March 17, 1931. C. STEENSTRUP 1,797,030

MAKING HEAT EXCHANGERS

Original Filed Oct. 4, 1928

Fig. 1.

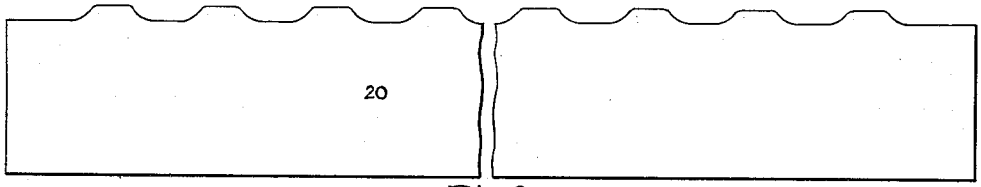


Fig. 2.

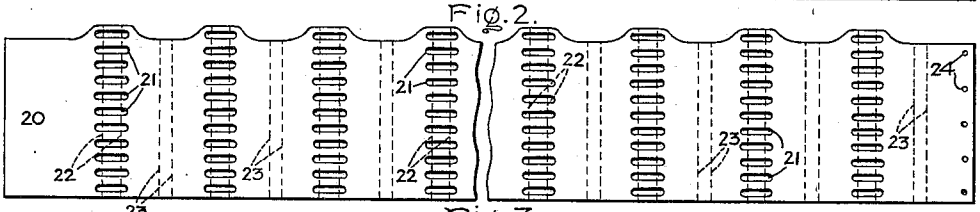


Fig. 3.

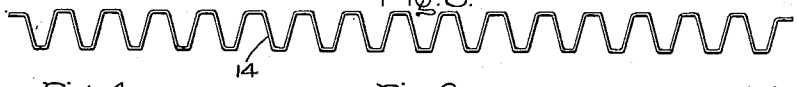


Fig. 4.

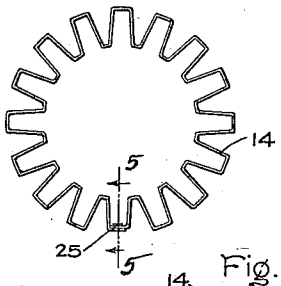


Fig. 6.

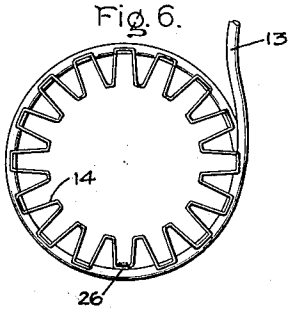


Fig. 7.

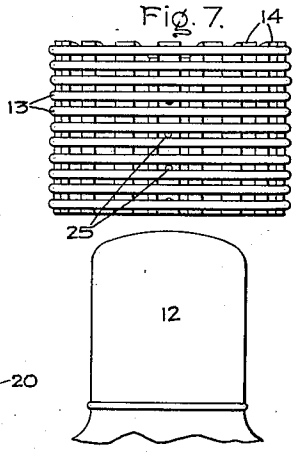


Fig. 9.

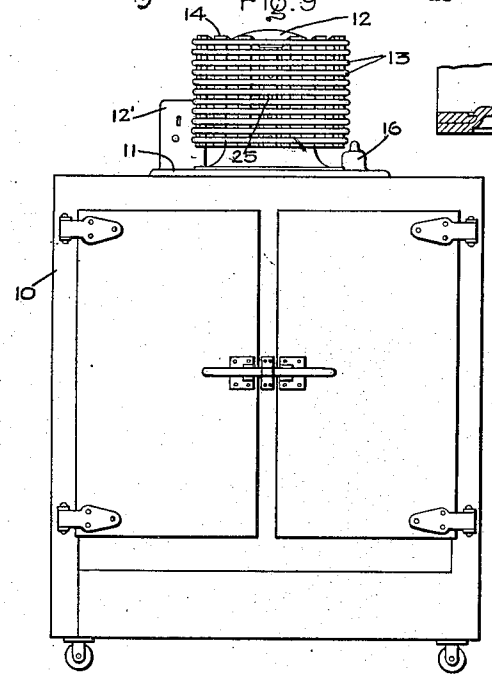


Fig. 5.

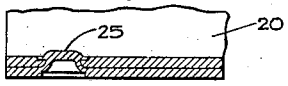


Fig. 8.

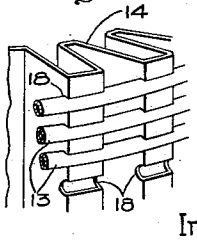
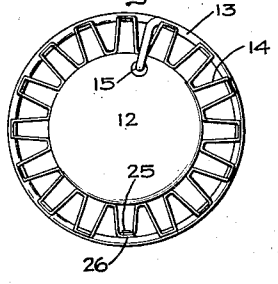


Fig. 10.



