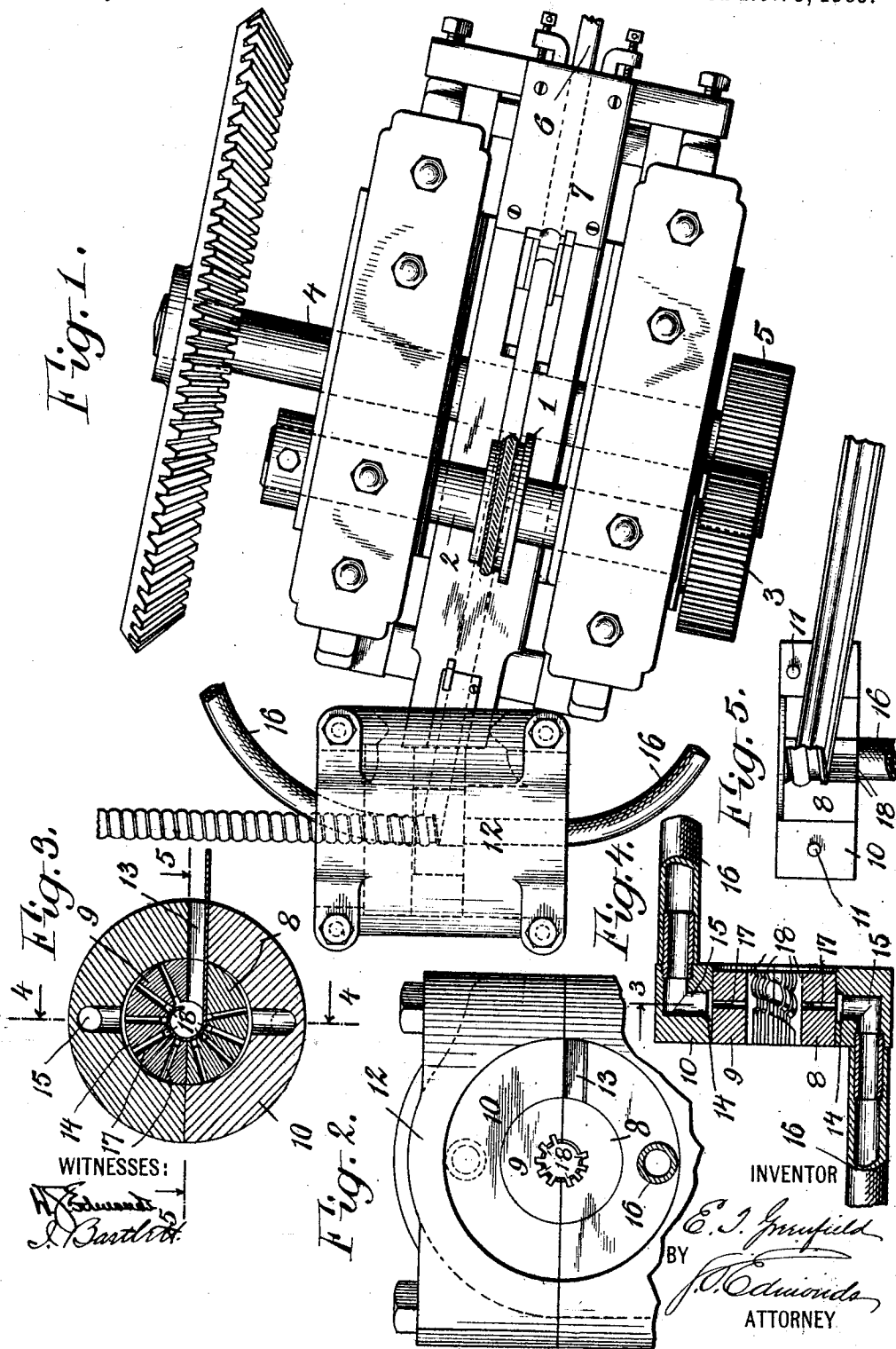


E. T. GREENFIELD.
 APPARATUS FOR MAKING SPIRAL TUBING.
 APPLICATION FILED APR. 29, 1908.

939,244.

Patented Nov. 9, 1909.



UNITED STATES PATENT OFFICE.

EDWIN T. GREENFIELD, OF KIAMESHA, NEW YORK.

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Specification of Letters Patent.

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To all whom it may concern:

Be it known that I, EDWIN T. GREENFIELD, a citizen of the United States, residing at Kiamesha, in the county of Sullivan and State of New York, have invented certain new and useful Improvements in Apparatus for Making Spiral Tubing, of which the following is a specification.

This invention relates to the manufacture of metallic tubing by winding or bending a strip spirally so as to form a series of successive spirals each interlocked with and movable relatively to the spirals adjacent thereto.

The invention is of particular utility in machines of the type disclosed in Letters Patent Number 630,502 granted to me August 8, 1899.

