

G. A. LUTZ.
TUBE MAKING MACHINE.
APPLICATION FILED SEPT. 21, 1907.

Patented Sept. 21, 1909.
3 SHEETS—SHEET 1.

934,683.

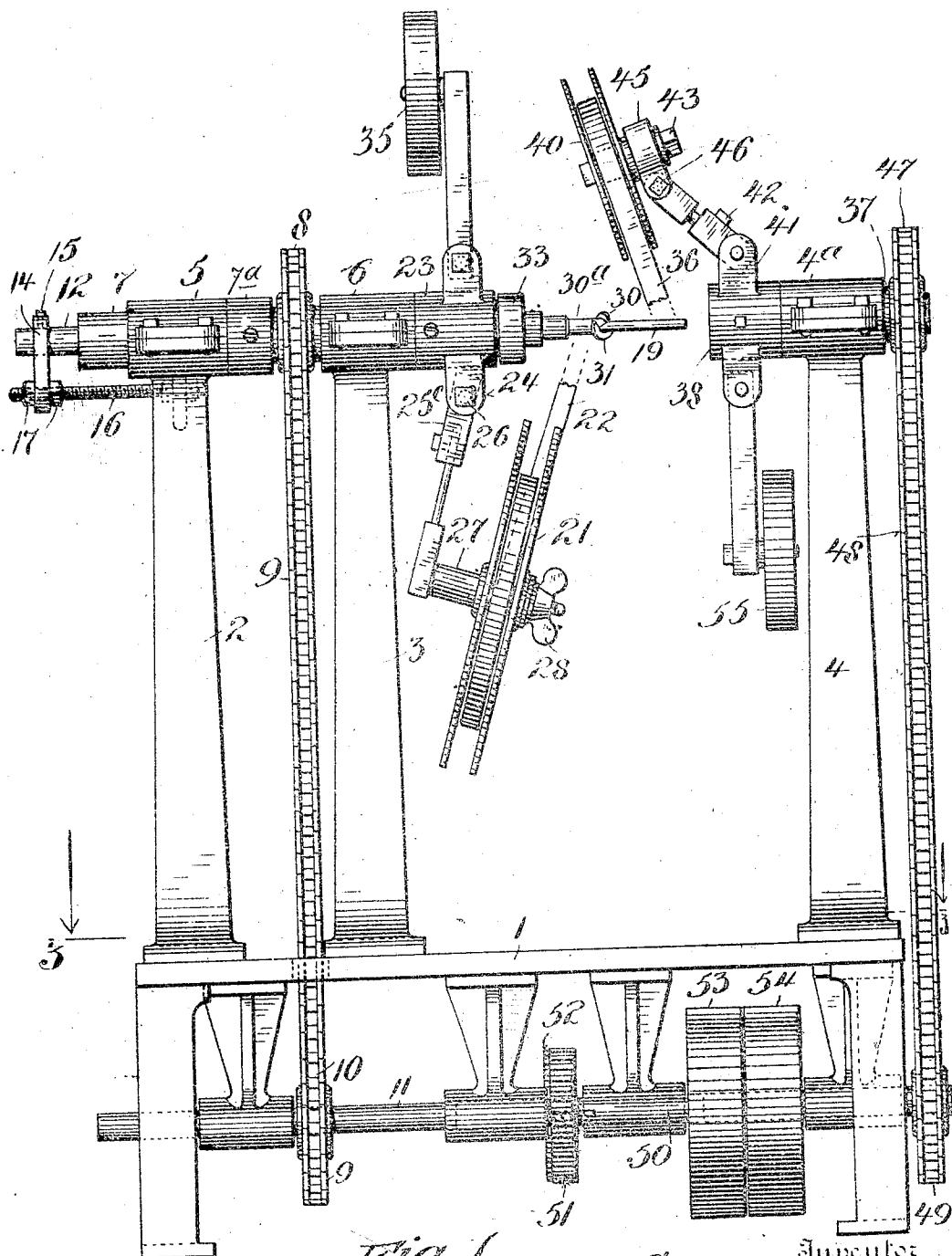


Fig. 1.

