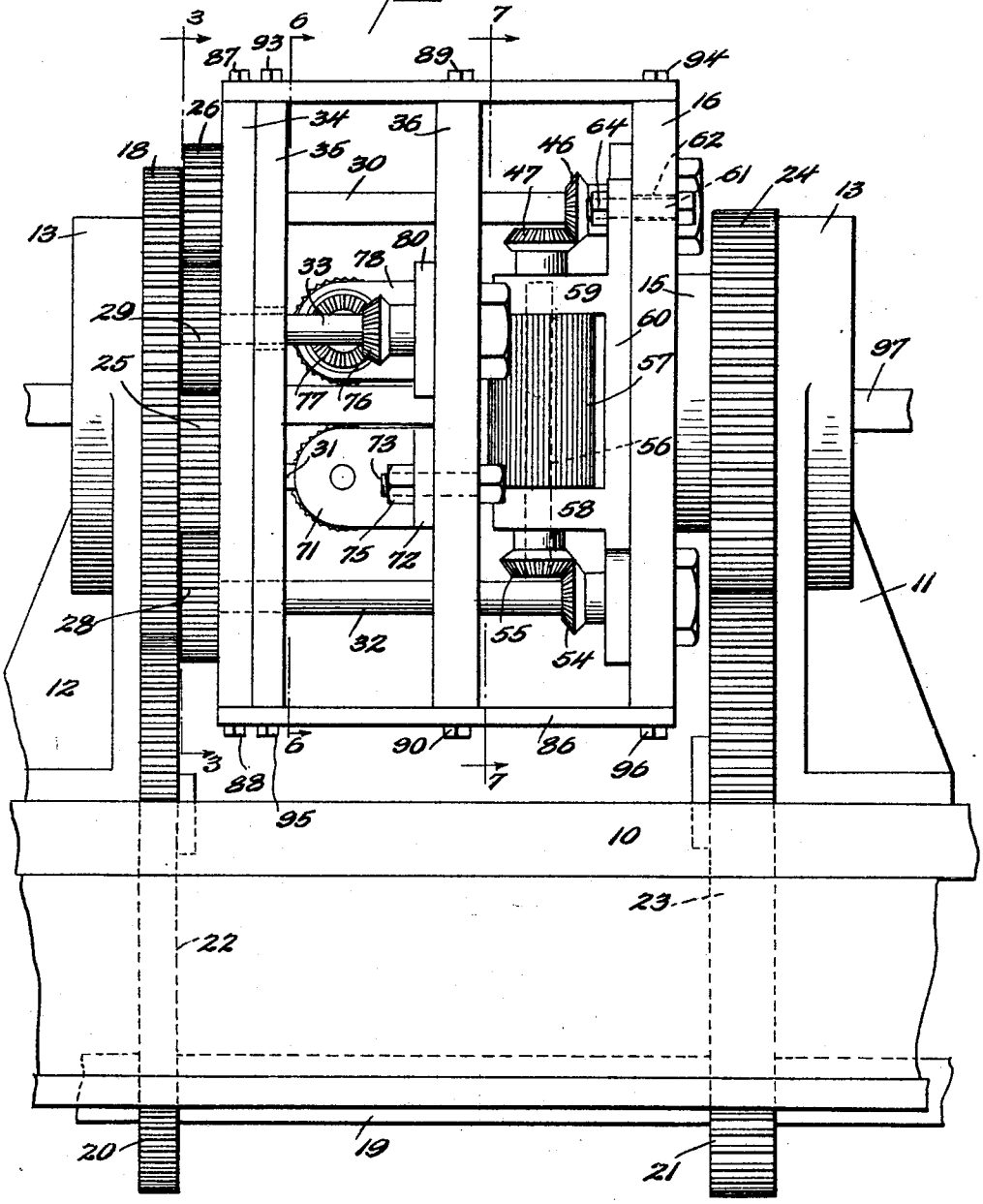
Aug. 16, 1932. S. T. MALTBY 1,872,152

MECHANISM FOR FORMING SPIRALLY WOUND MULTISIDED TUBES

Filed May 1, 1930 4 Sheets-Sheet 1

FIG. 1.



