Feb. 26, 1935. D. F. NEWMAN 1,992,835

METHOD OF BENDING CONDUITS

Filed June 29, 1934

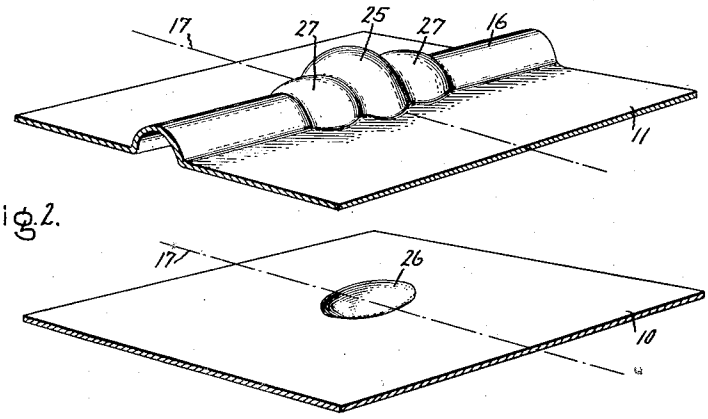



Fig. 2.

Fig. 1.

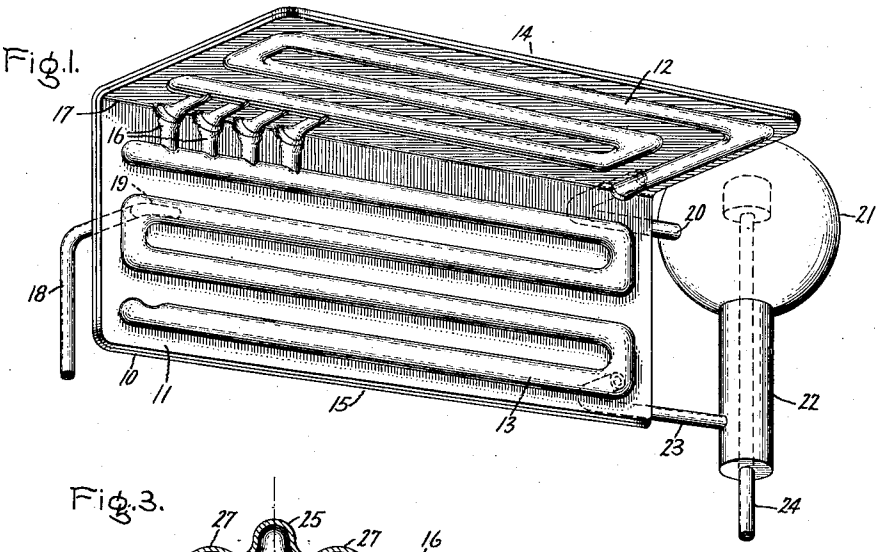



Fig. 3.

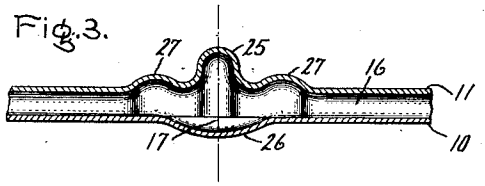
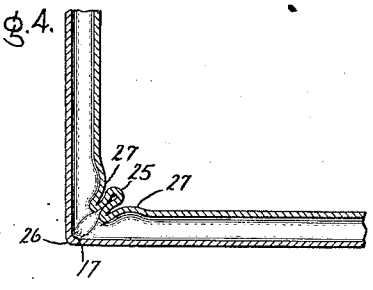



Fig. 4.




Inventor:
Delbert F. Newman,
by Harry E. Dunham
His Attorney.

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# UNITED STATES PATENT OFFICE

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## METHOD OF BENDING CONDUITS

Delbert F. Newman, Schenectady, N. Y., assignor to General Electric Company, a corporation of New York

Application June 29, 1934, Serial No. 733,032

10 Claims. (Cl. 153—32)

My invention relates to methods of bending conduits, and particularly to methods of bending flat sided conduits formed between sheets of metal.

