UNITED STATES PATENT OFFICE.

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MACHINE FOR MAKING TUBES.

No. 931,134.


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To all whom it may concern:

Be it known that I, GEORGE A. LUTZ, a citizen of the United States, and resident of New York city, borough of Brooklyn, in the county of Kings and State of New York, have invented certain new and useful Improvements in Machines for Making Tubes, of which the following is a specification.

My invention has for its object to provide means for winding strips of paper, tape or analogous flexible material into tubular form, and wherein two strips may be spirally wound one upon the other with their convolutions wound in opposite directions.

My invention comprises a rotative mandrel adapted to wind a flexible strip or tape thereon, means for guiding the strip or tape to the mandrel, a relative mandrel having a portion journaled within tube 5, as by bearings 9. The parts 8 and 8* may be made integral, or may be separate parts secured together, as by a pin 10, as shown in Fig. 3. A sprocket wheel 11 is shown secured to the shaft part 8* of the mandrel and receives the chain 12 from a sprocket wheel 13 on a shaft 14 hung in suitable bearings upon the machine provided with a gear 15, whereby the mandrel may be rotated at the desired speed from a driving shaft. At 16 is a reel or support for a strip of paper, fiber or the like 17, 65 which reel revolves upon a suitable stud or spindle 18 shown carried by a support 19 depending from part 7, as by being connected to lug 7* by a screw 20, whereby the reel may be adjusted at a suitable angle with respect to the axis of mandrel 8. A thumb nut 19 and suitable friction devices detachably support the reel upon shaft 18 with the desired frictional resistance to rotation of the reel. Loosely surrounding mandrel 8 is 75 a wormlike or spirally disposed guide 8*, of suitable pitch, through which strip 17 passes as it is being wound upon the mandrel, which guide serves to direct the strip 17 at the desired angle. The guide 8* may be formed integral with a collar or cap 8* or may be made separate and secured thereto in suitable manner, which collar or cap is secured at the end of tube or bearing 5, and the mandrel rotates within the bore of said collar or cap.

With the arrangements described the strip 17 is first laid around the mandrel a few turns and then the latter is rotated, and thereupon the strip is wound upon the mandrel so that the edges of the convolutions of the strip line. To assist in pushing or sliding the tube 17 along the mandrel as it is wound thereon I provide a rotative friction roll or disk 21 that is shown bearing 95 upon tube 17* adjacent guide 8*, and said roll rotates in a plane at an oblique angle across the axis of mandrel 8 in such manner as to have a forwardly pushing action upon the tube wound upon the mandrel. The friction roll 21 is shown carried by a shaft 22 that extends at an acute angle with respect to mandrel 8, and said shaft is shown jour- 100 nalled in bearings 6*, 7*, of caps 6, 7. Said shaft carries a gear wheel 23, that meshes with a pinion 24 secured upon the mandrel extension or shaft 8*. The ratio of the gears 23, 24 is shown substantially as 4 to 1, where-
by the friction roll 21 rotates at a slower speed than the mandrel, although the relative speeds of rotation of said roll and mandrel may be such as desired. As the strip 17 is being wound upon the mandrel, the friction roll 21 by being in contact with the wound strip or tube and rotating in the direction reverse to the winding of the strip, and being located at an angle to the axis of the tube 17° formed by the wound strip, serves to propel such tube along the mandrel.

At 25 is a strip of tape or other suitable flexible material adapted to be wound around the spirally wound tubing 17°, and it is shown carried by a reel 26 supported by a stud or spindle 27 shown carried by an arm 28 attached to a sleeve or hub 29 secured upon a hollow shaft 30 that is journaled in a bearing 31 carried by standard 4. Arm 28 is shown adjustably supported by a screw 32 carried by lugs 29° of hub 29, whereby reel 26 may be adjusted at the desired angle with respect to the axis of mandrel 6.

As 33 is a counterweight carried by hub 29 to balance reel 26.

Shaft 30 is shown provided with a sprocket wheel 34 receiving a chain 35 which passes over a sprocket wheel 36 which may be on an extension of shaft 14, but which is shown on a shaft 37 hung in suitable bearings carried by frame 1, said shaft having a gear wheel 38 in mesh with an idle gear 39 meshing with gear 15, fast and loose pulleys 39, 40 on shaft 37 serving to rotate the latter in the desired direction, whereby reel 26 and tape 25 are carried around the mandrel in the direction of rotation of the latter. By suitably arranging the diameters of sprockets 36 and 13, or 34 and 11, relatively to each other, the reel support 26 can be rotated faster than the mandrel to cause strip 25 to wind about the mandrel around tube 17°.