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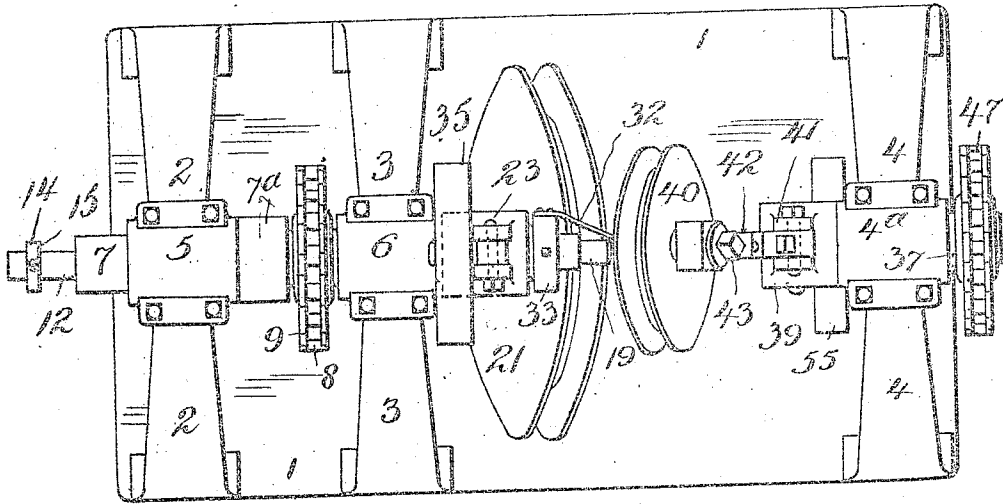


Fig. 2.

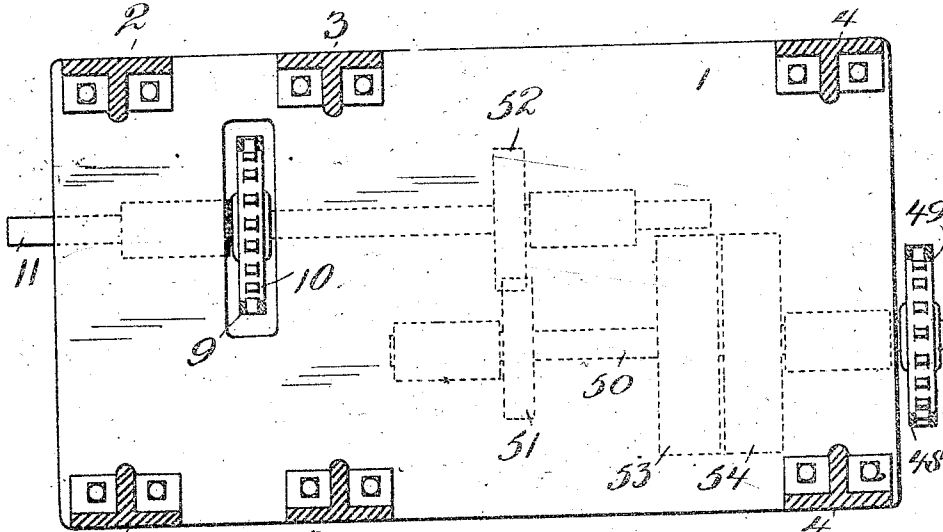
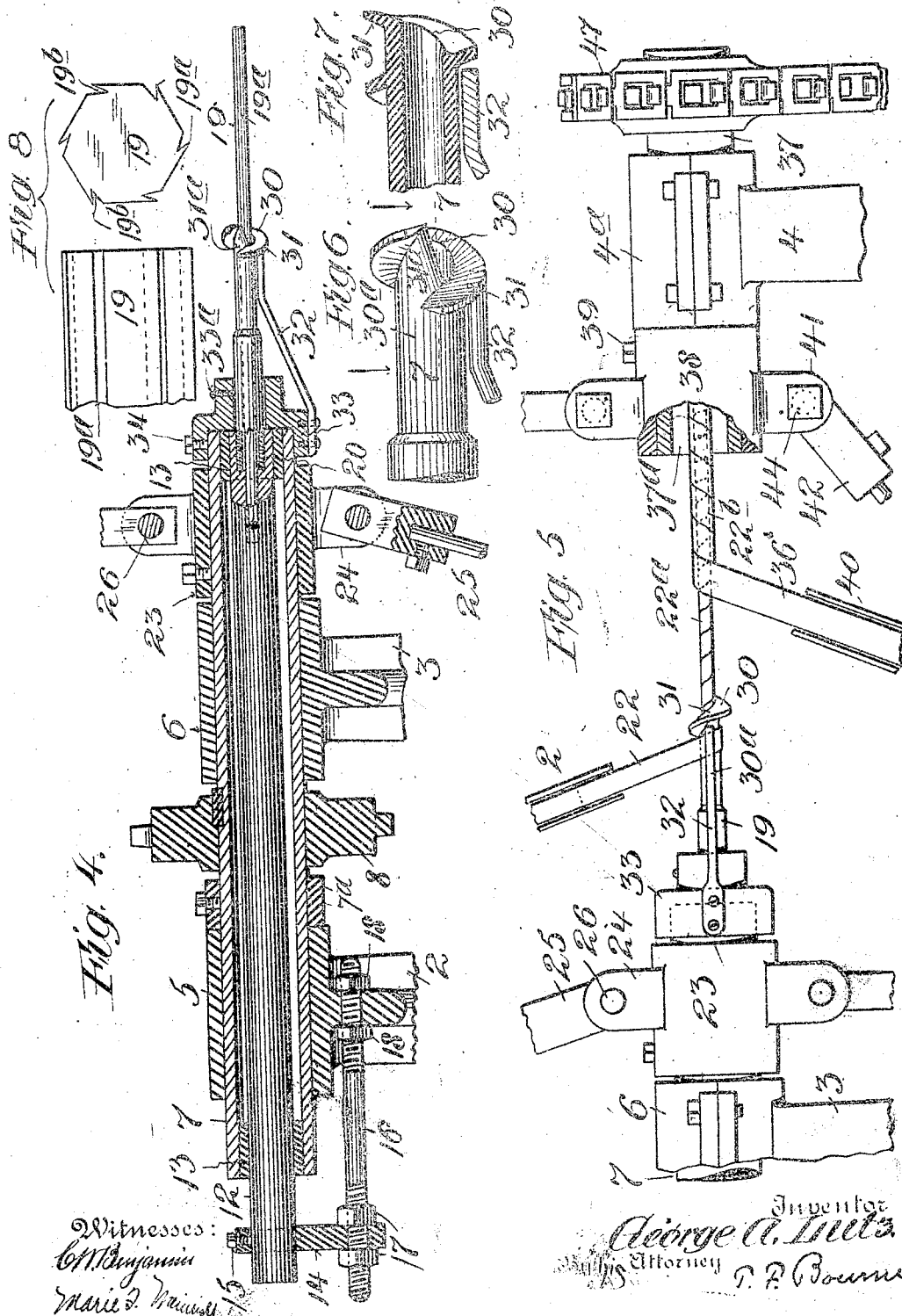


