July 8, 1952 H. A. GOLDBERG 2,602,649

REFRIGERANT PLATE

Filed Dec. 4, 1946

Fig. 1.

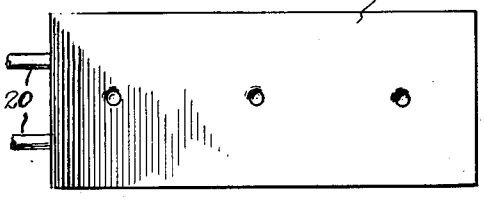


Fig. 2.

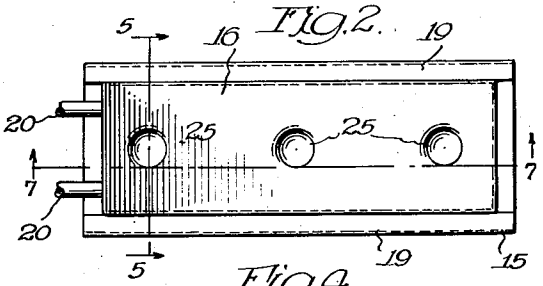


Fig. 3.

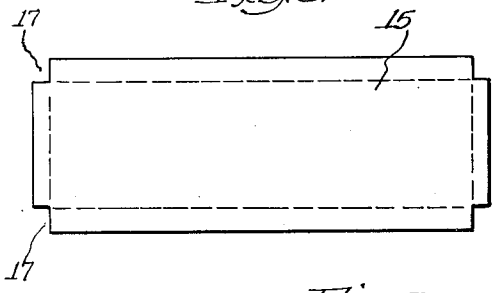


Fig. 4.

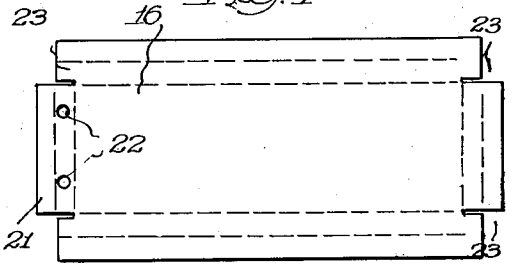


Fig. 5.

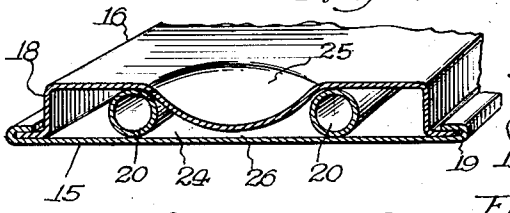


Fig. 6.

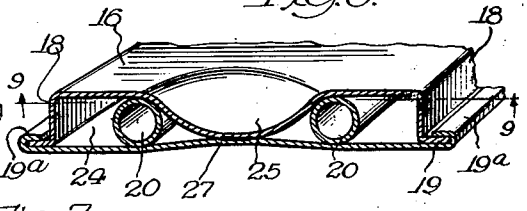


Fig. 7.

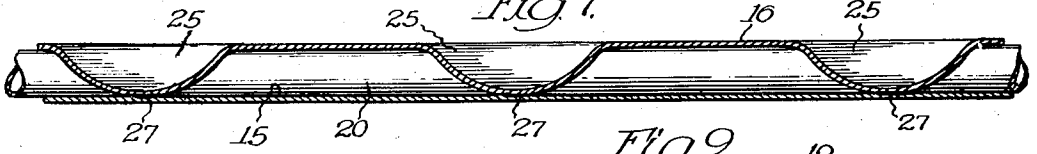


Fig. 9.

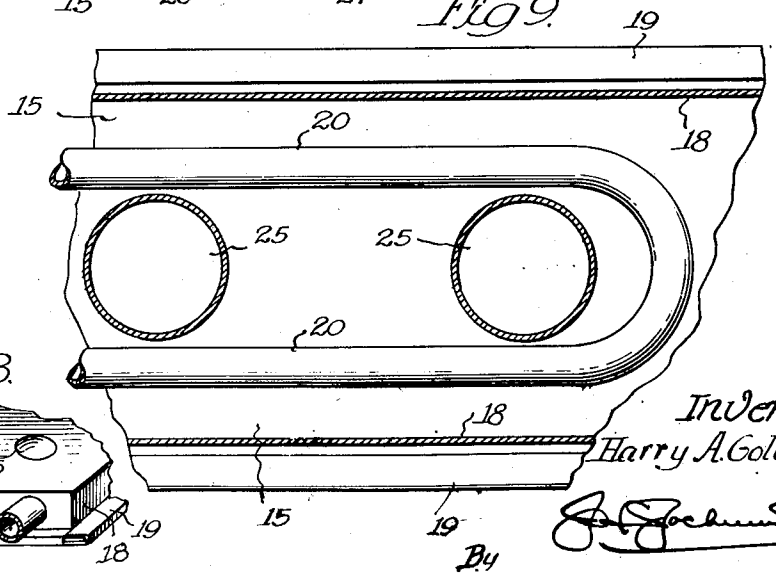
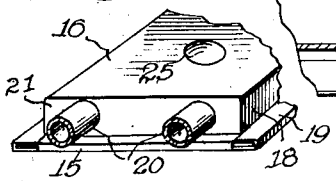