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MECHANISM FOR FORMING SPIRALLY WOUND MULTISIDED TUBES

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FIG. 2.

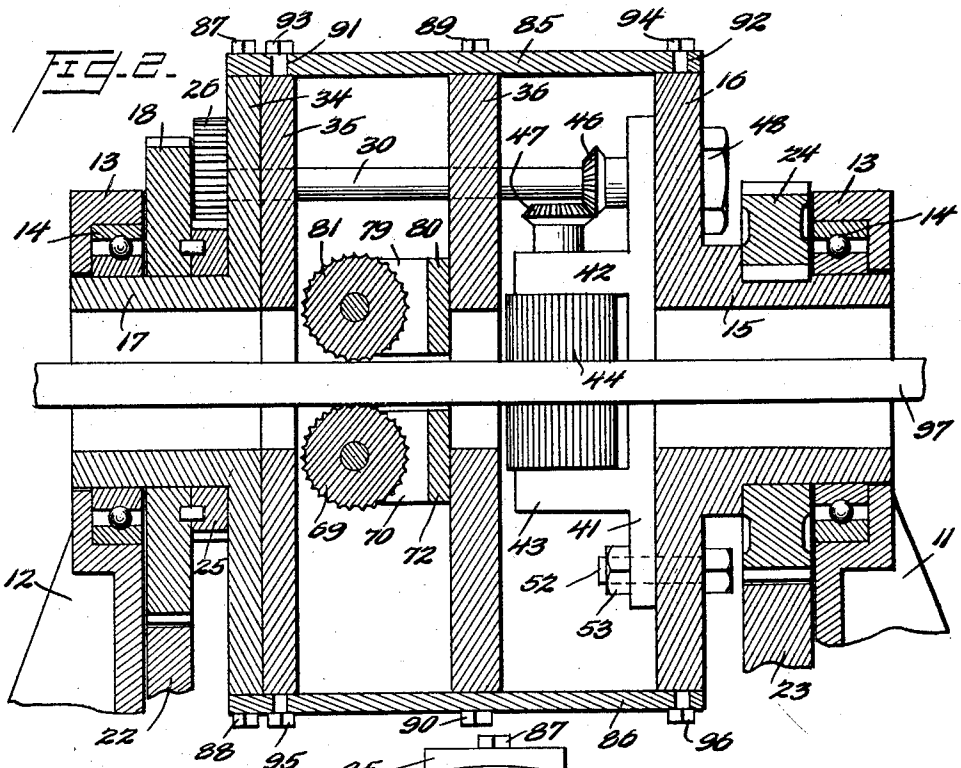
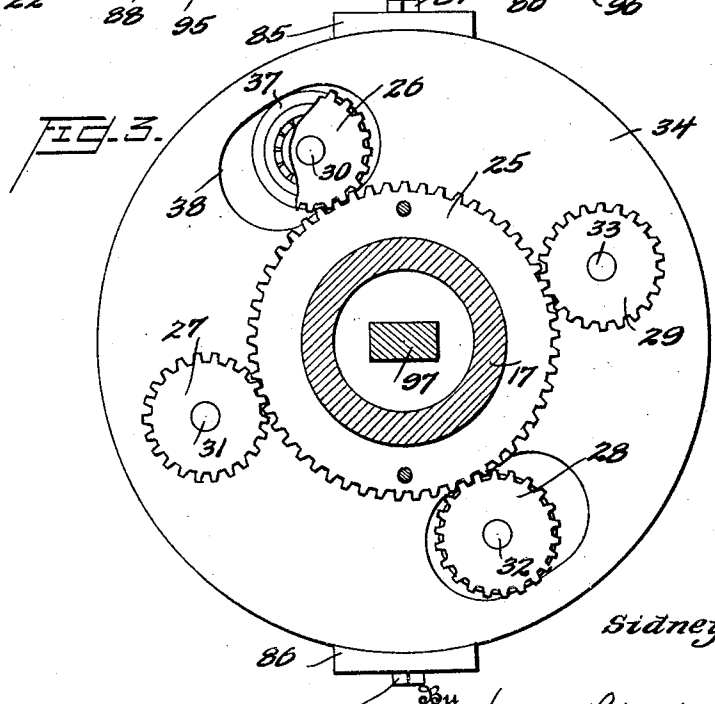


FIG. 3.



