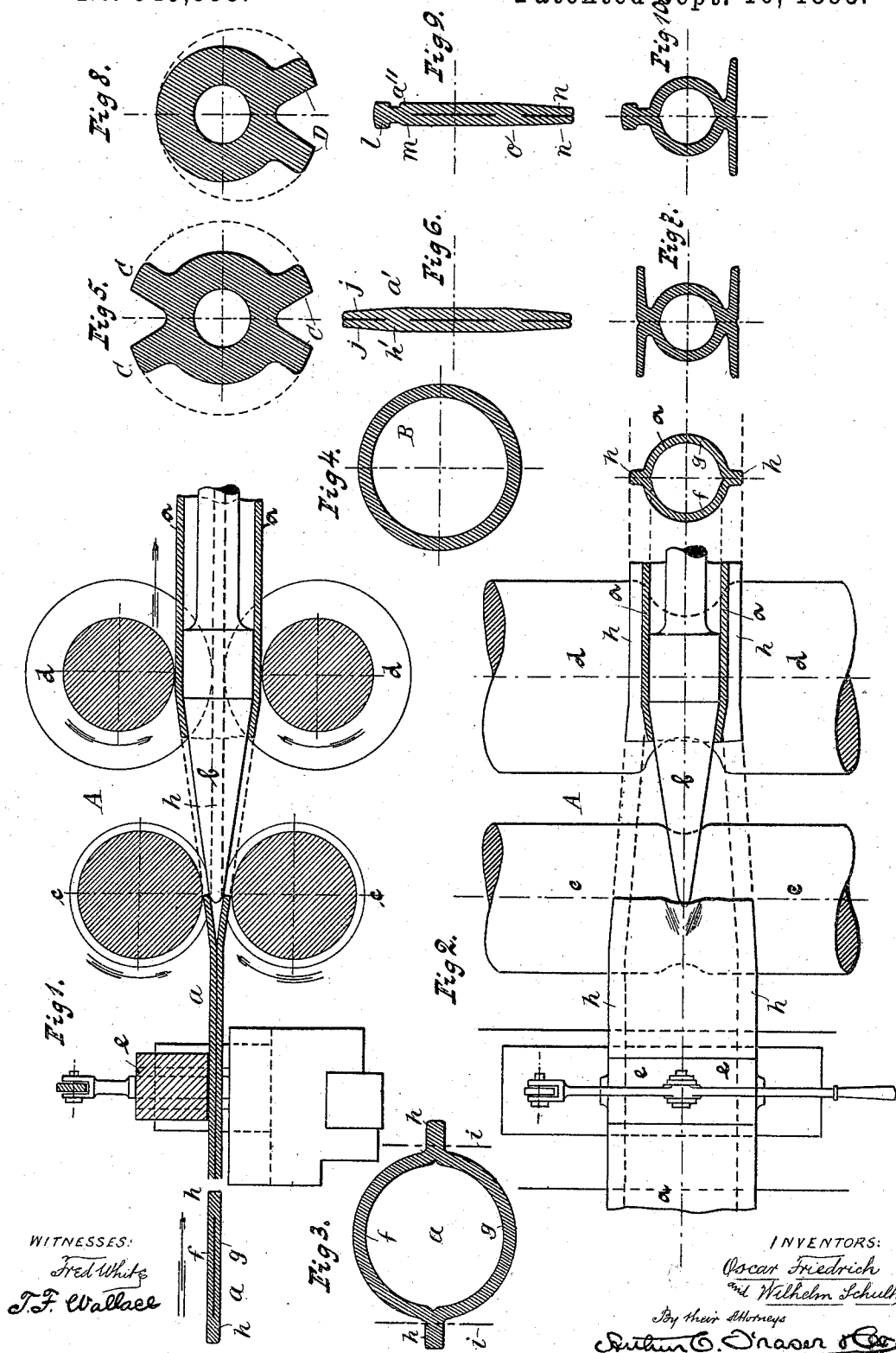


(No Model.)

O. FRIEDRICH & W. SCHULTE.
APPARATUS FOR MAKING METAL TUBES.

No. 545,953.

Patented Sept. 10, 1895.



UNITED STATES PATENT OFFICE.

OSCAR FRIEDRICH AND WILHELM SCHULTE, OF DUISBURG, GERMANY, ASSIGNORS TO THE DUISBURGER EISEN- UND STAHLWERKE, OF SAME PLACE.

APPARATUS FOR MAKING METAL TUBES.

SPECIFICATION forming part of Letters Patent No. 545,953, dated September 10, 1895.