To produce the tube 17° with the means above described strip 17 is first coiled upon the mandrel and pushed along the same a suitable distance, and then strip 25 is coiled around the tube 17° and the machine is then started, whereupon the mandrel is rotated, as in the direction of the arrow a in Fig. 6, while the friction roll 21 is rotated in the direction of the arrow b in said figure, and thereby the tube 17° is formed and pushed along the mandrel, and simultaneous to such movement of said tube the reel 26 is carried around the mandrel in the direction the same as the direction of the latter and strip 25 is thus wound upon the spiral tube 17°, the convolutions of said tube being thereby reversed in direction to the convolutions of strip 25, forming the tube 17° comprising the two spirally wound strips, and said tube passes from the mandrel through the bore 30° of shaft 30. Strip 25 may be wider than strip 17 so that while the convolutions of the latter lie edge to edge in alinement the convolutions of strip 25 will overlap each other as much as desired, and in accordance with the inclination of reel 26 with respect to a plane located at an oblique angle to the axis of rotation of the mandrel.

Having now described my invention what I claim is:

1. The combination of a rotative mandrel, a stationary guide concentric therewith, a stationary support for a strip, means to rotate said mandrel, a roll located obliquely to the axis of the mandrel, and means for positively rotating said roll independently of the wound strip to propel the strip that is wound on the mandrel.

2. The combination of a rotative mandrel, a spiral-like guide concentric therewith, means for rotating said mandrel, a stationary support for a strip, a roll adapted to bear on the strip wound on the mandrel, said roll being located in a plane at an oblique angle to the axis of the mandrel for pushing the strip along the mandrel, and means for rotating said roll.

3. The combination of a rotative mandrel, a spiral-like guide concentric therewith, means for rotating said mandrel, a stationary support for a strip, a roll adapted to bear on the strip wound on the mandrel, said roll being located in a plane at an oblique angle to the axis of the mandrel for pushing the strip along the mandrel, and means for rotating said roll.

4. The combination of a rotative mandrel, a stationary support for a strip, and a guide for the support, with a support for another strip, and means for rotating said support bodily around the mandrel in the same direction as the mandrel.

5. The combination of a rotative mandrel, a stationary support for a strip, and a stationary guide for the strip, with a support 110 for another strip, and means for rotating said support bodily around the mandrel in the same direction as the mandrel.

6. The combination of a rotative mandrel, a stationary guide associated therewith, a stationary support for a strip, means to rotate said mandrel, and means to propel a strip that is wound on the mandrel, with a support for another strip, and means for rotating said support bodily around the mandrel during rotation of the latter to lay a strip around the first wound strip.

7. The combination of a rotative mandrel, a stationary guide associated therewith, a stationary support for a strip, means to rotate said mandrel, and means to propel a strip that is wound on the mandrel, with another support for a strip, and means for rotating said support around the axis of the mandrel in the same direction as the latter.
and simultaneously therewith at a speed to cause winding of the strip upon the first wound strip.

8. The combination of a rotative mandrel, a guide associated therewith, a stationary support for a strip, means to rotate said strip, and means to propel a strip that is wound on the mandrel, with a hollow shaft aligned with the mandrel, a support for a strip carried by said shaft, and for rotating said shaft and said mandrel simultaneously at a speed to cause winding of the strip upon the first wound strip.

9. The combination of a rotative mandrel, a guide associated therewith, means for rotating said mandrel, a stationary support for a strip, a roll adapted to bear on a strip wound on the mandrel for pushing the strip along the mandrel, and means for rotating said roll, with another support for a strip, and means for rotating said support around the axis of the mandrel to lay a strip spirally around the first wound strip.

10. The combination of a rotative mandrel, a guide associated therewith, means for rotating said mandrel, a stationary support for a strip, a roll adapted to bear on a strip wound on the mandrel, said roll being located in a plane at an oblique angle to the axis of the mandrel for pushing the strip along the mandrel, and means for rotating said roll coincidently with the rotation of the mandrel, a shaft 14, and gearing connecting said shaft with the first named shaft, with a shaft aligned with the mandrel, a support for a reel carried by said shaft, a driving shaft and a gearing connecting the driving shaft with the shaft carrying the reel support for rotating the latter in the same direction as the mandrel.

Signed at New York city, in the county of New York and State of New York, this 23rd day of August, A. D. 1907.

GEORGE A. LUTZ.

Witnesses:

T. F. Bourne,
RALPH H. RAPHAEL.