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MECHANISM FOR FORMING SPIRALLY WOUND MULTISIDED TUBES

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FIG. 5.

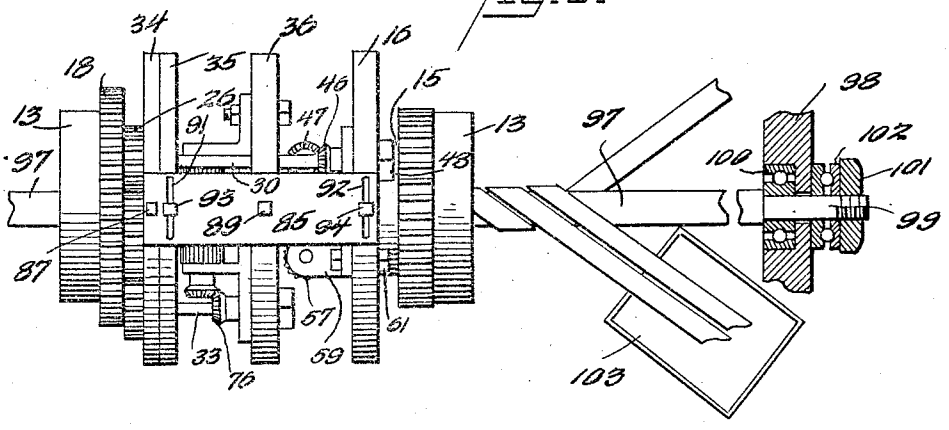
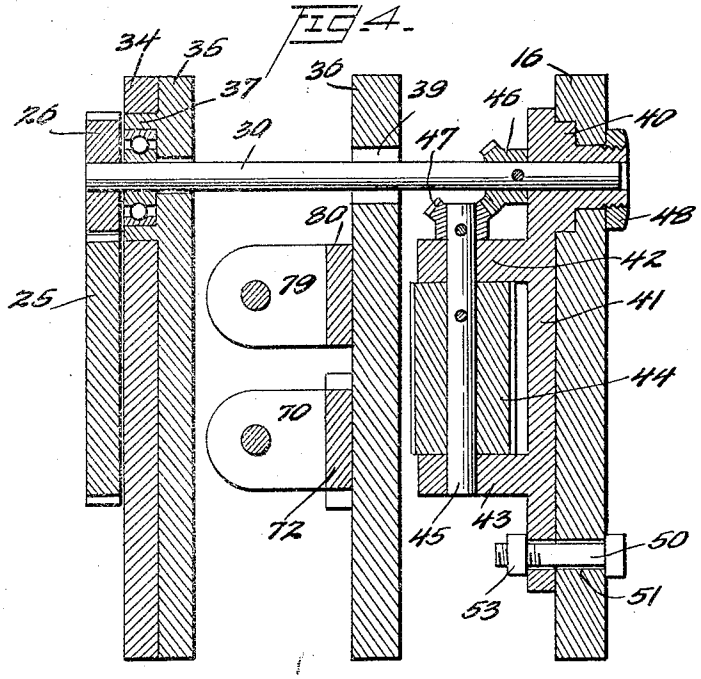


FIG. 4.



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MECHANISM FOR FORMING SPIRALLY WOUND MULTISIDED TUBES

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FIG. 6.