Fig. 8.



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REFRIGERANT PLATE

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3 Claims. (Cl. 257—256)

1

This invention relates, in general, to heat exchangers, but more specifically to refrigerant plates, which are generally known as "low temperature or evaporator plates," particularly adapted, though not necessarily limited in use, for refrigeration purposes, to increase the conductivity and convection surface area, and qualities of the exchanger. One of the objects of the invention is to provide an improved low temperature evaporator plate of this character, which will be simple and durable in construction, cheap to manufacture, and effective and efficient in operation.

Evaporator or flash plates of this character have heretofore been constructed in the form of plates of any desired thickness, shaped to form a housing or hollow plate, between which plates or the walls of the housing a refrigerating fluid flows.

The usual method of assembling and securing the parts of such a plate together is quite expensive and time consuming, and eventually the parts become loose, with the result that the effectiveness of the plate is impaired. To overcome these difficulties and objections, and to provide an improved structure of plate, and improved means for securing the parts in assembled relation, is another object of this invention.

A further object is to provide an improved method of manufacturing a refrigerant plate or heat exchanger of this character.

To the attainment of these ends, and the accomplishment of other new and useful objects as will appear, the invention consists in the features of novelty in substantially the construction, combination and arrangement of the several parts, and in substantially the method and steps in the method of producing the same, hereinafter more fully described and claimed, and shown in the accompanying drawing illustrating this invention, in which drawing

Fig. 1 is a plan view of one face plate.

Fig. 2 is a plan view from the opposite face of the plate.

Fig. 3 is a plan view of the blank for the plate shown in Fig. 1.

Fig. 4 is a plan view of the blank for the plate shown in Fig. 2.

Fig. 5 is a sectional view taken on line 5—5, Fig. 2, before the plates are welded together.

Fig. 6 is a view similar to Fig. 5, showing the plates welded together.

Fig. 7 is a sectional view on line 7—7, Fig. 2.

Fig. 8 is a detail perspective view of a portion of the completed plate, showing one end thereof.

2

Fig. 9 is a detail horizontal sectional view as taken on line 9—9, Fig. 6.

In the drawing, the exchanger consists essentially of two plates 15, 16, portions of which are spaced from each other, and may be of any desired size and configuration, and constructed of any suitable material which possesses the desired qualifications, and which is non-corrosive.

The plate 15 is formed from a flat blank and, in the present exemplification of the invention, is oblong, and the corners are cut away, as at 17, so as to facilitate folding of the edges, in a manner to be set forth. The plate 16 is somewhat larger than the plate 15, and the sides and ends thereof are bent at substantially right angles to the body portion, as at 18, to form spacing walls for the plates and a closure for the space therebetween. The edges of the walls 18 are bent at substantially right angles to the walls, as at 19, and terminate short of the peripheral edges of the plate 15, so that when the plates are assembled, that is, when the flanged edges 19 of the plate 16 abut or rest against the plate 15, the edges of the plate 15 beyond the edges of the portion 19 of the plate 16, are bent back upon the portion 19, as at 19a, to bind and secure the two plates firmly together around their edges. If desired, and as a further means for fastening the edges of these plates together, they may be spot welded, or fastened in any other desired or suitable manner.

Between the plates, a pipe 20 is disposed, which may be of any suitable configuration, for example, coiled, serpentine, or U-shaped, both of the ends of the pipe extending through an end wall 21, to provide a means whereby a supply and an exhaust for the coolant fluid may be readily attached, in any suitable manner. To permit the ends of the pipe 20 to project from between the plates, one of the end walls 21 of the plate 16 may be provided with apertures or openings 22. The plate 16 is also, preferably, cut away at its corners, as at 23, to facilitate bending or shaping of the plate.

