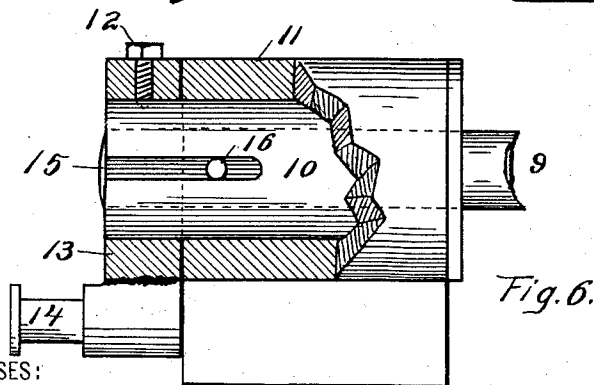
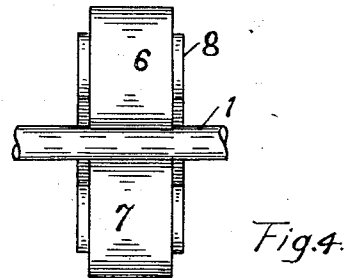
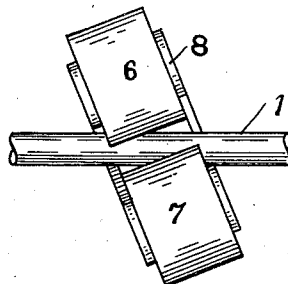
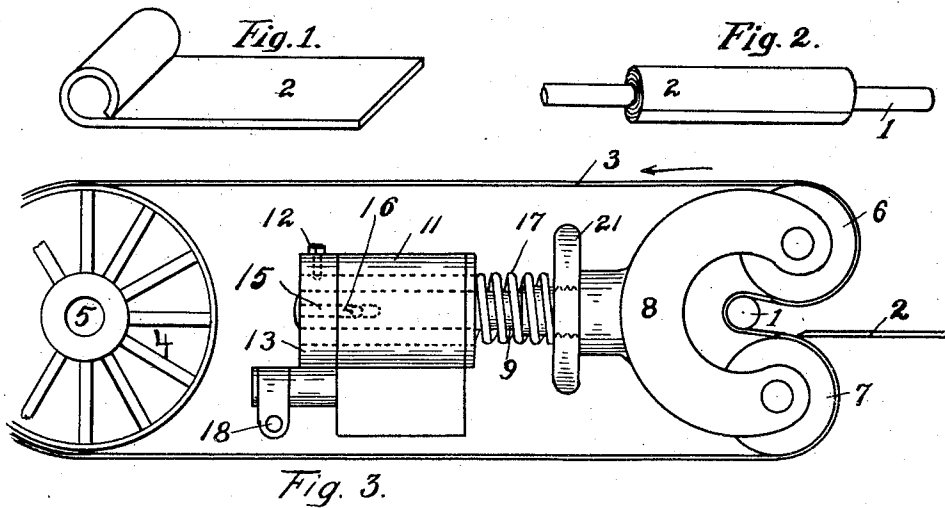


E. H. POWERS.
TUBE MAKING MACHINE.
APPLICATION FILED MAR. 18, 1912.

1,054,984.

Patented Mar 4, 1913.

2 SHEETS-SHEET 1.



WITNESSES:
Geo. W. Smith
Christine A. Braidel.