Fig. 3.

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UNITED STATES PATENT OFFICE.

GEORGE A. LUTZ, OF NEW YORK, N. Y., ASSIGNOR TO AMERICAN CIRCULAR LOOM COMPANY, OF PORTLAND, MAINE, A CORPORATION OF MAINE.

TUBE-MAKING MACHINE.

934,683.

Specification of Letters Patent. Patented Sept. 21, 1909.

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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 Tube-Making Machines, of which the following is a specification.

The object of my invention is to provide a machine adapted to make tubes comprising one or more spirally wound strips of paper, tape, or analogous flexible material, and in the machine I have illustrated I provide means for winding strips spirally one upon the other, with the convolutions of one winding wound in a direction contrary to the direction of winding of another strip.

In carrying out my invention I provide a stationary mandrel around which a strip is to be wound, a rotative wormlike guide surrounding the stationary mandrel and adapted to receive the strip to be wound and to push the winding along the mandrel as the strip is wound thereon, and a support for the strip with means for rotating the support at the same speed and in the same direction as the wormlike guide, all so arranged that the strip being wound upon the mandrel will pass from its support or reel through the wormlike guide and the latter acting upon the adjacent portion of the strip as it is being wound upon the mandrel will continuously push the spirally wound strip along the mandrel. I also provide a support for another strip or tape of fabric or the like so that the latter may be wound upon the first named spiral winding or tube as the latter travels along the mandrel, the support for the second named strip or its reel being rotated around the mandrel in a direction reverse to the direction of rotation of the first named support, whereby one spiral winding will be inclosed within the other, and the pitch lines of the spiral windings are reverse with respect to each other.

My invention also comprises the novel details of improvement and combinations of parts that will be more fully hereinafter set forth and then pointed out in the claims.

Reference is to be had to the accompanying drawings forming part hereof, wherein,

Figure 1 is a side elevation of a tube making machine embodying my invention; Fig. 2 is a plan view thereof; Fig. 3 is a section substantially on the line 3, 3, in Fig. 1; Fig.

4 is a longitudinal section, enlarged, showing the mandrel and associated parts; Fig. 5 is a detail view of the winding device, partly broken away; Fig. 6 is an enlarged detail of the wormlike guide for a strip to be wound; Fig. 7 is a section thereof substantially on the line 7 in Fig. 6, looking in the direction of the arrows, and Fig. 8 illustrates side and end views, enlarged, of the mandrel.