Application filed March 9, 1894. Serial No. 502,968. (No model.) Patented in England February 12, 1894, No. 3,038; in Austria March 14, 1894, No. 44/468; in Spain March 15, 1894, No. 15,528; in Italy March 31, 1894, No. 35,745/130; in Hungary April 19, 1894, No. 279, and in Canada April 20, 1894, No. 45,848.

To all whom it may concern:

Be it known that we, OSCAR FRIEDRICH and WILHELM SCHULTE, subjects of the German Emperor, and residents of Duisburg, Kingdom of Prussia, Germany, have invented certain new and useful Improvements in Apparatus for Making Metal Tubes and Like Articles, (which invention is the subject of Letters Patent in Great Britain, No. 3,038, dated February 12, 1894; in Canada, No. 45,848, dated April 20, 1894; in Italy, No. 35,745/130, dated March 31, 1894; in Spain, No. 15,528, dated March 15, 1894; in Austria, No. 44/468, dated March 14, 1894, and in Hungary, No. 279, dated April 19, 1894,) of which the following is a specification.

This invention relates to apparatus for making seamless metal tubes or tube-like bodies with or without longitudinal ribs and of any cross-section which may be required for the purposes for which they are employed.

The invention aims to provide an improved apparatus for this purpose, in which such tubular bodies can be conveniently made from flat bands or ribbons composed of two thicknesses of metal. These bands may be made in any manner and of rolled or malleable material, according to their required dimensions or lateral strength, but must initially have laterally-projecting ribs.

According to our invention we provide, in combination with a mandrel, which enters between the layers of the side ribbed band to separate these layers, rolls, or equivalent drawing or gripping devices, for grasping the ribs and thereby forcing the band over the mandrel. The mandrel produces the internal shape of the resulting tube, while the rollers both move the band by gripping its ribs and determine the external shape thereof.

In the accompanying drawings, which illustrate the preferred form of our invention, Figure 1 is a fragmentary longitudinal section of our improved apparatus. Fig. 2 is a plan view thereof. Fig. 3 is a cross-section of a tube partially formed thereon. Fig. 4 is a similar view of the same tube in its most complete form. Fig. 5 is a cross-section of a modi-

fied form of tube. Fig. 6 is a cross-section of the band from which this tube is formed. Fig. 7 is a cross-section of another form of tube which can be constructed from the blank shown in Fig. 6. Fig. 8 is a cross-section of another form of tube. Fig. 9 is a cross-section of another form of band, and Fig. 10 is a cross-section of the tube formed therefrom.

Referring to the drawings, let *a* indicate a flat double ribbon or band; *e*, a guide or conducting-ram therefor; *b*, a mandrel for passing between the folds or sides of the ribbon; and *A* the drawing and shaping apparatus for drawing the ribbon over the mandrel and shaping it thereon, which apparatus consists in this construction of flat gripping-rollers *c*, slightly grooved opposite the point of the mandrel, and grooved shaping-rollers *d*, having grooves to correspond with the desired shape of the resulting tube and acting on the latter opposite the widest or shaping part of the mandrel, and gripping portions grasping the ribs of the tube. The band *a* may be of any cross-section in which the band has two sides or thicknesses *f* and *g*, and one or more longitudinal edges or ribs *h*, formed integral with its top and bottom sides. This band is taken from a heating or scaling furnace, or any other suitable source of supply, and is moved through the guide *e* and its end carried to the drawing or shaping apparatus, by which it is passed over the mandrel. The mandrel *b* shown is constructed with a cylindrical body, having the shape of the interior of the tube, between the final shaping-rolls *d* and a conical point in front of this body and between the first gripping-rolls *c*. The apparatus *A* preferably consists of two flat rollers *c* on opposite sides of the point of the mandrel, having grooves of sufficient depth to permit the thickness of the sides of the band to pass over the point of the mandrel, and beyond these grooves the rollers have opposed faces, which are adjusted to grip the outer flat portions and the flanges or ribs *h* of the band and thereby in their rotation feed the adjacent sides of the rollers turn. In this

manner the sides of the band at the outset being separated sufficiently to permit the entrance of the point of the mandrel the band will be forced over the latter and thereby its sides separated as the rollers act.

The shaping-rollers *d* are grooved to correspond with the external shape of the resulting tube desired, and their grooves press the separated sides of the band against the mandrel, thus causing the interior of the band to take the shape of the corresponding part of the mandrel. At their sides the rollers are constructed to grip the ribs *h* of the band, and this action, together with their action on the remaining portion of the band, serves to propel the band over the mandrel.