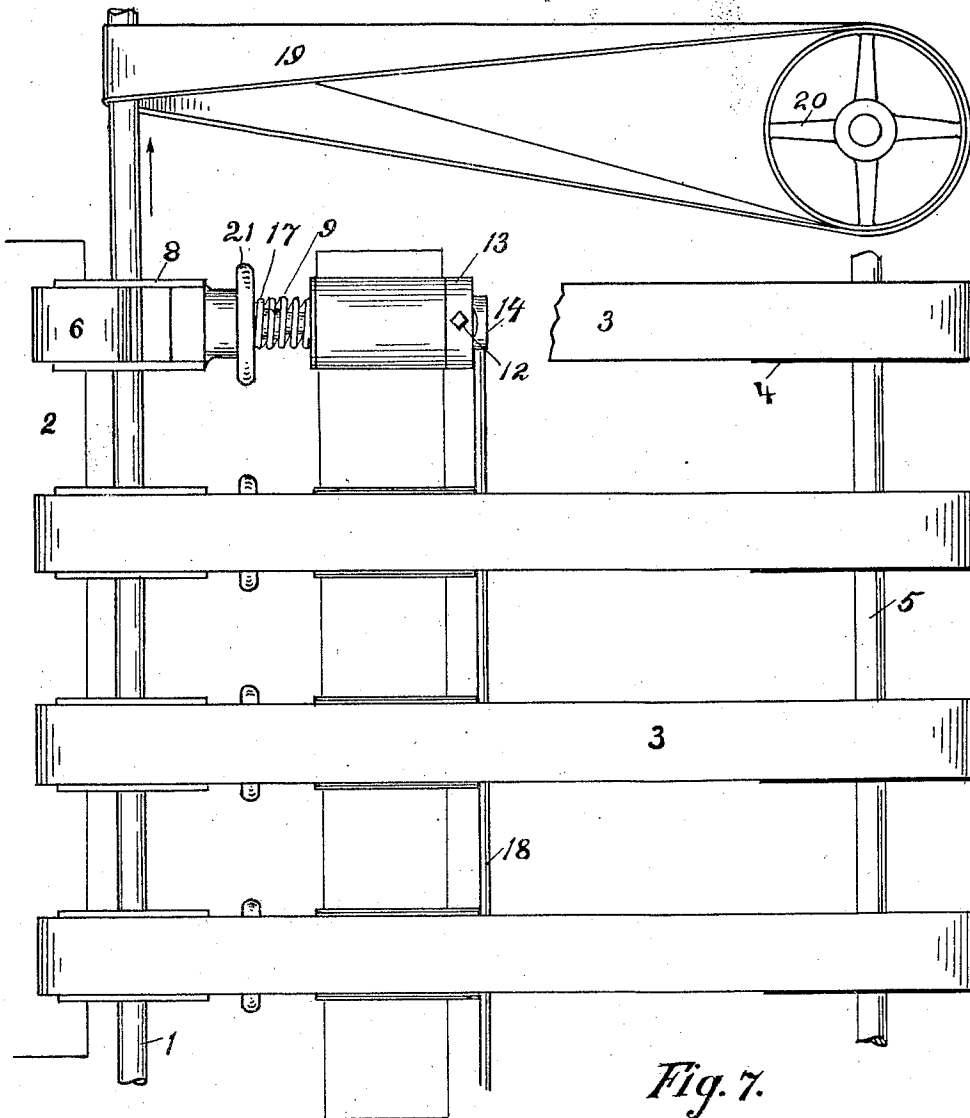
INVENTOR
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UNITED STATES PATENT OFFICE.

EDWIN H. POWERS, OF SAGINAW, MICHIGAN, ASSIGNOR TO SIDNEY L. EASTMAN,
TRUSTEE, OF SAGINAW, MICHIGAN.

TUBE-MAKING MACHINE.

1,054,984.

Specification of Letters Patent.

Patented Mar. 4, 1913.

Application filed March 18, 1912. Serial No. 684,446.

To all whom it may concern:

Be it known that I, EDWIN H. POWERS, a citizen of the United States, residing at Saginaw, in the county of Saginaw and State of Michigan, have invented certain new and useful Improvements in Tube-Making Machines; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

This invention relates to paper tube-forming machines and pertains more particularly to improvements in the tube winding mechanism of a convolute tube machine.

The present improvement pertains more especially to the means for wrapping a glued sheet around the mandrel and for automatically ejecting the completed tube from the mandrel, and includes means whereby the entire periphery of the completed tube is rolled upon by the ejecting device, thereby producing a smoother and more uniform surface to the tube.

Another object of the invention is to provide rolling devices that will not only roll the tube on the mandrel, but also are capable of being slightly shifted in position and to thereupon perform not only their ordinary function of rolling the tube, but also to eject the tube lengthwise from the mandrel.

My improved rolling device is capable of being adapted to numerous types of convolute tube-forming machines in which a mandrel is employed, the gummed sheet being wound upon the mandrel by the operation of the machine. I have, therefore, illustrated and described in this specification only so much of the mechanism of a tube-forming machine as is necessary to explain the operation of my invention.

With the above objects in view and certain others which will appear later in the specification, my invention consists in the devices illustrated and claimed and the equivalents thereof.

In the drawings, Figure 1 is a perspective view of a convolute tube partly rolled; Fig. 2 is a similar view of a rolled tube on the mandrel; Fig. 3 is a side view of my improved rolling device; Fig. 4 is a front view of the rolls, showing their normal or rolling position with relation to the mandrel; Fig. 5 is a similar view showing the rolls in

their tilted position, in which position they serve to eject the completed tube from the mandrel; Fig. 6 is a part sectional detail showing the construction of the bearing that carries the rolls; Fig. 7 is a top plan view broken away in part, showing the mandrel and a number of sets of rolls in place.

1 represents the mandrel of a tube-forming machine. This mandrel may be either of the rotating or non-rotating type.

2 is a sheet of gummed paper to be wound upon the mandrel.

3, 3 represents a plurality of winding belts, each of which is driven by a wheel 4, the wheels being mounted on a revoluble shaft 5,—or, if desired a single drum may be used instead of the wheels.