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by Charles E. Mullen
His Attorney.

Patented Mar. 17, 1931 1,797,030

UNITED STATES PATENT OFFICE

CHRISTIAN STEENSTRUP, OF SCHENECTADY, NEW YORK, ASSIGNOR TO GENERAL ELECTRIC COMPANY, A CORPORATION OF NEW YORK

MAKING HEAT EXCHANGERS

Original application filed October 4, 1928, Serial No. 310,371. Divided and this application filed November 15, 1929. Serial No. 407,541.

My invention relates to a method of making air-cooled heat exchangers such as that used for condensers for refrigerating machines which are provided with cooling fins and a chamber arranged in heat exchange relation with the fins. A heat exchanger of this construction is described and claimed in my application Serial Number 310,371 filed October 4, 1928, of which this application is a division.

It has been the practice heretofore in building air-cooled heat exchangers of this kind to attach cooling fins to a casing or other suitable support and to arrange a condenser pipe coil or chamber on the fins. Attaching the fins to a casing or support in this way is costly because of the equipment and labor required.

The object of my invention is to carry out a method of making air-cooled heat exchangers of the type above referred to, such that the cooling fins and the condenser pipe coil, or chamber, can be secured to the support without welding or riveting the fins to the support. I do this by arranging the pipe coil or chamber about the fins so as to constitute an annulus, and then press the fins on the supporting member so as to secure the fins and the pipe coil or chamber thereto.

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

In the drawing Fig. 1 is a side elevation of a sheet of metal of the form which I employ in forming condenser cooling fins in accordance with my invention; Fig. 2 is a side elevation of this plate after rows of openings have been punched therein in such arrangement that they form outwardly presented notches in the completed fins; Fig. 3 is an edge view of the plate after it has been bent in zigzag form; Fig. 4 is a plan view of the annulus of fins formed by fastening the ends of the zigzag plate together; Fig. 5 is a sectional view on the line 5—5 of Fig. 4 showing the particular manner employed in the present construction for fastening the ends of the zigzag plate together; Fig. 6 is a plan view of the annulus of fins after the condenser pipe coil has been arranged in notches thereon; Fig. 7 is a side elevation of the annulus of fins having a condenser pipe coil thereon and arranged above the refrigerant containing casing or supporting member on which the annulus of fins is pressed; Fig. 8 is a fragmentary perspective view of the annulus of fins, as shown in Fig. 6, showing the outwardly presented notches formed by the openings in the plate and the condenser pipe coil arranged therein; Fig. 9 is a front elevation of a refrigerator having my invention applied thereto, and Fig. 10 is a plan view of the refrigerant containing casing and air-cooled condenser shown in Fig. 9.

Referring to the drawing, I have shown my improved method as used for making a condenser for a refrigerator cabinet 10 having a refrigerating machine associated therewith of the general construction described in my application, Serial No. 109,960, filed May 18, 1926, or my application Serial No. 166,212, filed February 5, 1927. The refrigerating machine is mounted on a base plate 11, which is removably supported in an opening in the refrigerator cabinet 10, and comprises a refrigerant containing casing 12 having a compressor and motor arranged therein which is controlled in response to the temperature of the cooling unit of the refrigerator by a thermostatic device 12. In this construction the compressed refrigerant is delivered from the casing 12 to a condenser pipe coil 13, which is carried by cooling fins 14 attached to the casing, and which communicates with the casing at 15. The refrigerant is condensed in the pipe coil and flows therefrom to the cooling unit of the refrigerator under control of a float valve or other suitable device indicated at 16.

The cooling fins 14 constitute an annulus which is clamped into engagement with the casing 12 so as to support the condenser pipe coil 13 and fins 14 entirely by frictional engagement therewith, without the necessity for brazing, welding or riveting the fins thereto. In order to support the fins 14 in

the desired relation to each other so that they can be readily secured to the casing 12 by means of the condenser pipe coil 13, they are made of zigzag form, as clearly shown in Figs. 4, 6 and 10 of the drawing, and form outwardly presented notches 18 therein, as shown in Fig. 8 for supporting the condenser pipe coil thereon.

The method by which I make the foregoing described condenser construction is such that the cooling fins and the condenser pipe coil is secured to the casing 12 without welding, brazing or riveting the fins thereto. I do this by arranging the condenser pipe coil 13 about the fins 14 so as to constitute an annulus in which the inside diameter formed by the inwardly presented edges of the fins form a very secure press fit on the casing 12, as shown in Fig. 6. I then press the fins on the casing under considerable pressure into the relation shown in Figs. 9 and 10, so that the fins and the condenser pipe coil are securely attached to the casing, entirely by frictional engagement therewith. This insures good thermal contact between the condenser pipe coil and the fins, and also between the fins and the casing 12 so that the fins efficiently cool the condenser pipe coil 13 and also the casing 12.

