

Nov. 3, 1931.

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1,829,979

METHOD OF MAKING FINNED TUBES

Original Filed Dec. 30, 1927

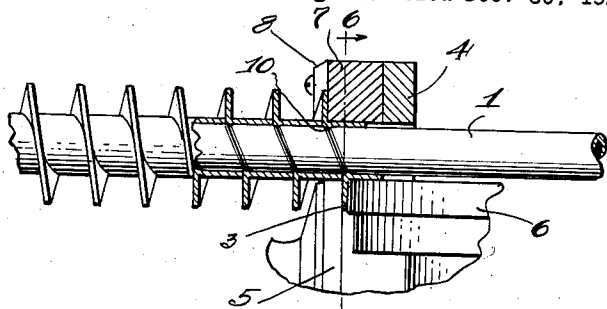


Fig. 1

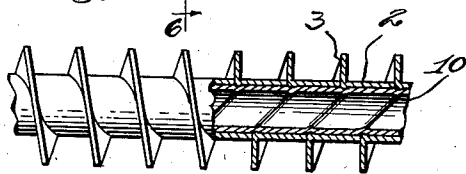


Fig. 2

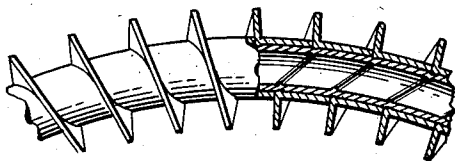


Fig. 3

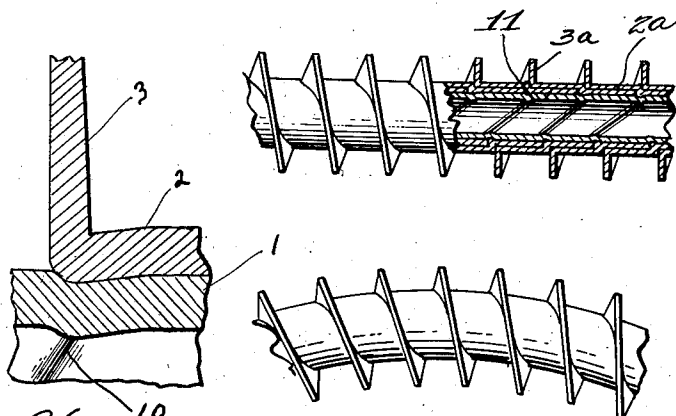


Fig. 4

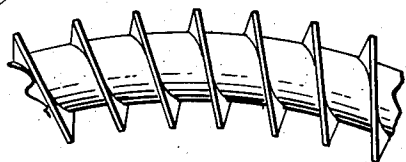


Fig. 5

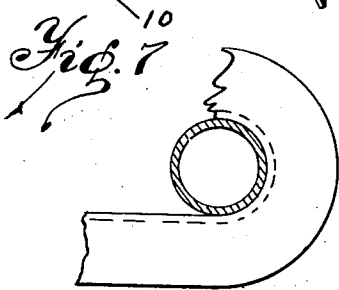


Fig. 6

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METHOD OF MAKING FINNED TUBES

Application filed December 30, 1927, Serial No. 243,511. Renewed April 8, 1931.

This invention relates to a finned tube and method of making same.

Finned tube has many uses particularly in connection with apparatus which requires transference of heat and as examples of such use, the automobile radiator and condensing units of mechanical refrigerators may be cited. In making up an apparatus employing fin tube, however, difficulties have been encountered in bending the tube into proper shape, because tube provided with a helical fin which is soldered or otherwise sealed onto the tube is rendered quite stiff and rigid by reason of the fin.

The principal object of the present invention is the provision of a finned tube capable of being comparatively easily bent or shaped, and with this in mind, the invention provides a tube consisting of a preformed tubular body with the helical fin applied to the body without the use of any sealing metal. This fin is applied to the tube with a considerable degree of tightness and in such a manner that it will not become loose or move longitudinally or lengthwise of the tube. A tube thus constructed may be nicely bent or shaped into relatively sharp curves for making up condenser units, or the like, out of relatively long lengths of tube, whereas a solder or otherwise sealed fin tube could not be bent into curves sufficiently sharp for the purpose.

In the accompanying drawings:

Fig. 1 is a side view with parts in section showing how the fin may be applied to a preformed tube.

Fig. 2 is a side view partly in section showing a completed tube.

Fig. 3 is a view similar to Fig. 2 but indicating how the tube may be bent or curved.

Fig. 4 is a view partly in section and partly in side elevation showing a modified form of tube.

Fig. 5 illustrates the tube of Fig. 4 as it is curved.

Fig. 6 is a view taken on line 6—6 of Fig. 1, showing the application of the helical fin to the preformed tube.

Fig. 7 is an enlarged view in section illus-

trating the manner in which the tube is grooved.

This tube consists of an ordinary preformed tube 1 which may be of any desired construction but which is preferably a tube made from strip stock which is rolled transversely into tube form; it may be of single ply or double ply wall construction, and the type of longitudinal seam may vary; all these details of construction of the preformed tube may be changed to meet various requirements.