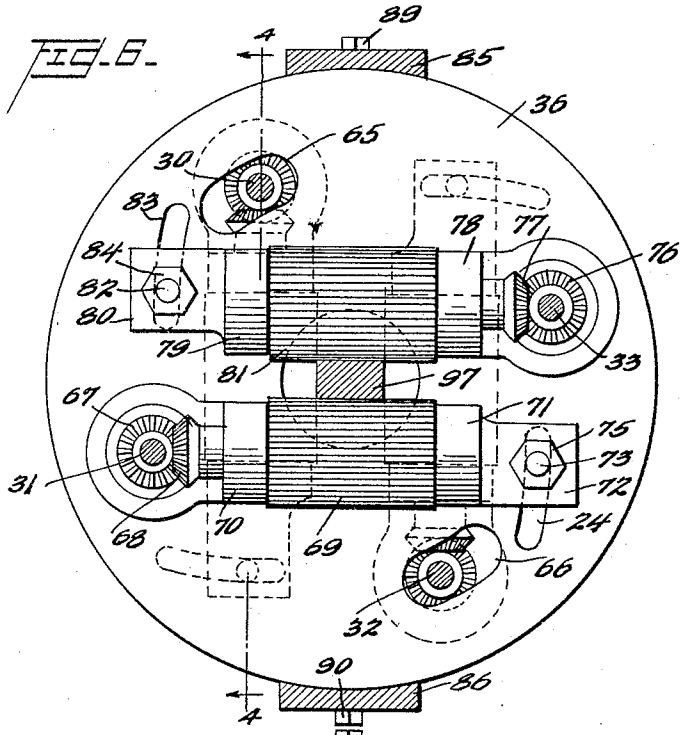
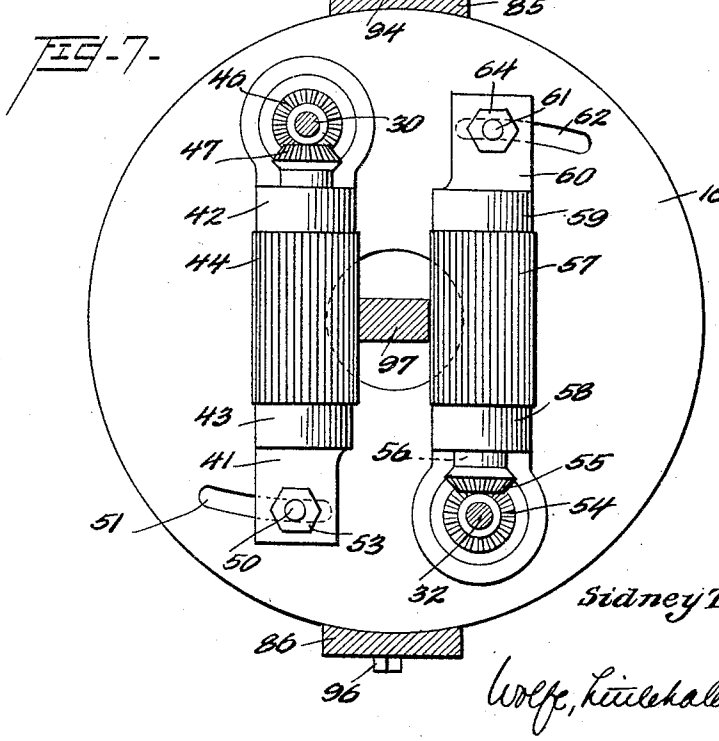


FIG. 7.



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UNITED STATES PATENT OFFICE

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MECHANISM FOR FORMING SPIRALLY WOUND MULTISIDED TUBES

Application filed May 1, 1930. Serial No. 448,925.

This invention relates to mechanism for forming spirally wound multi-sided tubes, and it comprises, with a multi-faced rotatable mandrel of rectanglar or polygonal cross section, and means for feeding one or more strips onto the mandrel, to be wound thereon by its rotation, a frame carrying rollers adapted to bear against the respective faces of the mandrel passing therethrough, of driving means for rotating the frame and mandrel, and gearing actuated by the driving means for rotating the feed rollers to form a tube and continually strip it from the end of the mandrel therebeyond, together with means for adjusting the feed rollers to accommodate mandrels of different size; all as will be described hereinafter in greater detail, and as claimed.

