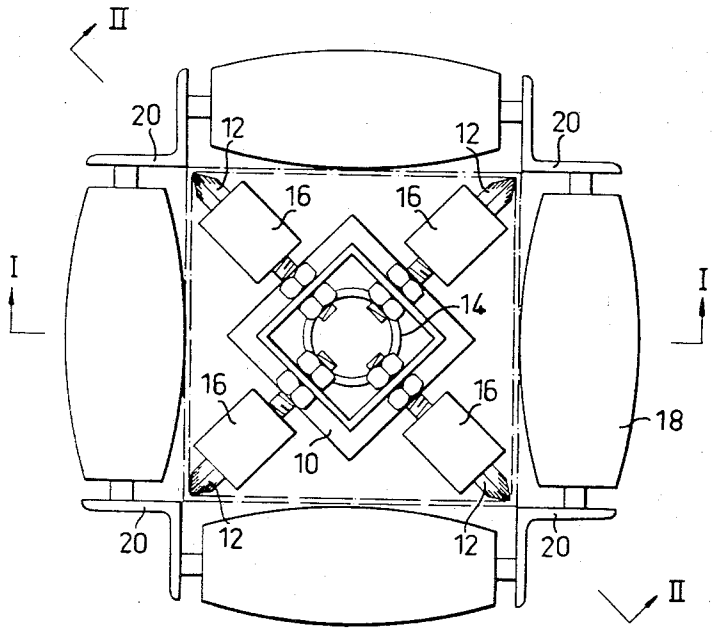
March 26, 1968 J. E. HJALMARSSON 3,374,652

TUBE SHAPING APPARATUSES

Filed Oct. 15, 1965

3 Sheets-Sheet 1

FIG. 1



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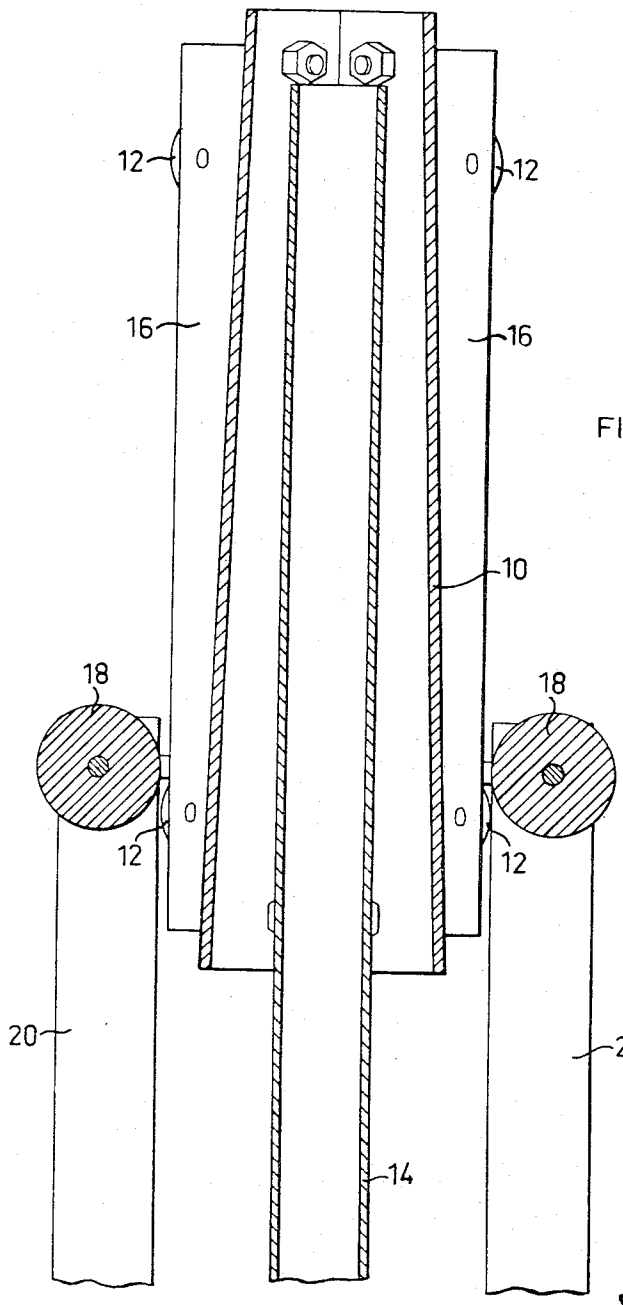