In the accompanying drawings, in which similar numerals of reference indicate corresponding parts in the several views, the numeral 1 indicates a suitable frame shown provided with standards 2, 3, 4, which parts may be of any suitable construction. The standards 2, 3, have suitable bearings 5, 6, in which a hollow shaft 7 is journaled, which shaft is shown provided with a sprocket wheel 8 receiving a chain 9 which passes over a sprocket wheel 10 carried by a shaft 11 journaled in suitable bearings supported by frame 1 for rotating shaft 7. A collar 7^a secured on shaft 7 limits its endwise movement. Within shaft 7 is a rod or bar 12 shown supported near opposite ends of said shaft by suitable bearings 13 within said shaft, whereby the rod or bar 12 may be supported without rotation. The rod or bar 12 is held in the desired stationary position by suitable means. For this purpose I have shown an arm 14 secured to rod 12 by a screw 15, the arm 14 having an aperture receiving a threaded rod 16 that passes through an aperture in standard 2, nuts 17, 18 on screw rod 16 serving to clamp the latter respectively to arm 14 and standard 2, and whereby rod 16 may be adjusted lengthwise for correspondingly adjusting rod 12 as desired. Rod 12 supports a mandrel 19 which may be made integral with said rod or may be made separate therefrom and attached thereto as by a pin 20, so that shaft 7 will rotate concentrically with respect to the mandrel. Shaft 7 carries a reel, spool or support 21 for a strip 22, such as paper or fiber, that is to be wound upon the mandrel, and for this purpose I have shown a collar or sleeve 23 secured upon shaft 7 and having lugs 24 adjustably supporting an arm 25, as by means of screw 26, which arm carries a stud 27 upon which reel 23 is mounted to rotate, a thumb nut 28 or the like on stud 27 serving to removably support reel 21 upon stud 27, and to permit

the desired frictional holding of the reel upon said stud to prevent the reel from rotating too freely. Arm 25 may be adjusted at any suitable angle with respect to the radius of shaft 7 to cause strip 22 when carried around the mandrel to wind thereon in spiral form at the desired pitch. Mounted concentrically and freely around mandrel 19 is a guide 30 whose outer end is made in spiral or wormlike form, being shown provided with a spirally disposed flange 31, shown passing nearly but not wholly around the tubular portion 30^a of the guide, providing a space 31^a for the passage of strip 22 (see Fig. 6). The tubular portion 30^a of the guide receives the mandrel and said guide is rotated around the mandrel simultaneously with and at the same speed as shaft 7, and for this purpose I have shown guide 30 secured by screw 33^a to a collar or cap 33 that is secured upon shaft 7, as by screw 34. A finger 32 secured to collar 33 projects along part 30^a of guide 30 providing a space therebetween receiving strip 22 to hold the same in position respecting guide 30. At 35 is a suitable counterweight carried by sleeve 23 for balancing reel 21.

With the arrangements above described the strip 22 is laid upon the mandrel and passed through the space 31^a of guide 30, and thereupon as reel 21 and its strip are carried around the stationary mandrel coincidentally with the simultaneous rotation of guide 30 at the same speed as the reel, the strip will be wound around the mandrel, passing through the space 31^a of the guide, and the rotation of said guide around the mandrel in contact with the adjacent edge of strip 22 will cause the spirally wound portion of tube 22^a to be pushed along the mandrel coincidentally with the winding of the strip thereon in tubular form, so that the strip is pushed along the mandrel at the same relative speed with which it is wound on the mandrel, and the edges of the convolutions of the strip align.

I have also shown means for winding a strip or tape 36 around the spirally wound tube 22^a while the latter is upon the mandrel, and to this end I have shown the standard 4 provided with a bearing 4^a in which is journaled a suitable hollow shaft 37 that carries at its inner end a sleeve or head 38 shown secured to said shaft by screw 39, which sleeve supports the reel 40 of strip 36, for which purpose I have shown sleeve 38 provided with lug 41 adjustably supporting an arm 42 and carrying at its outer end the spindle or stud 43 upon which reel 40 rotates, said arm being shown adjustably connected with lugs 41 by screw 44, and spindle 43 is shown carried by a bearing 45 adjustably connected with arm 42 by a screw 46, whereby reel 40 can be supported and adjusted in suitable angular relation with

respect to mandrel 19. Shaft 37, and thereby reel 40, is rotated to carry said reel around mandrel 19, and in the arrangement shown said reel travels in the direction reverse to the direction of rotation of reel 21. For this purpose I have shown shaft 37 provided with a sprocket wheel 47 receiving a chain 48 from a sprocket wheel 49 on a shaft 50 journaled in suitable bearings on frame 1 and carrying a gear 51 that meshes with a gear 52 on shaft 11, fast and loose pulleys 53, 54 on shaft 50 serving to permit suitable rotation of the latter. The arrangement of gearing shown is such that when shaft 50 is rotated in a given direction the reel 40 will be carried around the mandrel in one direction and reel 21 will be carried around the mandrel in the reverse direction. A suitable counterweight 55 may be attached to sleeve 38 on the side opposite reel 40 to balance the latter. The bore 37^a in shaft 37 is aligned with mandrel 19, as shown in Fig. 5, for the passage of tube 22^b.

