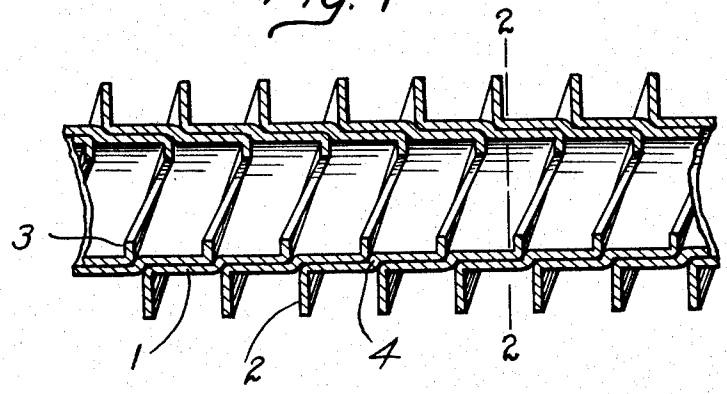
Oct. 7, 1930. H. W. BUNDY 1,777,782

EXTERNALLY AND INTERNALLY FINNED TUBE AND METHOD THEREFOR

Filed Feb. 11, 1929

Fig. 1



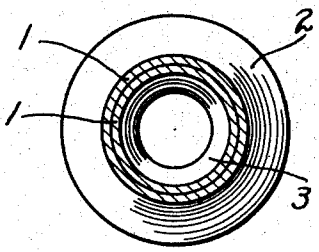




Fig. 2

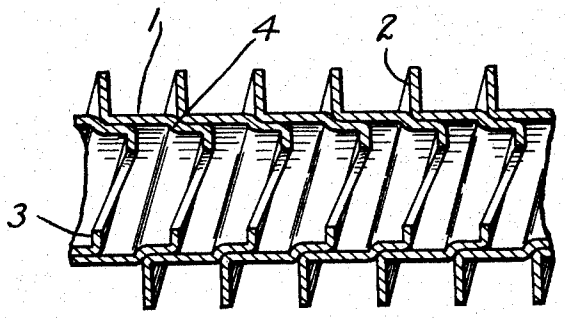



Fig. 3

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Patented Oct. 7, 1930

1,777,782

# UNITED STATES PATENT OFFICE

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## EXTERNALLY AND INTERNALLY FINNED TUBE AND METHOD THEREFOR

Application filed February 11, 1929. Serial No. 339,033.

This invention relates to fin tubing, and has to do especially with a tube provided with a fin both externally and internally. Such a tube is advantageous for use in many places for heat exchange purposes, in that fluid inside of the tube has a large area of contact with the tube, due to the internal fin, as well as does the fluid outside the tube which contacts with the external fin.

In the accompanying drawings:

Fig. 1 is a sectional view of a tube constructed in accordance with the invention, showing both the external and internal fin.

Fig. 2 is a section taken through the tube on the line 2—2 of Fig. 1.

Fig. 3 is a section taken through a slightly modified form of the tube.

The tube of this invention can be constructed from a strip of stock which is helically wound with adjacent convolutions overlapping and secured together to form the body of the tube. This strip of stock is generally referenced 1, and in order to provide the external fin, one edge of the strip of stock is turned up, thus to form a fin 2. This fin may be advantageously disposed at right angles to the body portion of the stock, or it may be at an angle thereto other than a right angle. For the purpose of providing the internal fin the opposite end of the stock may be turned inwardly thus to form the internal fin 3. This fin 3 may be at a right angle to the body of the stock as shown, or it may be disposed at an angle other than a right angle.

The manner in which the tube is made is as follows: The stock 1 may be drawn from a suitable roll while it is flat in form; it may then be passed through suitable dyes or shaping rollers which turns the edges so as to form the fins 2 and 3. Such dyes or rollers, as the case may be, are well understood by those versed in the art and are accordingly not shown herein. Reference may be made to my application No. 200,273 wherein an apparatus for treating a strip of stock, in this manner, is shown.