It is an object of my invention to provide mechanism for rotating a multi-sided mandrel to spirally wrap a tube thereon, such mechanism further serving to form a multi-sided tube and to strip it from the mandrel.

A further object is to provide for adjusting such tube forming and stripping mechanism so that mandrels of various sizes can be accommodated.

Other and further objects will be apparent from the following description and drawings, in which

Figure 1 is a side view of the tube forming and stripping mechanism comprising this invention;

Figure 2 is a vertical sectional view taken through the axis of the mechanism but showing the mandrel in full lines;

Figure 3 is a sectional view taken along the line 3—3 of Figure 1, in the direction of the arrows;

Figure 4 is an enlarged detail sectional view taken along the line 4—4 of Figure 6;

Figure 5 is a top view showing the arrangement of the mandrel and tube winding and stripping mechanism together with one form of feed for the tube material;

Figure 6 is a sectional view taken along the line 6—6 of Figure 1;

Figure 7 is a sectional view taken along the line 7—7 of Figure 1.

Referring more particularly to the drawings.

The bed 10 of a tube making machine has spaced upright supports 11 and 12 bolted or otherwise affixed thereto in any suitable manner.

The upright supports have bosses 13 for the support of bearings 14 (shown in Figure 2 for the purpose of illustration as ball bearings) which in turn receive and support the hub 15 of a plate 16 and the hub 17 of a plate 34, respectively.

A drive shaft 19, beneath the bed of the machine has gears 20 and 21 keyed thereto, the gear 20 driving a gear 18 which is rotatable on the hub 17 through an intermediate gear 22, journalled in the bed of the machine, while gear 21, through an intermediate gear 23, also journalled in the bed of the machine, drives a gear 24 which is keyed to the hub 15.

A gear 25 is keyed to gear 18 to rotate therewith upon hub 17, and is in mesh with pinions 26, 27, 28 and 29 on the shafts 30, 31, 32 and 33, which pass through the parallel plates 34, 35, 36 and 16.

As is shown in Figures 3 and 4 the plate 35 has a projecting boss 37 which receives a ball bearing for the support of shaft 30, such boss extending freely through an arcuate slot 38 in plate 34 (see Figure 3). The plate 36, also, is slotted as at 39 for the free passage of the shaft therethrough.

At its opposite end the shaft is journalled in the shouldered hub 40 of an adjustable feed roller bearing which comprises an elongated base 41 with spaced projecting bearings 42 and 43, between which a feed roller 44 is mounted to rotate with a stub shaft 45. A bevel pinion 46 is secured to the shaft 30 and is meshed with a similar pinion 47 affixed to the stub shaft 45, thereby to drive the stub shaft and roller upon rotation of shaft 30. The hub 40 of the base extends through plate 16 and is secured for pivotal movement thereon by a nut 48 which engages threads on the hub (Fig. 4). At its other end the base receives a headed bolt 50 which extends through an arcuate slot 51 in the plate 16.

The arc of the slot is on a radius from the axis of shaft 30, so that upon loosening the nut 53 the roller 44 may be moved about

shaft 30 as a pivot and thereby adjusted to accommodate mandrels of different size, as will be more fully described hereinafter.

The shaft 32, driven by pinion 28, is mounted in the same manner as shaft 30 and carries a bevel pinion 54 in mesh with bevel pinion 55 on shaft 56 which carries a roller 57 between spaced ears 58 and 59 projecting from a base 60. The base 60 is pivoted on shaft 32 and at its opposite end is bored to receive a headed bolt 61 which passes through an underlying arcuate slot 62 in the plate 16, the arc of the slot being struck on a radius from the shaft 32. A nut 64 on the bolt serves to hold the roller 57 in adjusted position.