Mandrel 19 is shown in polygonal form (Fig. 8), beyond guide 30 and provided with longitudinally disposed sharp edges 19^a formed by longitudinally undercut grooves 19^b cut or formed in the mandrel, and said mandrel is preferably tapered toward its outer end, all whereby when strip 22 is wound on the mandrel the edges 19^a will engage the strip and thereby keep the spiral winding or tube 22^a from rotating around the mandrel, and thereby the tube 22^b will pass from the mandrel in a straight condition and kinks are thus prevented from forming in tube 22^b.

After the spirally wound tube 22^a has been formed upon mandrel 19 for a suitable distance, the strip or tape 36 is laid around said tube, and then both reels are simultaneously revolved around the mandrel in opposite directions, whereby as tube 22^a is formed and pushed along the mandrel by guide 30 the strip 36 will be wound around said tube, the resulting tube 22^b comprising a plurality of reversely wound spiral strips, the outer strip 36 overlapping the joints between the abutting edges of the strip forming tube 22^a. I have also illustrated the strip or tape 36 as being wider than strip 22, whereby the edges of the latter may overlap as desired in accordance with the inclination of reel 40 with respect to the axis of the mandrel. The tube 22^b thus formed passes through the bore 37^a of shaft 37.

Strip 22 may be of paper or fiber while strip 36 may be of fabric or friction tape, and the finished tube may be used for a conduit to receive electric conductors, preferably provided with a covering in well known manner.

Having now described my invention what I claim is:

1. The combination of a stationary man- 130

drel, a guide supported concentrically with respect to the axis of the mandrel, a support for a strip, and means for rotating said support and guide, with a support for another strip and means for rotating the same, in the direction opposite to the direction of rotation of the first named support, whereby a plurality of strips may simultaneously be wound in opposite directions upon said mandrel.

2. The combination of a stationary mandrel, a guide concentric therewith, a support for a strip, and means for rotating said support, with a support for another strip, and means for rotating the same in the direction reverse to the rotation of the first named support.

3. The combination of a stationary mandrel, means for guiding a strip thereto, a support for a strip, and means for rotating said support, with a support for another strip, and means for rotating the same in the direction reverse to the rotation of the first named strip.

4. The combination of a stationary mandrel, a guide supported concentrically with respect to the axis of the mandrel, a support for a strip, and means for rotating said support and guide, with a support for another strip, means for rotating the latter in the direction reverse to the rotation of the first named support, whereby a plurality of strips may simultaneously be wound in opposite directions upon said mandrel, and means for adjusting said supports to permit the reels to extend at desired angles with respect to the axis of the mandrel.

5. The combination of a stationary mandrel, a guide supported concentrically with respect to the axis of the mandrel, a support for a strip, and means for rotating said support and guide, with a hollow shaft alined with the mandrel, a support for a strip car-

ried by said shaft, and means for rotating said guide and supports simultaneously.

6. The combination of a stationary mandrel, a guide supported concentrically with respect to the axis of the mandrel, a support for a strip, and means for rotating said support and guide, with a hollow shaft alined with the mandrel, a support for a strip carried by said shaft, and means for rotating the first named support in one direction and the second named support in the reverse direction simultaneously.

7. The combination of a stationary mandrel, a guide surrounding the same, a support for a strip, and gearing for simultaneously rotating said guide and support in the same direction, with a hollow shaft alined with the mandrel, a support for a strip carried by said shaft, and gearing connecting said shaft with the first named gearing and arranged to rotate said supports in opposite directions simultaneously.

8. The combination of a stationary mandrel, a guide surrounding the same, a shaft concentric with the mandrel, a support for a strip carried by said shaft, said guide being connected with said shaft to be rotated thereby, a shaft provided with a gear, and gearing connecting said shafts, with a hollow shaft alined with the mandrel, a support for a strip carried by said shaft, a shaft provided with a gear meshing with the first named gear, and gearing connecting shaft with the hollow shaft, whereby said supports will be rotated simultaneously in opposite directions.

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:

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