The normal distance between the portions of the plates 15 and 16 that form a chamber or space 24, within which the pipes 20 are located, is such that the pipes engage or rest against both plates. Before the plates 15 and 16 are assembled, a series of depressions or upstruck portions 25 are formed in the plate 16, in any suitable manner, and this is accomplished by upsetting or striking up a portion of the plate within the confines of, and spaced from the edges of the plate. These depressions, any number of which

may be provided, are of a depth slightly less than the outside diameter of the pipes, so that when the plates are assembled, with the pipes **20** therebetween, the ends of the depressions or struck-out portions will terminate short of the plate **15**, to provide a slight space **26**, while the body portions of both plates rest against the pipes. This space is provided so that when the ends of the depressed portions **25** are secured to the plate **15**, as at **27**, which may be done by resistance welding, or by any other suitable fastening means, the plates will be drawn together, and tightly against the pipes **20**, thereby insuring a tight binding of the parts, and a rigid contact of the plates with the pipes. Furthermore, the pipes will be rigidly held against displacement with respect to the plates.

These depressed or upset portions **25** may be provided at any place with respect to the area of the plate, but are preferably arranged so that they will project between the bends or adjacent portions of the pipes.

With this improved construction, it will be manifest that there will be produced a heat exchanger or refrigerant plate in which the conductivity and convection qualities are greatly increased, and a plate that will be of a compact and rigid construction.

While the preferred form of the invention has been herein shown and described, and the preferred method of producing the invention has also been described, it is to be understood that various changes may be made in the details of construction, and in the combination and arrangement of the several parts, and also in the method and the steps in the method of producing the same, within the scope of the claims, without departing from the spirit of this invention.

What is claimed as new is:

1. A refrigerant plate comprising two spaced plate elements, means securing together the peripheral edges of said plate elements, a refrigerant circulation pipe disposed within the space between said plate elements, said pipe being return bent so that the longitudinal portions thereof are in substantially spaced apart parallelism, a plurality of substantially dish-shaped depressions in one of said plate elements between the longitudinal portions of said pipe extending toward the other plate element, the depth of each said depression being less than the outside diameter of said pipe, and the extremity of each said depression being spot welded to said other plate element, whereby said plate elements are drawn together to clamp said pipe therebetween.

2. A refrigerant plate comprising two spaced plate elements, one of said plate elements being provided with a flange around the periphery

thereof extending toward the other plate element and having a second flange extending outwardly therefrom, a return bent portion around the periphery of the other plate element providing a space to receive the outwardly extending flange of said one plate element, means for securing the outwardly extending flange of the one plate element to the return bent portion of the other plate element, a refrigerant circulation pipe disposed within the space between said plate elements, said pipe being return bent so that the longitudinal portions thereof are in substantially spaced apart parallelism, a plurality of substantially dish-shaped depressions in one of said plate elements between the longitudinal portions of said pipe extending toward the other plate element, the depth of each said depression being less than the outside diameter of said pipe, and the extremity of each said depression being spot welded to said other plate element, whereby said plate elements are drawn together to clamp said pipe therebetween.

3. A refrigerant plate comprising two spaced plate elements, means securing together the peripheral edges of said plate elements, a refrigerant circulation pipe disposed within the space between said plate elements, said pipe being return bent so that the longitudinal portions thereof are in substantially spaced apart parallelism, a plurality of substantially dish-shaped depressions in one of said plate elements between the longitudinal portions of said pipe extending toward the other plate element, the depth of each said depression being less than the outside diameter of said pipe, and the diameter of each said depression being greater than the distance between the inner sides of the parallel portions of said pipe, and the extremity of each said depression being spot welded to said other plate element, whereby said plate elements are drawn together to clamp said pipe therebetween.

HARRY A. GOLDBERG.

REFERENCES CITED

The following references are of record in the file of this patent:

UNITED STATES PATENTS

Number	Name	Date
1,110,065	Linga	Sept. 8, 1914
1,709,865	Muffly	Apr. 23, 1929
1,754,051	Rosenberg	Apr. 8, 1930
1,826,344	Dalgleish	Oct. 6, 1931
1,829,387	Arnold	Oct. 27, 1931
1,982,075	Smith	Nov. 27, 1934
2,085,191	Hastings	June 29, 1937
2,248,801	Bernt	July 8, 1941
2,405,432	Kleist	Aug. 6, 1946
2,467,191	Crider	Apr. 12, 1949