

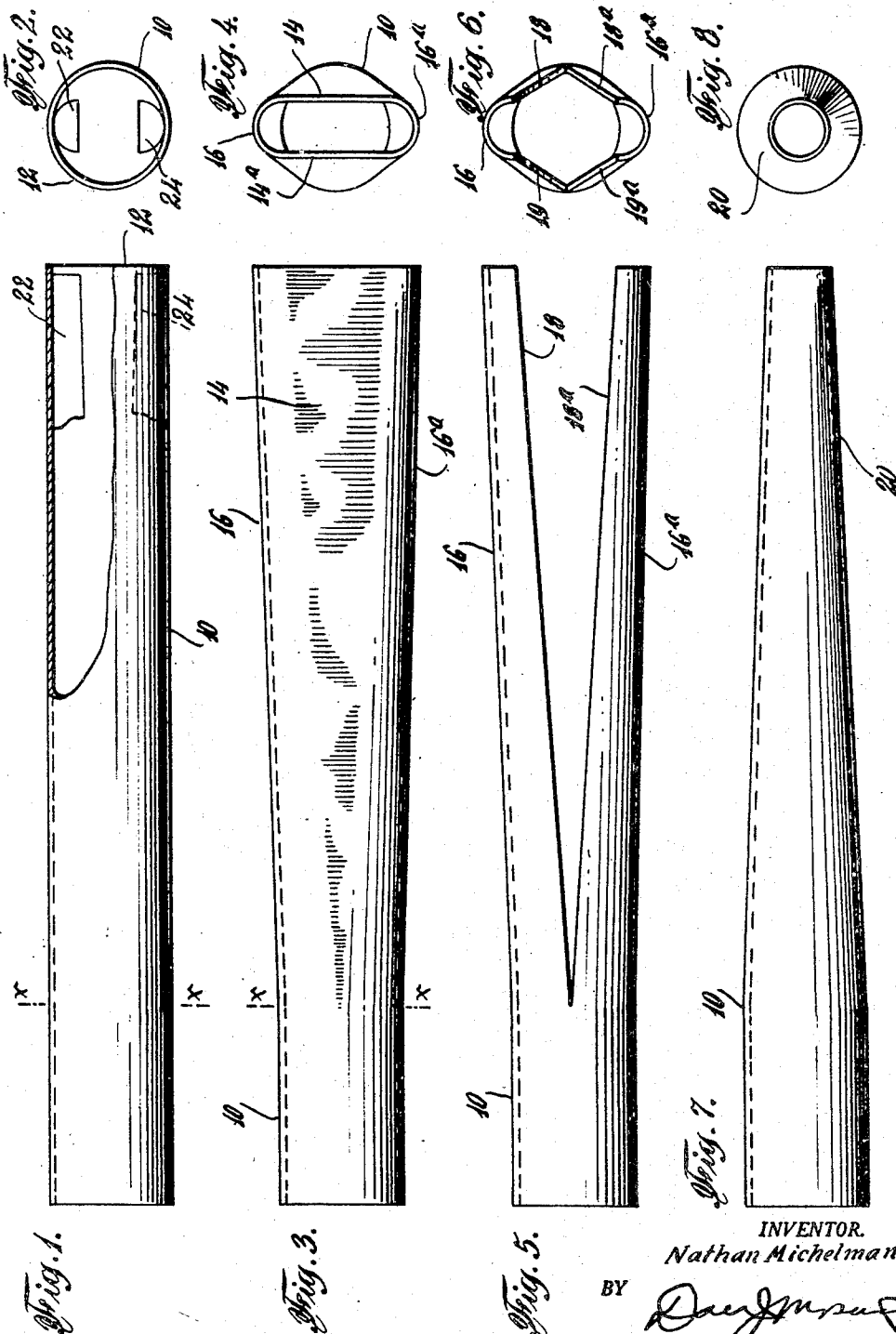
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METHOD OF MAKING TAPERED TUBES

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## METHOD OF MAKING TAPERED TUBES

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This invention relates to tapered metal tubes such as are employed for piles for foundations, flag poles, and the like, and is directed to the provision of a novel and improved method for making such tubes.

Up to the present time, tapered tubes have been produced by taking a length of tube, cutting it to provide an elongated V-shaped slot therein, and then passing the tube through a swaging press or a plurality of rings of decreasing diameter, while continuously turning the tube, so as to deform and shape the portions adjacent to the slot in such a manner as to bring the edges thereof into juxtaposition, the edges being then united by welding in a final operation.

As is well known to those skilled in the art, such a method is not satisfactory for various reasons, among others because in the shaping operation the tube becomes easily distorted so that the required exact conical shape cannot be always obtained. Furthermore, in case of heavy tubes having walls of considerable thickness, the shaping operation is very difficult to perform and the results obtained are entirely unsatisfactory.

In any event, the aforementioned method does not lend itself to the formation of tubes tapered only along a part of their length, since it is practically impossible in the shaping operation described to produce a conical section coaxial with the remaining portion of the tube that has not been acted upon, and the resulting structure is therefore unusable for any practical purposes.

It is therefore the general object of the invention to provide a novel and improved method adapted to be used in the production of tubes tapered throughout their length as well as in the formation of tapered tube sections only, and which entirely eliminates the aforementioned shortcomings while being advantageously applicable also to tubes of considerable wall thickness.

Another and more specific object of the invention is to provide a method for forming tapered tubes or tapered tube sections, whereby any shaping or swaging operation involving deformation of tube portions under rotation thereof may be entirely dispensed with, so as to eliminate the danger of distortion of the structure as a result of such operation.

