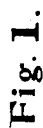


1,004,121.

2 SHEETS--SHEET 1.



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TUBE WINDING MACHINE.
APPLICATION FILED OCT. 3, 1910.

1,004,121.

Patented Sept. 26, 1911.
2 SHEETS—SHEET 2.

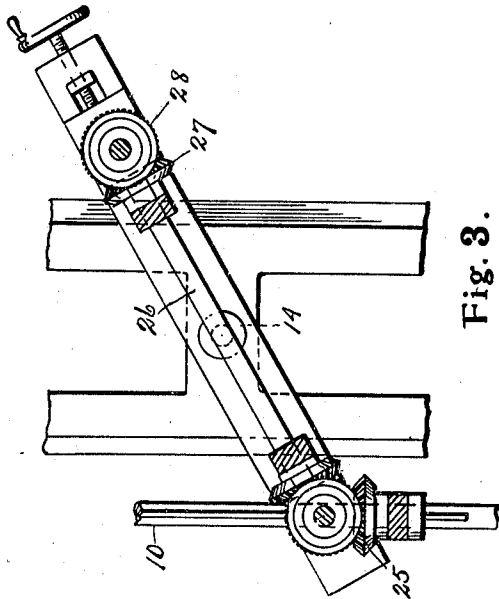


Fig. 3.

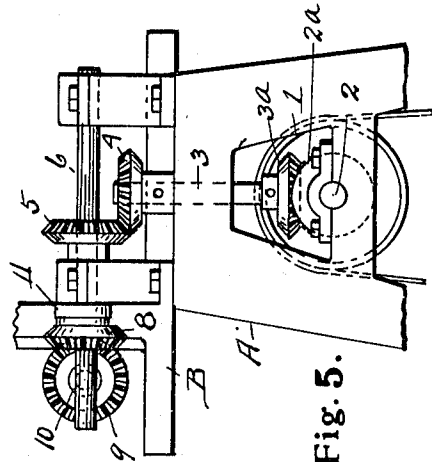


Fig. 5.

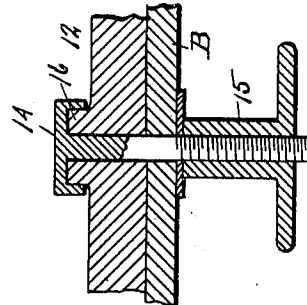


Fig. 4.

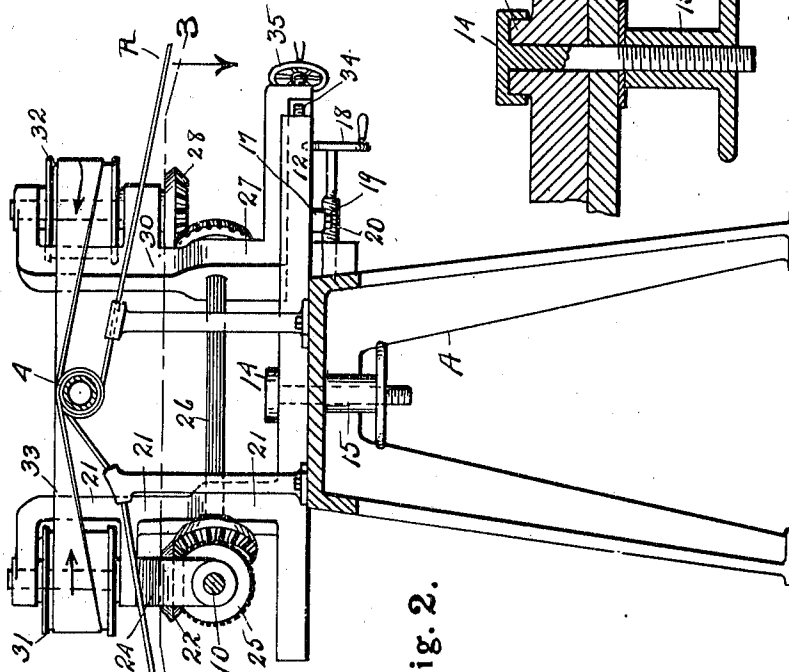


Fig. 2.

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TUBE-WINDING MACHINE.

1,004,121.

Specification of Letters Patent.

Patented Sept. 26, 1911.

Application filed October 3, 1910. Serial No. 584,969.

To all whom it may concern:

Be it known that I, CHARLES F. WELSH, a citizen of the United States, residing at Detroit, county of Wayne, State of Michigan, have invented a certain new and useful Improvement in Tube-Winding Machines, and declare the following to be a full, clear, and exact description of the same, such as will enable others skilled in the art to which it pertains to make and use the same, reference being had to the accompanying drawings, which form a part of this specification.

This invention relates to tube-winding machines.

It has for its object an improved machine for winding what are known as spirally wound tubes; in the construction of devices of this class a ribbon of paper is wound spirally around a mandrel by revolving the mandrel on its axis and drawing the ribbon of paper from its storage roll as it is used in the construction of the tube; the tube under construction is pushed off from the free end of the mandrel and is cut into lengths to produce the commercial tube or box. The winding ribbon is held firmly against the mandrel or against an under-lying part of the ribbon by belts that cross the mandrel obliquely thereto and the pressure of the belt serves to press the pasted or glued surfaces of the ribbon into close contact.

The main object of this invention relates to means for adjusting these obliquely lying belts while maintaining their driving mechanism in proper relation therewith.

In the drawing:—Figure 1, is a plan view of the machine. Fig. 2, is a cross section at the line 2—2 of Fig. 1. Fig. 3, is a horizontal cross section at the line 3—3 of Fig. 2. Fig. 4, is a cross section of the central connection of a belt support. Fig. 5, is an elevation of the main driving mechanism. Fig. 6, is an elevation of the means for transmitting motion from a laterally movable shaft to the gear which directly drives the pressure belts.