I carry out this method in the following manner: I form a sheet of metal 20 as shown in Fig. 1. I then punch or otherwise form a plurality of rows of openings 21 therein which are spaced apart longitudinally thereof, and form openings 24 in one end of the plate to facilitate riveting the ends thereof together. I bend the plate on the dotted lines 22 and 23 in zigzag form, as shown in the edge view thereof in Fig. 3. By bending the plate 20 in this manner the openings 21 form outwardly presented notches in the fins as indicated at 18 in Fig. 8, which are adapted to support the condenser pipe coil. As notches cannot be readily formed in the ends of the plate 20 for supporting the pipe coil, I make the ends of the plate slightly shorter than the other zigzag portions thereof, so that in the completed condenser these ends engage the condenser pipe at 26 when it is arranged thereon, as shown in Figs. 6 and 10. After I form zigzag plate 20 in this way I bend it into annular form and fasten the ends thereof together in any suitable manner, as by welding or riveting at 25, as shown in Figs. 4 and 5. I then wind the condenser pipe 13 in the outwardly presented notches 18 in the annulus of fins 14 in such manner that the inwardly presented edges of the fins are at the proper radial distance from the axis thereof to form a secure press fit on the casing 12, or other supporting member for the condenser. This reinforces the annulus of fins sufficiently to withstand the stresses to which it is subjected upon being pressed on the casing 12, as the condenser pipe coil resists, by circumferential tension therein, the stresses to which the annulus of fins is subjected. I then place the annulus of fins with the condenser pipe coil 13 wound thereon over the casing 12, and press the same thereon into the position shown in Figs. 9 and 10, so that it is rigidly supported on the casing entirely by frictional engagement therewith, which avoids the necessity of attaching the inwardly projecting edges of the fins to the casing by welding, brazing or riveting, as in the usual construction. I then connect one end of the pipe coil 13 to the refrigerant containing casing 12, as indicated at 15, and the other end thereof to the float chamber or controlling device indicated at 16, through which the refrigerant is delivered to the cooling unit in the refrigerator cabinet.

Although I have shown my improved method for making an air-cooled condenser of a compression refrigerating machine, I do not desire my invention to be limited to the particular method disclosed, and I intend in the appended claims to cover all modifications which do not depart from 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 making a heat exchanger having a supporting member, cooling fins and a chamber, which comprises arranging the chamber about the fins so as to constitute an annulus, and pressing the fins on the supporting member so as to secure the fins and the chamber thereto.

2. The method of making a heat exchanger having a supporting member, cooling fins and a chamber, which comprises arranging the fins in annular form, securing the chamber about the fins, and pressing the fins on said supporting member so as to secure the fins and the chamber thereto.

3. The method of making an air-cooled condenser for a refrigerating system having a supporting member, cooling fins and a condenser chamber, which comprises shaping a sheet of metal in zigzag annular form so as to constitute the fins, securing a condenser about said fins, and pressing the fins on the supporting member so as to secure the fins and the condenser thereto.

4. The method of making an air-cooled condenser for a refrigerating system having a supporting member, cooling fins and a condenser chamber, which comprises shaping a sheet of metal in zigzag annular form so as to constitute the fins, winding a condenser coil about the fins and pressing the fins on the supporting member so as to secure the fins and the condenser coil thereto.

5. The method of making an air-cooled condenser for a refrigerating system having a supporting member, cooling fins and a condenser pipe coil, which comprises forming a sheet of metal with rows of openings spaced apart longitudinally thereof. shaping the

sheet of metal in zigzag annular form with the rows of openings forming outwardly presented notches so as to constitute the fins, winding a condenser pipe coil in the notches in the fins, and pressing the fins on the supporting member so as to secure the fins and the condenser coil thereto.

6. The method of making an air-cooled condenser for a refrigerating machine having a casing constituting a refrigerant chamber, cooling fins and a condenser chamber, which comprises shaping a sheet of metal in zigzag annular form so as to constitute the fins, securing a condenser chamber about the fins, and pressing the fins on the casing so as to secure the fins and the condenser chamber thereto.

7. The method of making an air-cooled condenser for a refrigerating machine having a casing constituting a refrigerant chamber, cooling fins and a condenser, which comprises forming a sheet of metal with rows of openings spaced apart longitudinally thereof, shaping the sheet of metal in zigzag annular form with the rows of openings forming outwardly presented notches so as to constitute the fins, arranging a condenser pipe coil in the notches of the fins, and pressing the fins on the casing so as to secure the fins and the condenser coil thereto.

In witness whereof, I have hereunto set my hand this 14th day of November, 1929.

CHRISTIAN STEENSTRUP.