FIG. 2

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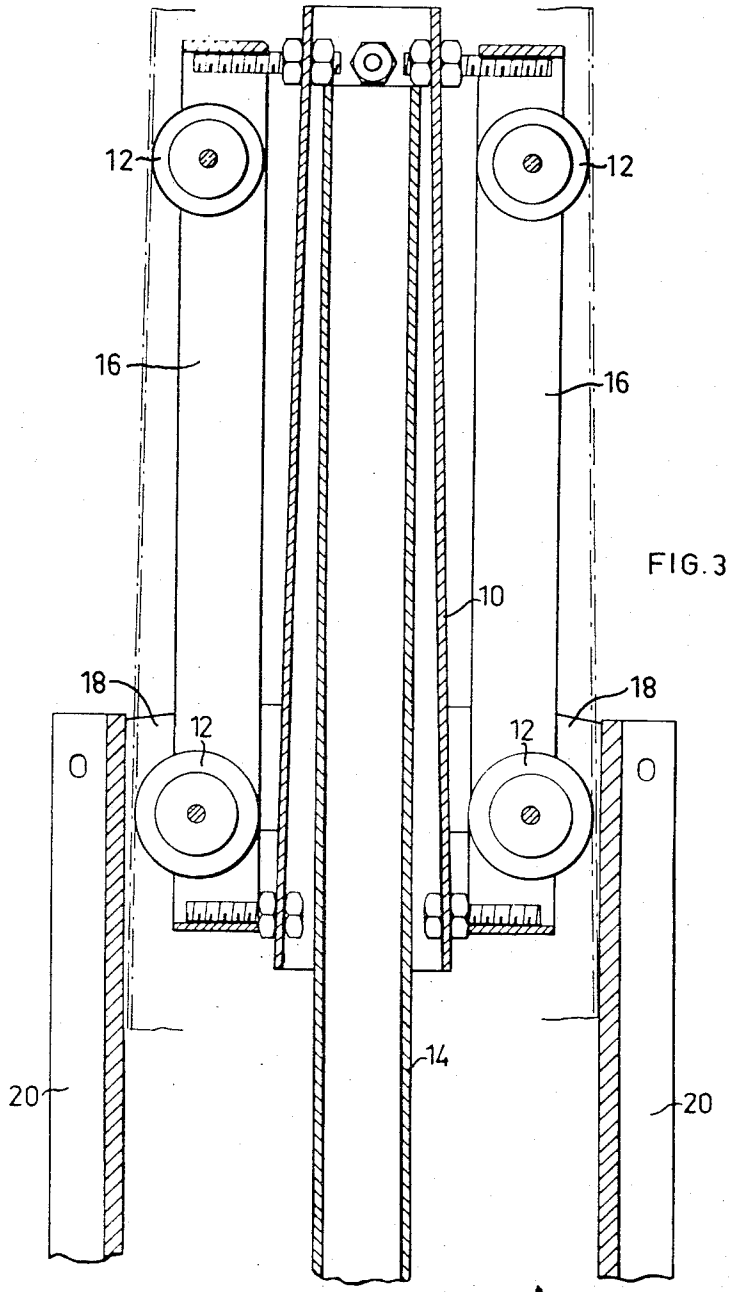

FIG. 3

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TUBE SHAPING APPARATUSES

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Claims priority, application Sweden, Oct. 21, 1964, 12,647/64
6 Claims. (Cl. 72—113)

This invention relates to an apparatus for shaping tubes of round cross section, preferably metal tubes for e.g. ventilating systems, into tubes of angular, rectangular or other non-circular cross section and substantially planar side surfaces.

Tubes of angular cross section, e.g. square cross section, are preferred for ventilating and like systems because such tubes take up less space than do tubes of round, i.e. circular or oval cross section. It has proved very difficult, however, to realize an economical production of tubes of angular cross section, and so one has turned to the expedient of shaping tubes of round cross section into tubes of angular cross section, which is an economical and advantageous procedure. The apparatuses which have been suggested hitherto, however, are extremely complicated and very costly.

The present invention has for its object to provide a simple and inexpensive apparatus of the type outlined above, wherein the tube of round cross section is passed onto a mandrel and wherein in each corner of the angular cross section the mandrel has rotatably mounted thereon edge-producing rollers, and in the proximity of and substantially between said edge-producing rollers on the mandrel further rollers are rotatably mounted around the mandrel for shaping the side surfaces of the angular cross section, said further rollers having their axes extending in parallel with the side surfaces of the angular cross section.