Conduits for heat exchange devices, such as evaporators and condensers of refrigerating machines, are frequently constructed by providing indentations in one of two metal sheets and by securing the sheets together in face engagement to provide a passageway between the sheets. In some constructions it becomes desirable to bend the sheets at sharp angles to obtain the required shape, and in such cases considerable difficulty is encountered in preventing restriction of the passageways at the places where they cross the bends in the sheets. This is particularly true of passageways and conduits formed with one round or curved side and one flat side, as is a common practice in the construction of refrigerator evaporators.

Accordingly, it is an object of my invention to provide a method for bending a conduit having a flat side in such a manner that there is substantially no restriction of the passageway therethrough.

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

For a better understanding of my invention reference may be had to the accompanying drawing, in which Fig. 1 is a perspective view of a sheet metal refrigerator evaporator provided with passageways, and constructed in accordance with my invention; Fig. 2 is a detail perspective view of two sheets formed in accordance with my invention prior to their being secured together and bent; Fig. 3 is a sectional elevation through the passageway formed between the sheets shown in Fig. 2 after they have been secured together, and Fig. 4 is a sectional view of the sheets shown in Fig. 3 after they have been bent.

In Fig. 1 I have shown a flooded type refrigerator evaporator comprising two sheets 10 and 11 secured together in face engagement, the sheet 11 being provided with elongated rounded indentations or corrugations cooperating with the flat portions of the sheet 10 to form sinuous passageways 12 and 13 in the upper and lower portions 14 and 15 of the evaporator respectively, and which communicate with each other through a plurality of passageways 16. The sheets 10 and 11 are bent at a sharp angle along a line 17. Liquid refrigerant is supplied to the evaporator from a condenser, or other suitable source, through a conduit 18 and flows into the passageway 13 at 19 and thence upwardly through the passageway 13 and the passageways 16 into the conduit 12 from which it flows through a connection 20 into a header 21, which is substantially half filled with liquid refrigerant, so that the liquid level is above the passage 12. Liquid refrigerant circulates from the header 21 to a tube 22 and back to the conduit 13 through a connection 23. The refrigerant flowing through the conduits 12 and 13 is vaporized by the heat absorbed, and the vaporized refrigerant collects above the liquid level in the header 21 from which it is withdrawn through a suction tube 24 and is returned to the source.

The refrigerant evaporator shown is of the construction described and claimed in a copending application of Christian Steenstrup, Serial No. 733,044, filed June 29, 1934, and assigned to the General Electric Company, assignee of my present invention. I, therefore, do not herein claim anything shown or described in said Steenstrup application, which is to be regarded as prior art with respect to this application, my invention relating to methods for bending flat sided conduits, such as those employed in the evaporator of the said Steenstrup application.

When the sheets are bent in forming the upper and lower portions 14 and 15 at the desired angle, it is necessary to provide some arrangement for preventing the restriction of the passageways. In accordance with my invention, therefore, I provide bulges arranged along the passageways at the line of bending in such a manner that the passageways may be bent at a sharp angle without reducing their cross-sectional area and thereby restricting them.

Referring now to Fig. 2 I have shown portions of the sheets 10 and 11 adjacent the line 17 along which the sheets are to be bent in forming the evaporator shown in Fig. 1. The passageways 16 are formed by providing corrugations in the sheet 11 transversely of the line 17. In order to prevent caving in and restricting of the passageway 16 during bending, I provide a bulge 25 in the corrugation at the line of bending, a downwardly extending bulge 26 in the sheet 10 opposite the bulge 25 to counteract the caving in effect in the sheet 10 opposite the corrugation along the line of bending. I also provide additional bulges 27 in the sheet 11 closely adjacent either side of the bulge 25 along the corrugation 16 in order to obtain a more symmetrical bend in the bulge 25. The sheets 10 and 11 are then

secured and sealed together face to face, and in Fig. 3 is shown a sectional view through one of the passageways 16 after this operation. The sheets 10 and 11 shown in Fig. 3 are bent along the line 17 to form a right angle as shown in Fig. 4. During this bending operation the bulge 25 is compressed at the corner which is being formed and the sides of the bulge 26 are pressed together. As can clearly be seen, the bulge 25 has been collapsed and the bulge 26 forms the corner of the bend on the other side. The sizes of the bulges 25 and 26 are selected so that there will be substantially no restriction of the passageway after bending, and so that the corner formed during the bending operation shall not be indented opposite the corrugations.