The fin is formed by fin stock which is preferably angular in cross section, the leg 2 of the angle forming a spiral band around the tube 1, and the leg 3 forming a helical fin. As shown in Fig. 1, the tube 1 is received in a winding head 4 which includes pressure rolls 5 and 6 having oppositely disposed engaging surfaces which engage between them, the fin forming leg 3. The winding head or fin applying mechanism is fully described and claimed in my patent application Serial No. 243,512, filed December 30, 1927, and for the purposes of the present invention it is not necessary to again describe it here. Suffice to say, however, that the rolls 5 and 6 are driven and engage the fin stock so as to feed the same. Also these rolls engage the fin leg with considerable pressure which is sufficient to compress the metal of this leg with a progressively increasing amount of compression from the band 2 to the outer edge of the leg 3, thus to give the fin stock a curvature. It will readily be understood that when the leg 2 is given a helical formation around the tube the diameter of the outside edge of the fin forming leg must be greater than the inner, and the compression of the metal therein provides for this. The winding head also includes what might be termed a lead die 7 having a slanting or cam surface 8 which engages with the fin and sets the pitch of the helical fin. This also is fully described in the aforementioned application.

In the form of tubes shown in Figs. 1 to 3 inclusive, the pitch of the helical fin is such that the adjacent convolutions of the leg 2 abut against each other. This construction with the convolutions thus abutting would

vary in pitch in accordance with the variance of the width of the leg 2.

The curvature given to the fin is such that the normal inside diameter of the helical fin is less than the outside diameter of the tube, thus, the fin tightly grips the tube. In fact, the fin is preferably wound upon the tube with such a degree of tightness as to indent or partially collapse the wall of the tube, as shown at 10. This indentation or partial collapse lies approximately underneath the fin forming leg 3, and takes the form of a helical groove in the body of the tube. Thus, the fin stock as it tightly grips the tube, seats in this helical curve in the tube body. The fin stock can not come loose from the tube, nor can it move lengthwise of the tube because of being seated in this helical groove. There is, however, sufficient give or slight play which can be effected to permit bending or curving of the tube as indicated in Fig. 3, whereas, if the fin or leg 2 thereof was sealed to the tube by solder or other metal the tube would have a greater stiffness and rigidity and could not be bent into relatively sharp curves.

The invention is also embodied in the modified form of tube shown in Figs. 4 and 5. In this form of tube the fin stock is applied so that adjacent convolutions of the leg 2a overlap each other. In this form, however, the same principles of fin application are adhered to and the tube is grooved or partially collapsed as at 10a. It will be noted that the leg 2a of one convolution of the fin stock underlies the fin forming leg 3a of the next adjacent, and that the curving or partial collapsing is also effected in the leg 2a, as shown at 11.

Another feature of this tube may be mentioned, and this feature resides in the fact that the tube is strengthened by the helical band formed by the leg 2a of the fin stock. While this manner of reinforcing the tube is shown in a previously filed application of mine, it has a particular association with the present invention in that a reinforced tube is provided which at the same time is not rendered unduly stiff or rigid by such reinforcement. It is thus possible to utilize preformed tube 1, made up of thin stock which would not have sufficient strength for the purpose were it not for the helical reinforcing band. Another feature is the fact that the tube thus constructed can be bent in curves which are sharper than the preformed tube alone could be bent without the fin. In other words, a thin walled tube without a fin, when being bent in a sharp curve, would collapse; that is, the wall of the tube on the inside of the curve would bend or break at a sharp angle. It has been found, however, that such a tube with the helical fin thereon is reinforced by the fin and a collapse of this nature is prevented. The reason for this is assigned to the

fact that the wall of the tube, on the inside curve, is strengthened and reinforced by the helical fin stock.

Claims:

1. The method of providing a helical fin on a preformed tube, which comprises winding helical fin stock on the tube with sufficient initial tightness to partially collapse the body of the tube thus to provide a helical groove in the body of the tube in which the fin seats.

2. The method of providing a helical fin on a preformed tube which comprises winding fin stock on the tube which is angular in cross section with one leg of the angle forming a helical fin, and the other leg forming a helical band on the tube, effecting a tight winding of the fin stock sufficient to partially collapse the body of the tube to form a helical groove substantially underlying the helical fin in which the fin stock seats to form the only connection between the tube and the fin stock.

3. The method of attaching a helical fin to a preformed tube which comprises, winding cold fin stock of angular formation in cross section on the tube to form a helical fin with the adjacent convolutions in contacting relation and the winding so tight that no other fastening means is needed.

4. A method of providing a fin on a preformed tube which comprises substantially simultaneously winding fin stock on the tube and effecting a depression or groove in the wall of the tube by partial collapse of the tube wall underneath the wound fin stock, and seating the fin stock in this groove.

In testimony whereof I affix my signature.

HARRY W. BUNDY.