The intermediate plate 36 is arcuately slotted at 65 and 66 to permit free passage of the shafts 30 and 32 therethrough and to permit adjustment of the plates 16 and 35, with the shafts 30 and 32 which they mount, about their common axis relative to plates 34 and 36. Shafts 31 and 33, shown 180° apart and each spaced 90° from the shafts 30 and 32, are journalled in plate 34 but pass freely through arcuate slots (not shown) in the plate 35. As shown in Figures 1 and 6, shaft 31 mounts a bevel pinion 67 in mesh with a bevel pinion 68 on a shaft (not shown) which carries a roller 69 between spaced ears 70 and 71 extending from a base 72 which is pivoted on shaft 31. An extension of the base opposite the driving gear is formed with a hole for receiving a headed bolt 73 which also passes through an arcuate slot 74 in the plate 36 and is fastened by means of a nut 75. The radius of curvature of the slot 72 has its origin in the axis of shaft 31.

Similarly, shaft 33 carries a bevel pinion 76 meshing with a similar pinion 77 on a shaft (not shown) which extends between ears 78 and 79 projecting from a base 80 and between which a roller 81 is mounted, fast on the shaft, the base being pivoted on the shaft 33. A projecting portion of the base 80, remote from the drive gearing, receives a headed bolt 82 which also passes through an arcuate slot 83 in the plate 36 and is fastened by a nut 84. Thus, the rollers 69 and 81 can be adjusted about their respective drive shafts by adjustment of the bolts 73 and 82 in the arcuate slots 74 and 83 of plate 36 to be moved toward and away from each other without, however, disturbing their parallel relationship.

The rollers 44, 57, 69 and 81 are preferably, though not necessarily longitudinally grooved to present a roughened gripping surface for stripping a tube from the mandrel.

Bracing members 85 and 86 are fastened to the peripheries of the plates 34, 35, 36, and 16. Two of such members are shown but it is to be understood that any number desired may be provided. The members 85 and 86 not only brace the plates and hold them parallel to each other, but serve to permit adjustment of alternate plates relative to the others. For this purpose the members are drilled to receive, respectively, screws 87, 88 which are tapped into the plate 34 and screws 89, 90 tapped into the plate 36 (Figure 5). Member 85 is transversely slotted as at 91 and 92, and member 86 is correspondingly slotted for the reception of screws 93, 94, 95 and 96, respectively.

When it is desired to adjust the mechanism for accommodating a mandrel larger than that shown in the drawings the rollers 69 and 81 on plate 36 are first swung about their respective drive shafts 31 and 33 after loosening the nuts 75 and 84. The rollers are adjusted to parallelism any desired distance apart.

The nuts 93, 94, 95, 96 are then loosened and the plate 16 (with its attached plate 35) is moved in a counter-clockwise direction about its axis, as seen in Figure 7. The shafts 30 and 32 are thus moved away from the vertical plane passing through the axis of the plate. Nuts 53 and 64 are now loosened and the rollers brought to parallelism with their arcs at right angles to the axes of rollers 69 and 81, in the form of structure shown in the drawings wherein a rectangular mandrel is used.

If a smaller mandrel is to be used the rollers on plate 36 are swung about their respective shafts 31 and 33, toward each other and are then fastened against accidental movement. The plate 16 and its attached plate 35 are then moved in a clockwise direction to move the axes of shafts 30, 32 closer to the vertical plane through the axis of the mandrel, the rollers 44 and 57 being thereafter adjusted to parallelism and squared with the rollers on plate 36.

It is to be understood that this invention is not confined to the use of two series of rollers as shown, but may include as many rollers as the mandrel has faces, one or more rollers for each face, or any number of duplicate series of rollers for each face, as desired.

Referring now to Figure 5 wherein is shown a preferred mounting of the mechanism above described, the mandrel 97, of rectangular or polygonal cross-section, passes through an opening in the supporting bracket 98 which rises from the machine bed. The end 99 of the mandrel is turned to cylindrical shape and mounts a radial bearing 100, carried by the bracket. The cylindrical end of the mandrel is threaded to receive a nut 101 between which and the outer face of the bracket is clamped a thrust bearing 102. This showing of the mandrel mounting is simply by way of illustration. Any suitable mounting which will permit rotation of the mandrel by the mechanism hereinbefore described may be used.