On a frame A is mounted a master wheel 1 on a shaft 2. On the shaft is a miter wheel 2^a which gears with a miter wheel 3^a on the vertical shaft 3 and drives the same, thereby transmitting motion to miter wheels 4 and 5 and driving horizontal shaft 6 which extends to the side of the frame and has mounted upon it a miter wheel 8 arranged to slide longitudinally of the shaft 6 and meshes with miter wheel 9 on shaft 10. The

shaft 10 is carried in bearings which will be hereinafter described and is capable of lateral movement with respect to the frame A. The two wheels 8 and 9 are yoked by a yoke 11 that holds them at all times in mesh sliding the wheel 8 on its shaft 6 to correspond with the lateral movement of the shaft 10. The shaft 10 is carried at the end of two parallel members oscillating 12 and 12^a, these two members and the various attachments to them are similar in all respects, and only one of them will be described, with the understanding that the second one is exactly similar to the one described, and that the indicating numerals on the second member 12^a are similar to the numerals on the member described with the exception that each one has an alphabetical character connected with it to distinguish it from the corresponding number on the member described. The member 12 is pivotally supported on the cross part B of the frame and held thereto by a bolt 14 and nut 15. The bolt 14 terminates at its head end with a cap which engages over a raised ring 16 on the member 12, and the entire member 12 oscillates the member B, and is actuated in its oscillating movement by parallel rod 17 that couples 12 and 12^a, and is provided with a rack 19 that engages with driving gear 20 on a shaft actuated by hand winch 18. The shaft is journaled in the main frame A. The oscillating cross member 12 carries at one end a stud 21 which carries a miter wheel 22. The stud is coupled to the shaft 10 by yoke 24 pivotally connected to the stud and slidingly connected to the shaft. Mounted slidingly on the shaft is a miter wheel 25 arranged to be held in mesh with the miter wheel 22 by means of the yoke 24. A cross shaft 26 journaled in the stud 21 and in a similar but sliding stud 27 at the opposite end of the member 12 is connected by miter gearing to the gear 22 and to a similar gear 28 mounted on a shaft journaled in the stud 30. The gears 22 and 28 are on vertical shafts journaled in the studs 21 and 30 and these vertical shafts carry belt wheels 31 and 32 which drive the belt 33. The stud 27 is arranged for a longitudinal movement along the cross member 12 and is held in adjusted position by screw 34 actuated by hand wheel 35, and this adjustment is used to arrange the tension of the belt 33 as may be desired for compressing the paper ribbon as has

been mentioned in the previous part of the description. One run of the belt 33 passes around the mandrel 4 and as the ribbon R winds around the mandrel the turn of the ribbon passes through the wind of the belt and is pressed either upon the under-lying edge of itself or upon the under-lying companion ribbon as may be desired. A pressure roll or pair of pressure rolls 36 are mounted to bear against the mandrel with the already formed tube interposed between the mandrel and the rolls, and to press down strongly the edges of the ribbon and smooth the edges into a continuous surface or to smooth down and press out the cement, glue or other substance that may be used, and may have, because of the previous pressure, exuded slightly along the edges of the ribbon. A tube severing appliance is preferably attached and is indicated under the general character C, but is not further referred to because it forms no part of the present invention.

The two pressure belts are driven by the shaft 10 and inasmuch as it is desirable to change the angularity of the pressure belt to conform to the width of the ribbon that is used, and to the size of the mandrel that is employed, it is necessary to provide not only for the adjustment of the tension of the belts but to provide for driving them throughout the extent of the change of angularity that may be given to them. In changing the angularity of the member 12 the stud which carries the belt wheels changes its absolute distance from the axis of the mandrel 4, and the shaft 10, which is parallel to the axis of the mandrel 4 must change its absolute distance therefrom in the same amount. This is provided for by swinging the shaft 10 with the member 12 and making suitable provision to maintain in mesh the gear which drives the shaft 10, one of which is on the cross shaft 6 and the other on the shaft 10 itself. This is done by providing for the sliding movement of the miter wheel 8 on its own shaft which is accomplished without losing its engaging relation with the miter gear 9, and the some-

what similar yoke couplings 24 slide on the shaft 10 while remaining in pivotal connection with the stud 21 and serving to maintain the intermeshing gear 22 and 25 in connection while the stud 21 serves to maintain the connection between the bevel gears 22 and shaft 26.

What I claim is:—

1. In a tube-forming machine, the combination of a supporting frame, a mandrel, an oscillating member angularly adjustable across said mandrel and pivoted to said frame, shafts, one of which is provided with a miter gear carried by said oscillating member and having pulleys mounted thereon, a belt carried by said pulleys and engaging around said mandrel, a drive shaft having a miter wheel thereon, a miter gear splined on said drive shaft and intermeshing with said gear on said pulley shaft, means for holding said gears in intermeshed relation, a second drive shaft disposed at right angles to the first-mentioned drive shaft and having a miter wheel splined thereon intermeshing with the miter wheel on the first-mentioned drive shaft, means for holding said miter wheels in intermeshed relation and means for rotating said second drive shaft, substantially as described.

2. In a tube-forming machine, having a suitable winding apparatus adapted to oscillate, a gear thereon, a driving shaft having a drive connection with said gear movable lengthwise said shaft, a second driving shaft at right angles to said first driving shaft and having a drive connection therewith movable lengthwise along said second shaft, whereby the gear on said winding apparatus may assume any point in the arc through which it oscillates and the drive connections will adjust themselves thereto without the shafts changing their angular relation, substantially as described.

In testimony whereof, I sign this specification in the presence of two witnesses.

CHARLES F. WELSH.

Witnesses:

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WILLIAM M. SWAN.