A further object of the invention is to provide a method whereby a cylindrical tube to be tapered is initially deformed to simultaneously produce, in a single operation, planar tube portions subsequently to be removed and curved portions

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of decreasing radius, which, after removal of the flat portions, may be united to form the desired tapered structure without any further shaping thereof.

5 These and other objects will become apparent in the following description of the invention illustrated in the drawings, wherein:

Fig. 1 is a plan view of a tube wherein a tapered section is to be formed by means of the method according to the invention, the figure also illustrating means that may be employed to facilitate the carrying out of the method.

Fig. 2 is an end elevation of the tube of Fig. 1. Fig. 3 is a plan view of the tube illustrating the first step of the method.

Fig. 4 is an end elevation of the tube of Fig. 3. Fig. 5 is a plan view of the tube in a successive phase of formation of the tapered section.

Fig. 6 is an end elevation of the tube of Fig. 5. Fig. 7 is a plan view of the tube showing the completed tapered section, and

Fig. 8 is an end elevation of the finished tapered tube of Fig. 7, seen from the end thereof of minor diameter.

Referring now in detail to the drawings, numeral 10 indicates a tubular element, such as a pipe of any desired length and wall thickness. Assuming that said pipe is to be tapered along part of its length, as for instance between the line X-X in Fig. 1 and the end 12 of the pipe, the first step in the practicing of the method is as follows:

The pipe 10 is deformed or flattened from the starting point of the taper, at the line X-X, to the pipe end 12, so as to form therein planar converging wall portions 14, 14a of gradually increasing width and spaced from one another, at the end 12 of the pipe, by a distance equal to the desired final diameter of said end. As illustrated in Fig. 3, the flattening of the pipe thus effected results in the concurrent formation thereon of the longitudinally extending arcuate pipe portions 16, 16a interconnected by the aforementioned triangularly contoured planar wall portions 14, 14a and having a radius which gradually decreases from the initial point of the flattening to the end of the pipe proportionally with the gradual increase in width of the aforementioned flat wall portions.

In the following step of construction of the tapered section, the pipe is cut to remove the planar wall portions 14, 14a, as shown in Figs. 5 and 6, thereby defining the edges 18, 19 and 18a, 19a, respectively, of the arcuate pipe portions 16, 16a formed in the previous flattening operation. As

will be manifest, these latter portions constitute the two halves of the tapered section to be formed, the construction whereof will be readily completely by forcing the portions toward one another, to bring the aforementioned edges thereof into juxtaposition, and then uniting said edges in any suitable manner, as by welding, in a final forming operation. The resulting finished pipe, embodying a tapered section, is shown in Figs. 7 and 8.

If desired, in order to facilitate the flattening operation described, a pair of forming elements 22, 24 may be welded or otherwise fastened to the interior of the pipe 10 in diametrically opposed positions, as shown in Figs. 1 and 2. Such elements will have an outer contour identical to the inner contour of the pipe portions 16, 16a to be formed as described, and need not extend throughout the length of the pipe section to be tapered. Elements of short length positioned in proximity of the pipe end 12, will be sufficient. Of course, such elements will be removed upon completion of the flattening operation.

The method hereinbefore disclosed is applicable without any substantial modification to the production of pipes tapered from end to end. In this case the pipe will be flattened in the manner described starting from a point close to one end thereof, and after the structure has been completed, the untapered section thereof will be cut off.

It will be apparent from the foregoing that I have provided a novel and improved method, which permits of the formation of tapered tubes as well as of tubes embodying tapered sections, and which, in contrast to the methods of the prior art, involves only operations that can be easily controlled and eliminates any danger of undesired deformation of the tube that is inherent in the swaging operations required by such methods.

It is to be understood that certain changes and modifications may be made in the invention described and illustrated in the drawings without departing from the spirit of the invention or exceeding the scope of the claims.

I claim:

1. A method of producing tapered tubes, which comprises taking a cylindrical tube, deforming the same to produce therein arcuate portions of gradually decreasing radius interconnected by triangular planar portions, removing said planar portions, and then urging said arcuate portions towards one another to bring their edges into juxtaposition.

2. A method of producing tapered tubes, which

comprises taking a cylindrical tube, deforming the same to produce therein planar portions of gradually increasing width, and arcuate tube portions of gradually decreasing radius interconnected by said planar portions, removing said planar portions, urging said arcuate portions towards one another and then uniting said arcuate portions to one another.

3. A method of forming a tapered section in a cylindrical tube, which comprises deforming a section of the tube to produce therein triangular planar portions of gradually increasing width extending longitudinally of said tube section and converging toward one another, and arcuate portions of gradually decreasing radius interconnected by said triangular planar portions, removing said planar portions to provide triangular cut-outs between said arcuate portions, and then uniting the arcuate portions to one another.

4. A method of forming tapered tubes, which comprises taking a cylindrical tube, deforming the same to provide therein triangular planar portions of gradually increasing width extending from a point in proximity of one end of the tube to the other end thereof and arcuate portions of gradually decreasing radius interconnected by said triangular planar portions, removing said planar portions to provide triangular cut-outs between said arcuate portions, forcing said arcuate portions toward one another to bring the edges thereof into juxtaposition, uniting said edges to each other, and finally cutting off the undeformed portion of the tube.

5. A method of producing tapered tubes which comprises taking a cylindrical tube, deforming the same to produce therein opposing arcuate portions of gradually decreasing radius bounded by converging edges of opposing planar portions, removing said opposing planar portions along the converging edges thereof to provide substantially triangular cut-outs between the edges of said arcuate portions, urging the arcuate portions towards one another into juxtaposition at their edges and uniting the thus juxtaposed arcuate portions.

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