The number of strips used in the winding

of a tube is a matter of selection, but for example I have shown three strips, two of which are fed onto the mandrel from one side and engaging over its upper surface, while the third strip is fed from the other side and engages under the mandrel. A glue pot 103, diagrammatically shown in Figure 5, has mechanism for applying adhesive to the under surface of one of the two strips which pass over it.

In operation of the mechanism, rotation of gears 23 and 24 causes a rotation of the roller-carrying frame. Simultaneous rotation of gears 22 and 18 in the same direction but at a lower speed causes the pinions 26, 27, 28 and 29 to rotate about the gear 25. If it is desired to rotate the pinions 26, 27, 28 and 29 faster and thereby increase the speed of the feeding rollers 44, 57, 69, 81 it is only necessary to lock the gear 18 against rotation or to rotate it in a reverse direction. It is, therefore, to be understood that my invention contemplates the provision of variable speed mechanism for selective use under different conditions.

From the foregoing it will be apparent that this invention provides a forming and stripping mechanism for angular sided tubes which mechanism, constituting the drive for the mandrel in its rotation to wrap the tube relieves the mandrel of torsional strains and constitutes a support for its free end.

What I claim as my invention is:

1. A machine for wrapping tubes comprising a non-translatable mandrel, means for feeding tube material onto said mandrel to be wrapped thereon and cylindrical means engaging said mandrel beyond the zone of wrapping for rotating said mandrel and stripping a formed tube therefrom.

2. A machine for wrapping tubes comprising a multi-faced, non-translatable mandrel, means for feeding tube material onto said mandrel to be wrapped thereon, and cylindrical means adjustably pressing against the faces of said mandrel beyond the zone of wrapping for rotating said mandrel and stripping a formed tube therefrom.

3. A machine for wrapping tubes comprising in combination with a multi-faced, non-translatable mandrel, a frame through which said mandrel passes, means for rotating said frame and means for transmitting the motion of the frame to the mandrel, said means comprising a cylindrical roller angularly adjustable on the frame to engage a face of the said mandrel whereby the axis of the roller will be maintained parallel with the surface of the mandrel which said roller contacts.

4. A machine for wrapping tubes comprising in combination with a multi-faced, non-translatable mandrel, a frame through which said mandrel passes, means for rotating said frame, a pair of cylindrical rollers with axes angularly adjustable on said frame to engage said mandrel and be maintained in parallelism with the faces thereof which said rollers contact, and gearing for driving said rollers by rotation of the frame.

5. In a machine for wrapping tubes, a rotatable mandrel, means for feeding strips of tube material onto said mandrel, a series of spaced plates mounted axially of the mandrel, a support for said plates permitting their rotation in unison, a driving gear coaxial with said plates, shafts having pinions thereon in mesh with said gear, rollers mounted on plates of the series each geared to one of said shafts to be driven thereby, the rollers on the respective plates having their axes inclined to the others, a member connecting the plates of the series to permit rotary adjustment of some of them relative to the others, thereby to vary the positions of the rollers on respective plates, and gearing for rotating all of the plates as a unit.

6. In a machine for wrapping tubes, a rotatable mandrel, means for feeding strips of tube material onto said mandrel, a rotary frame adapted to drive said mandrel, said frame comprising a plurality of axially aligned plates with central openings through which the mandrel freely extends, pairs of spaced rollers carried on the faces of certain of said plates and adapted to support said mandrel, the rollers on each plate being angularly adjustable relative to the others, shafts geared to the individual rollers, said shafts being journalled in the plates carrying rollers which they drive but passing freely through slots in the other plates, a driving gear, pinions on said shafts in mesh with said gear, a member fastened to said plates whereby they will be rotated in unison, some of the plates being adjustably retained by said member thereby to vary the positions of the rollers on respective plates and thus provide for accommodation of different size mandrels, and gearing for rotating the frame as a unit.

In testimony whereof, I affix my signature.

SIDNEY T. MALTBY.