In the construction of band shown in Fig. 1 the tube resulting will have the cross-section shown in Fig. 3, wherein the side ribs *h* appear as longitudinal ribs on the tube. If a cylindrical tube like that lettered B in Fig. 4 is desired, the ribs *h* are removed on the dotted lines *i* in Fig. 3 and the tube is sent again over the mandrel, being turned at right angles to the position occupied during its first transit thereof, whereby it is smoothed and rendered cylindrical. In this second transit, which is the usual method of shaping tubes, the rollers *c* are not employed. By the word "tube" herein used we intend to include all hollow structures whether completely or but partially tubular. The invention may be availed of for manufacturing any such devices.

Fig. 5 shows a hollow body having two longitudinal ribs C C at its opposite sides. Such a body may be drawn from a band similar in construction to that shown in cross-section in Fig. 6 and lettered *a'*, which has its rib *h'* formed externally with separated ears *j*. A tube of the cross-section shown in Fig. 7 may also be formed from this band.

Fig. 8 shows a tube having two ears D on one side only.

The band *a''* shown in Fig. 9 has a solid head *l* beyond its rib *m* and split ears *n* beyond its rib *o*. A tube of the form shown in Fig. 10 may be made from such a band.

In carrying out our invention with our apparatus the band is drawn over the mandrel by grasping its ribs to separate its sides and is pressed into shape on the mandrel after such separation.

It will be seen that our invention provides an improved apparatus for manufacturing tubular bodies from flat bands or ribbons, which can be conveniently and effectively availed of, and it will be understood that the invention is not limited to the particular details of construction and operation set forth.

What we claim is—

1. In apparatus for making metal tubes and like articles from tube blanks having edges and an incision between the edges, a fixed mandrel having a tapering opening part and a smooth finishing part, in combination with

two rollers opposite said mandrel, spaced apart equally distant therefrom, and having axes at right angles to the axis of the mandrel, said rollers driven in the direction of travel of the tube to be rolled, each having a shaping groove opposite the mandrel and gripping portions at the sides of said groove, said grooves each having the shape to be given to the corresponding part between the edges of the tube, and engaging, pressing and shaping such part against the mandrel, and said gripping portions on each roller disposed at the sides of the mandrel, opposite the like portions of the other roller, and beyond said grooves, engaging, shaping and gripping the sides of the edges of the blank, propelling the latter thereby over the mandrel, and said mandrel and rollers having between their adjacent peripheries at the plane of the axes of the rollers an annular space corresponding to the desired cross-section of the tube and its edges, substantially as and for the purpose set forth.

2. In apparatus for making metal tubes or like articles from tube blanks having edges and an incision between the edges, a fixed mandrel having an opening point entering and separating the blank, and a subsequent finishing portion finishing the interior of the tube, and two pairs of driving rollers opposite said mandrel, the one pair opposite the opening end of the mandrel and the other pair opposite the finishing portion thereof, the first pair having shallow grooves rolling the tube against the mandrel, and having the shape of the sides of the tube between its edges as it enters the mandrel, and the second pair having deep shaping grooves finishing and shaping the outside of the tube opposite the finishing portion of the mandrel, and having the shape of the exterior of the finished tube between its edges, and each of said rollers having gripping portions at the opposite sides of and beyond said grooves, spaced apart and receiving and gripping the edges of the tube between them, said rollers turning in the direction of travel of the tube, driving it over the mandrel, and simultaneously shaping it, substantially as and for the purpose set forth.

3. In apparatus for making metal tubes or like articles from tube blanks having edges and an incision between the edges, a fixed mandrel *b* having a conical point and a cylindrical finishing part, in combination with two driven rollers *c* opposite said mandrel, having concave grooves parallel with the axis thereof, and cylindrical gripping portions at the sides of said grooves, said rollers and mandrel disposed with a space between them corresponding to the cross sectional shape of the blank as it passes on the mandrel, and said gripping portions separated with a space between them corresponding to the thickness of the edges of the blank, gripping these flanges and thereby propelling the blank over

the mandrel, and a second pair of driver rollers *d* having substantially semicylindrical grooves parallel with and opposite the cylindrical part of the mandrel, separated there-
5 from a distance equal to the thickness of the tube to be rolled, shaping, finishing and pressing the tube against the cylindrical part of the mandrel between the flanges of the tube, and
10 said second rollers having cylindrical gripping portions at each side of said grooves spaced apart a distance equal to the thickness of the

flanges of the tube to be rolled and gripping these flanges and thereby propelling the tube.

In witness whereof we have hereunto signed our names in the presence of two subscribing
15 witnesses.

OSCAR FRIEDRICH.
WILHELM SCHULTE.

Witnesses:

ALBERT KLINGHAMMER,
WILHELM BRÜGGEMANN.