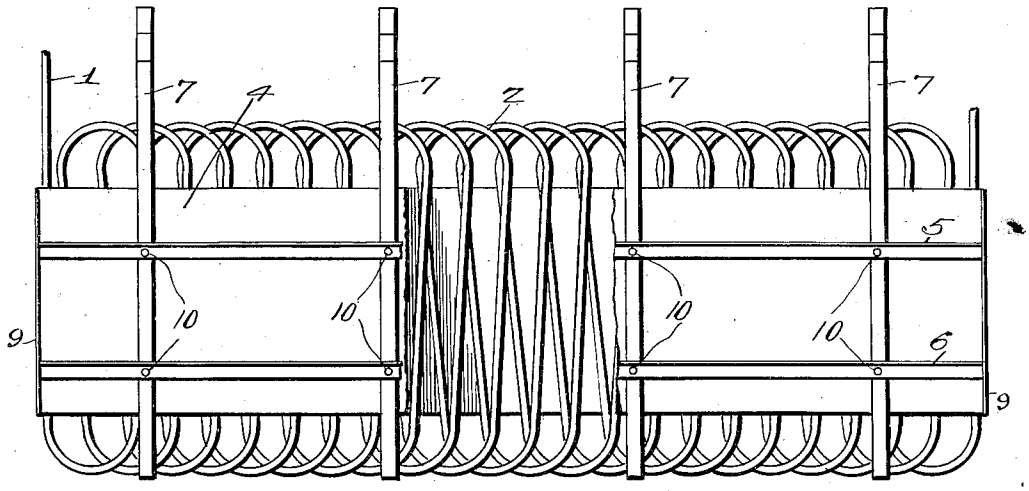


Fig. 2.

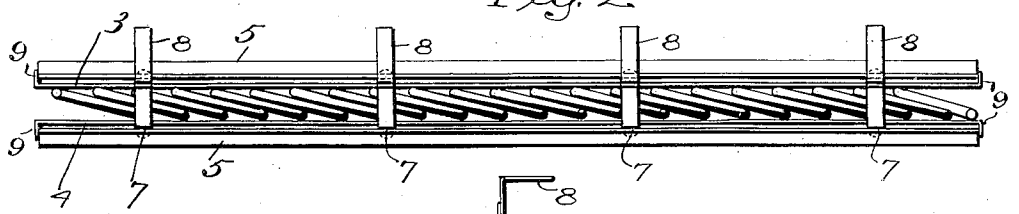
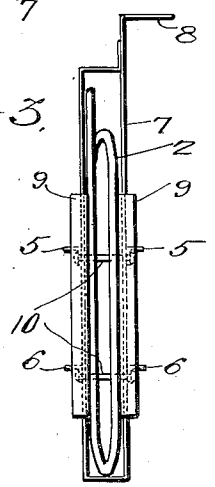


Fig. 3.



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REFRIGERATING COIL

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Application May 6, 1936, Serial No. 78,267

4 Claims. (Cl. 257—255)

This invention relates to improvements in refrigerating coils, and more particularly to coils adapted for use in milk-cooling tanks of the character, for example, disclosed in my United States Patent No. 2,039,235. In that patent I have described the advantages accruing to a coil in which the convolutions extend in a substantially vertical direction, and the principal object of the present invention is to provide a coil that by reason of certain specific construction hereinafter described shall have generally improved characteristics both functional and structural, and that shall thereby be particularly well adapted for milk-cooling purposes.

More specifically, an object of the invention is to provide a coil of exceptionally compact and simple design and relatively high efficiency, that shall be capable when properly installed in a milk-cooling or other cabinet or tank of cooling the entire bath of contained water or other liquid relatively rapidly, that shall effectively prevent stratification and premature ice formation, and that shall maintain at all times a relatively small temperature differential between the top and bottom liquid.

Another object of the invention is to provide a coil of the aforesaid characteristics the efficiency of which is not dependent on a predetermined water level nor upon forced circulation of the water in the tank.

Still another object of the invention is to provide a coil of the stated type that by reason of its simplicity of form shall be relatively inexpensive to manufacture, that may be readily installed in the cooling tank, that shall occupy a minimum space, and that shall be rugged and strong and relatively damage-proof.

In the attached drawing:

Figure 1 is a front elevational view of a coil made in accordance with my invention;

Fig. 2 is a plan view of the coil, and

Fig. 3 is an end elevational view.

With reference to the drawing, my coil structure in a preferred embodiment comprises a length of tubing 1 forming the coil proper 2, said tubing being formed into a transversely overlapping series of elongated substantially vertical convolutions wherein the transverse or horizontal portions are reduced to a practical minimum, the major portion of the coil thereby consisting of substantially vertically extending courses. The relative arrangement of the flatly overlapping convolutions is clearly shown in Figs. 1 and 2.