In machines for making such spiral tubing, it is usual to employ one or more pairs of die-rollers between which the strip or strips are passed to give the strip the desired transverse curvature, and either a bending die or forming rolls for effecting the spiraling of the strips. Before being spiraled, and if desired before being transversely curved, the strip is carried into a bath of a galvanizing compound so that the completed tube is properly protected against rust. I have found that in bending the strip both to form it spirally and to curve it transversely, the galvanizing coating is cracked at numerous points over the surface of the strip and particularly on the edges thereof and burs of the coating are raised upon the surface of the strip. These burs or flakes on the strip prevent forming the strip spirally as tightly as is desired since they hold co-acting surfaces of adjacent convolutions apart slightly.

My invention involves the provision of means for removing these flakes or burs, preferably during the spiraling operation, and for this purpose I prefer to employ a current of water for washing the flakes away. In a machine employing a bending die as disclosed in the patent above described, the die is provided with ducts through which a continuous stream of water is passed, these ducts being arranged in the manner which will make the stream of the fluid most effective in removing the flakes.

An apparatus embodying my invention is illustrated in the accompanying drawing in which—

Figure 1 is a top view of the principal

elements of a machine for making spiral tubing, Fig. 2 is an end view of the die, Fig. 3 is a transverse section of the die on line 3—3 of Fig. 4, Fig. 4 is a section of the die on line 4—4 of Fig. 3, and Fig. 5 is a top view of the lower portion of the die.

Referring to these drawings, 1 indicates a die-roller mounted on a shaft 2 and directly under these are a similar die-roller and shaft, the two shafts being geared together at 3 and driven from a power-shaft 4 by a gear 5. The two die-rollers have their peripheries shaped in the manner which will give to a strip passed between them the desired transverse curvature, the strip 6 being arranged to pass through a groove in a guide 7 suitably mounted on the frame of the machine. The strip 6, in addition to being laterally curved by the die-rollers, is forced forward thereby into the bending die by which it is spirally formed. The die consists of two semi-circular parts 8 and 9 each of which is secured to a semi-annular casing 10, the two casings having dowel-pins and holes 11 for positioning them relatively. The die and the casing therefor are mounted within a circular opening in a two-part holder 12 which is bolted upon the frame of the machine. In the two parts 8 and 9 of the die is a central opening the walls of which have a spiral groove formed therein corresponding in shape to the lateral curvature given the strip 6 by the die-rollers as shown in Fig. 4, and an opening 13 is provided through holder 12, casing 10 and the die through which the strip is passed to the central opening in the die.

Each part of the casing 10 is cut away on its inner face to form a chamber 14 between it and the part of the die 8 or 9 adjacent thereto and an opening 15 is provided through the casing 10 with which a tube 16 is connected, this opening leading to the chamber 14. In each of the parts 8 and 9 of the die are a plurality of radially-disposed ducts 17 opening at one end into the chamber 14. In the operative face of the bending die are a plurality of grooves 18 extending in a direction parallel to the axis of the die, (Fig. 4) with each of which one of the ducts 17 communicates.

In the operation of the machine, a strip 6 is inserted through the groove in guide 7 and passed between the die-rollers 1. These rollers curve the strip laterally and force it forward into the bending die by which it

is formed spirally in a manner well understood. The strip is galvanized before being introduced into the bending die, if desired in a separate and preliminary operation.

5 While the strip is being spiraled, water is forced into the pipes 16 and chambers 14 and passes from those chambers through the ducts 17 to the grooves 18. Within the die the water swirls around the strip as the latter is being bent by the grooved walls of the die and washes away the flakes of the galvanizing compound raised on the surface of the strip as the latter is bent by the die-rollers and the bending die. The water

10 forced into the die thus escapes at the ends of the die through the grooves 18 carrying the flakes with it and may be caught in a suitable receptacle arranged below the die. By the provision of such a rapidly moving

20 current of water about the strip of metal while the latter is being spirally formed, a much tighter tube can be made as the removal of flakes and burs of the galvanizing coating allows coating surfaces of adjacent convolutions to be brought into close contact. In starting the operation of spiraling a strip, the end of the strip is bent up slightly with a suitable tool so that the strip will not catch in the grooves 18 but after this the spiraling is continued in the usual manner

30 and the grooves 18 offer no obstruction.

Having described my invention, what I claim as new therein and desire to secure by Letters Patent of the United States is:

35 1. A machine for making spiral tubing

having a pair of die-rollers for curving a strip laterally, a bending die having a circular opening therein the wall of which is provided with spirally-formed grooves and a plurality of grooves extending lengthwise 40 of said opening and crossing said spiral grooves, a plurality of openings through the die leading to said lengthwise grooves, pipes communicating with said last-named openings, and an opening through said die leading 45 to said spirally-grooved wall through which a strip may be forced into contact with said wall, substantially as set forth.

2. A machine for making spiral tubing having a pair of die-rollers for curving a 50 strip laterally, a bending die having a circular opening therein the wall of which is provided with spirally-formed grooves and a plurality of grooves extending lengthwise 55 of said opening and crossing said spiral grooves, a holder for said die formed to provide a chamber between it and the die, pipes leading to said chamber, openings leading from said chamber to said lengthwise 60 grooves, and an opening through said die leading to said spirally-grooved wall through which a strip may be forced into contact with said wall, substantially as set forth.

This specification signed and witnessed 65 this 27th day of April, 1908.

EDWIN T. GREENFIELD.

Witnesses:

D. J. EDMONDS,
I. BARTLETT.