While I have shown my invention as applied to the making of a refrigerator evaporator, I do not desire it to be limited to the specific method shown and described, and I intend in the appended claims to cover all modifications within the spirit and scope of my invention.

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

1. The method of bending a conduit having a round and a flat side, which comprises forming a bulge in the round side of said conduit opposite the flat side and where said conduit is to be bent, and bending said conduit toward the side on which said bulge is located so that said bulge is compressed at the bend in said conduit.

2. The method of bending a conduit having a round and a flat side, which comprises forming a bulge in the round side of said conduit opposite the flat side and where said conduit is to be bent and a bulge in the flat side of said conduit opposite said first mentioned bulge, and then bending said conduit toward the side on which said first mentioned bulge is located so that said first mentioned bulge is compressed at the bend in said conduit.

3. The method of bending a conduit having a round and a flat side, which comprises forming a bulge in the round side of said conduit opposite the flat side and where said conduit is to be bent and additional bulges in said round side closely adjacent either side of said first mentioned bulge, and then bending said conduit toward said round side so that said first mentioned bulge is compressed between said additional bulges.

4. The method of bending a conduit having a round and a flat side, which comprises forming a bulge in the round side of said conduit opposite the flat side and where said conduit is to be bent and a bulge in the flat side of said conduit opposite said first mentioned bulge and additional bulges in said round side closely adjacent either side of said first mentioned bulge, and then bending said conduit toward said round side so that said first mentioned bulge is compressed between said additional bulges.

5. The method of forming a passageway between two sheets secured face to face and bent transversely of the passageway formed therein, which comprises forming an elongated indentation in one of said sheets transversely of the line along which said sheet is to be bent and a bulge in the wall of said indentation where the same crosses the line of bending, and then bending said sheets transversely of said indentation along said line of bending to compress said bulge at the bend in said sheets.

6. The method of forming a passageway between two sheets secured face to face and bent transversely of the passageway formed therein, which comprises forming an elongated indentation in one of said sheets and extending transversely of the line along which said sheet is to be bent and a bulge in said indentation where the same crosses the line of bending and a bulge on the other of said sheets registering with said first mentioned bulge, and then bending said sheets transversely of said indentation along said line of bending so that said first mentioned bulge is compressed at the bend in said sheets.

7. The method of forming a passageway between two sheets secured face to face and bent transversely of the passageway formed therein, which comprises forming an elongated indentation in one of said sheets and extending transversely of the line along which said sheet is to be bent and a bulge in said indentation where said indentation crosses the line of bending and additional bulges in said indentation closely adjacent either side of said first mentioned bulge, and then bending said sheets transversely of said indentation along said line of bending to compress said first mentioned bulge between said additional bulges.

8. The method of forming a passageway between two sheets secured face to face and bent transversely of the passageway formed therein, which comprises forming an elongated indentation in one of said sheets transversely of the line along which said sheet is to be bent and a bulge in said indentation where said indentation crosses the line of bending and additional bulges in said indentation closely adjacent either side of said first mentioned bulge and a bulge on the other of said sheets registering with said first mentioned bulge, and then bending said sheets transversely of said indentation at said first mentioned bulge to compress said first mentioned bulge between said additional bulges.

9. The method of forming a passageway between two sheets secured face to face and bent transversely of the passageway formed therein, which comprises forming an elongated indentation in one of said sheets transversely of the line along which said sheet is to be bent and a bulge in said indentation where said indentation crosses the line of bending and an additional bulge in said indentation closely adjacent either side of said first mentioned bulge, securing said sheets together to form a passageway between said indentation and said other sheet, and then bending said sheet transversely of said indentation at said first mentioned bulge to compress said first mentioned bulge between said additional bulges.

10. The method of forming a passageway between two sheets secured face to face and bent transversely of the passageway formed therein, which comprises forming an elongated indentation in one of said sheets transversely of the line along which said sheet is to be bent and a bulge in said indentation where said indentation crosses the line of bending and an additional bulge in said indentation closely adjacent either side of said first mentioned bulge and a bulge on the other of said sheets registering with said first mentioned bulge, placing said sheets together with the bulges in said sheets extending away from each other, securing said sheets together to form a passageway between said indentation and said other sheet, and then bending said sheet transversely of said indentation at said first mentioned bulge to compress said first mentioned bulge between said additional bulges.

DELBERT F. NEWMAN.