The coil 2 is closely confined between two side plates 3 and 4, said plates being of lesser effective height than the coil so that the latter projects beyond the upper and lower edges of the plates as illustrated. The plates 3 and 4 are firmly clamped upon the coil 2, and the arrangement is such that the upright portions of each convolution are in direct contact respectively and throughout the major portion of their lengths with the said plates. The plates may be clamped together upon the coil in any suitable manner, such, for example, as by through bolts 10. Each of the plates 3 and 4 preferably is reinforced and stiffened by a pair of longitudinal angle bars 5 and 6, and confined between the bars 5 and 6 and the associated side plate are a series of stirrup straps 7 which embrace the lower projecting portion of the coil 2 and which at their upper ends are formed with a transversely extending flange 8. Preferably the plates 3 and 4 are provided at their ends with outwardly extending flanges 9 which overlap the ends of the reinforcing bars 5 and 6, as illustrated.

It will be noted that in this assembly the upright coil 2 offers no material obstruction to the free passage of water between the plates 3 and 4, and that the water may enter the latter from the bottom and from each end, and also, when the coil structure is submerged to a sufficient depth, from the top of the plates. In assembly the coil structure is preferably mounted adjacent the rear wall of the cabinet, and is coextensive in length with the latter, it being apparent that the construction is such that the coil may be readily made in any length required. The coil may be suspended from the flanges 8 of the straps 7, or the bottoms of the straps may support the coil on the bottom or floor of the cabinet. It is desirable, however, that the coil shall extend substantially to the bottom of the cabinet so that the coil will embrace the full depth of the water at all times. Normally, when the milk cans are removed from the cabinet, the coil will be submerged to approximately two-thirds of its height in the water, and with the cans in position the level of the water will be raised to a level at least above the tops of the side plates 3 and 4. By reason of the free access of the water to the space between the side plates 3 and 4 occupied by the coil proper, the efficiency of the coil in the cooling operation will be maintained regardless of the water level. The upper water coming in contact with the vertical coil between the side plates will be rapidly chilled and will drop downwardly between the plates, drawing more of the relatively warm surface water into contact with the coils and setting up a convec-

tive circulation which rapidly cools the entire mass of water in the tank and which avoids the necessity for mechanical water-circulating means. Since the convolutions of the coil, as previously described, are in intimate contact with the side plates, the latter are conductively cooled and are themselves made to constitute effective cooling surfaces materially increasing the effective cooling area of the coil. Since the circulating water passing downwardly between the plates travels longitudinally of the coils, the flow is substantially free from eddy currents, and the entire vertically extending portions of the coil remain continuously in intimate contact with the water, so that the efficiency of the refrigerating operation is at a maximum. Also since the entire circumference of the major or vertically extending portions of the coil is being continuously wiped by the moving water, and by reason of the substantial freedom of the coil from dead spaces caused by eddy currents, there is not the same tendency as in the horizontally disposed coil to premature ice formation, and the coil may be operated at relatively low temperatures without danger of ice formation.

The compactness of form and ruggedness of the coil will be apparent, as also will be the simplicity of installing the coil in the tank, this by reason of the unitary construction incorporating a means whereby the coil may be suitably attached to the walls of the cabinet.

I claim:

1. An expansion-coil unit for milk cooling cabinets and the like comprising a substantially flat transversely extended coil composed of elongated upright and transversely overlapping convolutions, a pair of metallic plates at opposite sides of and in heat conductive contact with said coil, and means for clamping said plates together on the coil.

2. An expansion-coil unit for milk cooling cabinets and the like comprising a substantially flat transversely extended coil composed of elongated upright and transversely overlapping convolutions, a pair of metallic plates of lesser effective height than said coil at opposite sides of and in heat conductive contact with the latter, and means for clamping said plates together on the coil.

3. An expansion-coil unit for milk cooling cabinets and the like comprising a substantially flat transversely extended coil composed of elongated upright and transversely overlapping convolutions, a pair of metallic plates at opposite sides of and in heat conductive contact with said coil, means for clamping said plates together on the coil, and means attached to said plates for mounting the unit in said cabinet.

4. An expansion-coil unit for milk cooling cabinets and the like comprising a substantially flat transversely extended coil composed of elongated upright and transversely overlapping convolutions, a pair of metallic plates at opposite sides of and in heat conductive contact with said coil, means for clamping said plates together on the coil, and means for mounting the unit in the cabinet, said means comprising a plurality of vertically arranged metal loops secured to the said plates and substantially embracing the coil.

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