For better elucidation the invention will be described more in detail in the following with reference to the accompanying drawings in which:

FIG. 1 is an end view of the shaping apparatus according to the invention;

FIG. 2 is a section on line I—I in FIG. 1;

FIG. 3 is a section on line II—II in FIG. 1.

The apparatus illustrated in FIG. 1 comprises two spaced apart sets of edge-producing means in the form of rollers **12** which taper towards their periphery and are mounted for rotation on a mandrel **10**. The mandrel **10** presents a leading portion which is mounted on a stem **14** and on which the rollers are mounted for rotation in pairs by means of supports **16** (FIG. 3) which are adjustable with respect to the leading portion of the mandrel and extend longitudinally of said portion. The two rollers in each support **16** constitute a pair and are thus aligned. As clearly appears from FIG. 1, each pair of the edge-producing rollers **12** is located in one corner of the angular cross section to be imparted to a tube of round cross section. Thus each pair of edge-producing rollers is mounted for rotation at one end of the diagonals of the angular cross section; in the present instance the diagonals of a square. As will best be seen from FIG. 3, the diagonal distance between the rollers **12** of the first set, which is situated at the apex of the leading portion of the mandrel **10**, is smaller than the diagonal distance between the rollers of the second set which is spaced from the first set. The diagonal distance between the outer peripheries of the rollers in the second set is as large as the length of the diagonal in the square cross section.

Disposed above and between the edge-producing rollers of the second set are means for shaping the side surfaces of the tube. Said means may be, for instance, curved rollers **18** which are mounted for rotation in a frame **20** surrounding the mandrel **10**. It is also conceivable to substitute stationary means for the rollers, in which case the stationary means should be curved on the side facing the rollers corresponding to the curvature of the rollers **18**. The frame **20** can be secured in any conventional manner in relation to the second set of edge-producing rollers. The rollers **18** extend along the sides of the square cross section and are slightly longer than the side of the square. The curvature of the rollers serves to overcome the resistance offered by the tube material to the shaping operation. The tube walls will thus be shaped between the edge-producing rollers and the tube side wall shaping rollers when the tube is passed onto the mandrel. After the tube has passed the other set of edge-producing rollers a device (not shown), for example a carriage with clamping means, may grasp the tube and pull it past the two sets of edge-producing rollers. In addition to the guiding action exerted on the tube by the first set of rollers, also the device pulling the tube will guide it and thus prevent it from turning during the shaping operation.

The present invention thus makes it possible to shape a tube, preferably a metal tube of round cross section with the use of an extremely simple device into a tube of optionally angular cross section, e.g. square cross section, as mentioned above, or any polygonal cross section whatever.

While the invention has been described in the foregoing in connection with the embodiment illustrated in the drawings, it will be obvious to those skilled in the art that many modifications thereof may be resorted to within the scope of the appended claims.

What I claim and desire to secure by Letters Patent is:

1. An apparatus for continuously shaping tubes of round cross section, preferably metal tubes for ventilating and the like systems into tubes of angular cross section and substantially planar side surfaces, wherein the tube of round cross section is passed onto a mandrel and wherein each corner of the angular cross section the mandrel has rotatably mounted thereon edge-producing rollers, and in the proximity of and substantially between said edge-producing rollers on the mandrel further rollers are rotatably mounted around the mandrel for shaping the side surfaces of the angular cross section, said further rollers having their axes extending in parallel with the side surfaces of the angular cross section.

2. An apparatus in accordance with claim **1**, wherein several sets of edge-producing rollers pairs are mounted on the mandrel in spaced apart relationship and with one pair of said rollers at each corner of the angular cross section.

3. An apparatus in accordance with claim **2**, wherein the diagonal distance between the edge-producing rollers in the sets of such rollers is smallest in the set adjacent the apex of the mandrel.

4. An apparatus in accordance with claim **1**, wherein at least two sets of edge-producing rollers are spaced apart on the mandrel, while rollers for shaping the sides of the tube and thus the sides of the angular cross section are disposed at the last set of edge-producing rollers in which the diagonal distance between said rollers is largest.

5. An apparatus in accordance with claim **1**, wherein the edge-producing rollers in the set adjacent the rollers shaping the sides of the angular cross section taper towards their peripheries, while the edge-producing rollers

in the second set or the other sets have a more rounded shape.

6. An apparatus in accordance with claim 1, wherein the rollers shaping the sides of the angular cross section extend past the corners of the angular cross section and are of a shape adapted to the resistance offered by the tube material to the shaping operation.

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