The stock having thus been formed with its edges turned at an angle to the body portion, is helically wound as by means of the apparatus shown in the above mentioned application, with adjacent convolutions overlapping. As shown in Fig. 1 the overlap extends practically one-half of the width of the body portion of the stock with the result that the tube is given a wall throughout its entire length. Preferably the body portion is overset as at 4, for the purpose of receiving adjacent overlapping portions of the convolutions on each side of the particular convolution in question. The double wall of the tube is well shown in Fig. 2.

This tube can be secured together, or rather the adjacent convolutions secured to one another, in one of several ways, to wit: The stock used may have been previously provided with a coating of tin, and after the stock is wound to form the tube, the tube may be heated to melt the tin and sweat the parts together; again, the tube may be dipped in molten solder after it has been helically wound; also it may be secured together by metal other than solder, as for example, the convolutions may be welded together with copper so as to form what may be termed a copper welded tube.

In the Fig. 3 the stock which forms the tube is practically the same as that shown in Fig. 1, but the overlapping of adjacent convolutions is not so great. It is sufficient to provide for suitable contact and securing together of adjacent convolutions although the tube is not given a double wall throughout its length. It will be understood that in the winding of this stock, the same is preferably wound upon an arbor.

This tube is useful for heat exchange purposes, and a liquid may be passed through the tube while the exterior of the tube may be exposed to a gaseous fluid or submerged in another liquid. The liquid passing through the tube has good thermal contact with the tube by reason of the fin and at the same time a certain amount of agitation is set up in the fluid. The internal fin can be varied in size or width, to meet different conditions, for example; where a relatively rapid flow through the tube is desired the fin may be made small, so as not to interfere too greatly with the flow, while in other instances, the fin may be made

large. The tube is also useful where gas is passed through the tube and the exterior of the tube has thermal contact with a gas or liquid.

It is to be noted that the stock which forms this tube is roughly Z shaped in cross section. For the lack of a better term some of the claims appended hereto call for a strip of Z shape stock, and these claims are intended to cover stock which has its edges turned angularly in opposite directions.

Claims:

1. A tube for heat exchange purposes, comprising a body portion composed of a spirally wound longitudinally overlapping strip of sheet metal with the overlapping parts sealed together by molten sealing metal, one edge of said strip being bent laterally to form a spiral projecting fin on the exterior of the tube, and the other edge of said strip being bent laterally to form a spiral projecting fin on the interior of the tube.

2. A tube for heat exchange purposes comprising a body portion composed of a strip of sheet metal spirally wound with adjacent convolutions overlapping and securely fixed together, the edges of the said strip of sheet metal being turned angularly as regards the body of the said strip.

3. A tube for heat exchange purposes comprising a body portion composed of a strip of sheet metal spirally wound with adjacent convolutions overlapping and sealed together rigidly, the edges of the said strip of sheet metal being turned angularly as regards the body of the said strip, in substantially opposite directions, to form external and internal projecting spiral fins.

4. A tube for heat exchange purposes or the like, comprising a single strip of material which is Z shape in cross section and which is spirally wound with adjacent convolutions of the central portion of the Z overlapping and sealed together rigidly to form the tube body, and with the end portion of the Z forming spiral external and internal fins.

5. The method of making an externally and internally finned tube, which comprises, helically winding a strip of stock which has a body portion with its edges directed angularly from the body portion with adjacent convolutions of the body portion overlapping and rigidly secured together to form the tube body and with the said edges forming respectively spiral internal and external fins.

6. The method of making an internally and externally finned tube, which comprises, winding a strip of stock which is Z shape in cross section helically with adjacent convolutions overlapping to form the body of the tube, and with the end portions of the Z forming respectively internal and external spiral fins, and securing adjacent convolutions together by molten sealing metal.

7. The method of making an externally and internally finned tube, which comprises, drawing flat strip stock from a supply, bending stock longitudinally so that its edges project to opposite sides of the remaining body portion of the strip stock, and winding the strip stock helically with adjacent convolutions of the body portions overlapping to form the tube body and with the said edges forming respectively external and internal spiral fins, and sealing adjacent convolutions together with molten sealing metal.

In testimony whereof I affix my signature.

HARRY W. BUNDY.