6 and 7 are pulleys around which belt 3 passes, the run of the belt being as indicated by the arrow in Fig. 3, that is, up the front face of pulley 7, rearwardly around mandrel 1, up the front face of pulley 6 and around wheel 4. The pulleys 6 and 7 are mounted in a yoke 8, the yoke being carried by a spindle 9 which is slidable lengthwise in a bushing 10, this bushing being revolvably mounted in a suitable stationary journal box 11. The rear end of bushing 10 projects beyond the end of journal box 11, as shown in Fig. 6, and upon the projecting end of the bushing is fixed by means of a set screw 12 or otherwise, a crank arm 13 having a wrist pin 14 by which the bushing 10 may be turned through part of a revolution within the journal box 11. The bushing 10 is preferably formed with a longitudinal slot 15, and spindle 9 is provided with a projecting pin 16 slidably received in slot 15 so that spindle 9 may slide lengthwise in bushing 10 and may be rotated by the bushing when crank arm 13 is oscillated. To maintain proper tension of the belt 3 and to permit the belt to conform to the increasing diameter of the tube as the latter is being wound on the mandrel, I provide a compression spring 17 between the end of journal box 11 and yoke 8, as shown in Figs. 3 and 7. In practice I apply a number of sets of pulleys 6 and 7 side by side lengthwise the mandrel, there being as many sets of pulleys as may be required to suit the length of the tube to be made.

The operation of the device is as follows: Sheet 2 (see Figs. 3 and 7) is fed in between the belt 3 and the underside of mandrel 1

and is wound around the mandrel by the belt 3. That part of the sheet which forms the inner convolution of the tube is not gummed, but the remainder of the sheet is gummed on the side nearest the mandrel. This permits the tube to slide around the mandrel while the tube is being formed. When the tube has been rolled in position on the mandrel, cranks 13 are simultaneously oscillated by means of the wrist pins 14, which are secured together by a connecting rod 18. The effect of this movement of the crank 13 is to turn bushing 10, spindle 9, and yoke 8 with its pulleys 6 and 7, from the upright position shown in Fig. 4, to an angular position, as shown in Fig. 5. The belt thereupon takes up a slightly angular position with reference to the axis of the tube, and continued movement of the belt not only revolves the tube but drives it with a screw-like movement endwise off the mandrel 1. The belt may be prevented from running off the pulleys 6, 7, by any suitable guiding means, not shown.

If the mandrel 1 is of considerable length, as is necessary when long tubes are being made, I prefer to support its free end by means of a belt 19 that passes around the mandrel 1 near its free end and normally slides upon it, the belt 19 being driven by a pulley 20, the axis of which is preferably at right angles to the axis of mandrel 1, so that belt 19 is approximately quarter twist. When the tube is driven off the mandrel 1 by the angular adjustment of rolls 6 and 7 as previously described, its free end is received under belt 19, passing between the inner surface of the belt and mandrel 1, and thus out of the machine, the purpose of belt 19 being to sustain the free end of the mandrel and hold it in line against the opposite pull of the belts 3. The first tube is entered under belt 19 by hand, and thereafter, successive tubes following closely enter under the belt without assistance. When the completed tube is driven from mandrel 1 by the angular adjustment of the belts, it will be observed that all parts of the tube are rolled upon by the successive belts as the tube leaves the mandrel. A smooth, hard surface is thus imparted to the tube, insuring that the finished tube walls will be of uniform compactness throughout, this feature being of particular importance in the manufacture of certain classes of tubes, as for instance win-

dow shade rollers. The tightness of winding may be regulated by means of the spring 17, the pressure of which may be varied by turning the adjusting wheel 21, threaded on the spindle 9, as shown in Fig. 3.

While I have shown and described the belt 3 as being driven continually in one direction while the rolls 6 and 7 are turned angularly, it will be obvious that the same result could be obtained by reversing the direction of travel of the belt simultaneously with the angular adjusting of the rolls, in which case the rolls are given the opposite inclination.

Having described my invention, what I claim and desire to secure by Letters Patent, is:—

1. A tube-forming device comprising a mandrel, a belt engaging one side of said mandrel, a yoke, an upper and a lower belt-carrying pulley mounted in said yoke, said belt normally traveling circumferentially on said mandrel in a direction at right angles to the axis thereof; and means for simultaneously changing the axial direction of said upper and lower pulleys to change the direction of travel of said belt with relation to the axis of said mandrel.

2. A tube-forming device comprising a mandrel, a winding-belt, a yoke, an upper and a lower pulley for said belt mounted in said yoke, a journal box, a spindle on said yoke slidingly and revolvably received in said journal box, a compression spring interposed between said yoke and journal box, and means for angularly turning said yoke, whereby to propel a formed tube lengthwise said mandrel.

3. A tube-forming device comprising a mandrel, a winding-belt, a yoke, an upper and a lower pulley for said belt mounted in said yoke, a journal box, a bushing revolvably mounted in said journal box, a spindle on said yoke slidingly received in said bushing, means connecting the spindle and bushing to prevent rotation of the spindle relative to the bushing, a compression spring interposed between said yoke and journal box, a crank arm secured to said bushing, and adapted to angularly turn said yoke.

In testimony whereof, I affix my signature in presence of two witnesses.

EDWIN H. POWERS.

Witnesses:

CHRISTINE A. BRAIDEL,
GEO. W. SMITH.