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C. HOLLMANN

TUBE WINDING MACHINE

Filed April 11, 1927

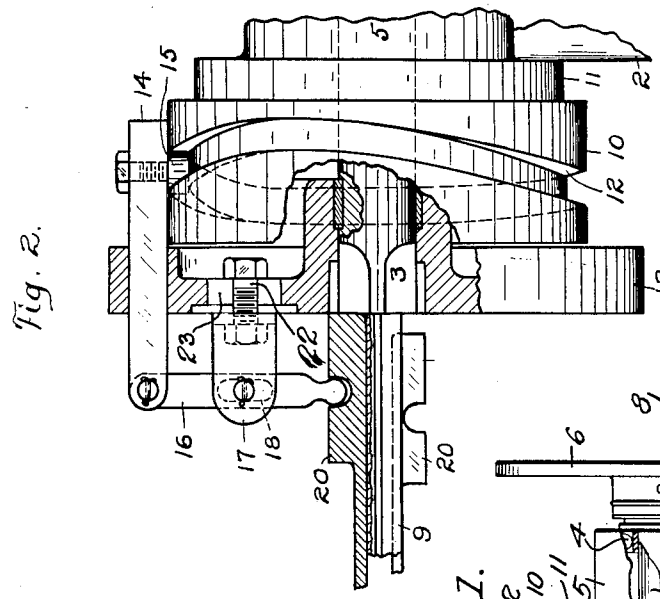


Fig. 2.

Fig. 1.

Fig. 3.

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TUBE-WINDING MACHINE.

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The invention relates to tube winding machines and it is especially directed to machines by which to form a continuous tube.

In forming tubes of paper strips it is common practice to wind the strips upon a mandrel. In order that the tube shall be continuously formed it is essential that means shall be provided to advance the formed tube along the mandrel, and the object of my present invention is to provide novel means by which to advance the tube along the mandrel as it is formed.

The invention consists in the novel combination and arrangement of parts hereinafter described and illustrated in the drawings, in which drawings—

Figure 1 is a side elevational view, partly in section, of a machine embodying the invention; Fig. 2 an enlarged side view of the tube advancing mechanism and Fig. 3 a front view of the cam member and mandrel, the actuating levers and supporting disk therefor being omitted.

In the illustrative embodiment of the invention, 1 represents a suitable support upon which a frame 2 is mounted, in which frame a shaft 3 is revolubly supported, ball bearings 4 being installed between the shaft and the housing 5 of the frame 2. The shaft may be driven in any suitable manner, such as by the disk 6 on the shaft frictionally engaging the wheel 7 driven by the electric motor 8. The mandrel 9 is a continuation of the shaft 3, and in the present adaptation of the invention the mandrel is square in cross section so as to form a rectangular tube.

A drum 10 is secured to the housing 5 as to the flange 11 on the housing, and a cam slot 12 is formed in the periphery of the drum.

A disk 13 is keyed to the shaft 3 and links or bars 14 are longitudinally reciprocably mounted in the disk, there being preferably as many links as there are sides on the mandrel. The rear end of each link carries a roller 15 that is engaged in the cam slot. Levers 16 are fulcrumed on brackets 17 that project forwardly from the disk 13, each lever having a slot 18 therein through which extends a pivot 19 that is suitably mounted in the bracket. The brackets 17 are adjustably mounted on the disk 13 by the bolts 22, the bolts being disposed in the radial slots 23 formed in the disk. Upon loosening the nuts on the bolts 22 the brackets may be moved toward or from the mandrel to decrease or increase the distance of the fulcrum of the levers 16 from the mandrel to shorten or lengthen the inner arms of the levers and thereby regulate the movement of the slides 20. The outer ends of the levers are pivoted to the forward ends of the links and their inner ends pivotally engage the rear ends of the slides 20 that are reciprocably supported in the longitudinal grooves 21 formed in the mandrel along each angle or edge thereof.

Since the disk 13 is keyed to the mandrel shaft and, therefore, is rotated thereby, the reciprocable links are carried by the disk about the drum 10. The rollers travel in the cam slot 12 and this slot causes the links to reciprocate and rock the levers 16 on their fulcrum. Three fourths of the length of the cam slot 12 progressively recedes from the forward face of the disk drum 10 and the remaining one-fourth of the slot comparatively sharply approaches said face of the drum, so that the rollers on the bars 14 during three-fourths of their travel in the cam slot are caused to move rearwardly of the mandrel and during their travel in the remainder of the cam slot,—that portion indicated between the broken lines *a*—*b*, in Fig. 3,—they are caused to move forwardly. Each bar 14, therefore, is reciprocated rearwardly during three quarters of each complete revolution of the disk 13 and forwardly during one quarter of such revolution. Hence each slide 20 is caused by the lever 16 that engages it to reciprocate forwardly during three quarters of a complete revolution of the mandrel and to reciprocate rearwardly during one quarter of the same, the speed of the retracting movement of each slide being three times as rapid as the speed of its forward movement.

The tube is formed preferably of gummed strips of paper 21 which are fed simultaneously to the mandrel from suitable sources, such as spools. The strips engage the forward portions of the slides 20 which project a suitable distance beyond the adjacent surfaces of the body of the mandrel 9, and said strips may abut or overlap each other.

In operation, the mandrel and the disk 13 together with the bars 14 and the levers 16 are rotated simultaneously at selected speed. This rotation of the disk causes the bars 14 to oscillate the levers 16 and reciprocate the slides 20. At the same time the strips 21 are wound on the mandrel the outwardly moving slides 20 advancing the tube thus formed along the mandrel and discharging the same continuously from the free end of the mandrel

where it may be cut in suitable manner into selected lengths. As each slide 20 reaches the outer end of its stroke the roller associated therewith enters the forwardly extending quadrant of the cam slot, and causes the lever 16 to rapidly retract the slide, the remaining slides continuing the advancement of the tube along the mandrel. Each slide readily releases the tube at the outer end of its stroke and its retraction does not interfere with the continuous advancement of the tube.

What I claim is:

1. In a tube winding machine, a rotatable mandrel, reciprocable members longitudinally disposed in the mandrel, means engaging the members and adapted to reciprocate them and a fixed member movably engaged by the latter means to cause said means to reciprocate the members.

2. In a tube winding machine, a rotatable mandrel, reciprocable members longitudinally disposed in the mandrel and adapted to advance the tube along the mandrel as it is formed thereon, means engaging the members and adapted to reciprocate them and a fixed cam movably engaged by said means to reciprocate the members.

3. In a tube winding machine, a rotatable mandrel, reciprocable members longitudinally disposed in the mandrel, pivoted members carried by the mandrel and engaging the reciprocable members respectively, and a fixed member having operative connection to the pivoted members and adapted to cause the pivoted members to reciprocate the reciprocable members.

4. In a tube winding machine, a rotatable mandrel, reciprocable members longitudinally disposed in the mandrel and adapted to advance the tube along the mandrel as it is formed thereon, means engaging the members and adapted to reciprocate them and a fixed cam movably engaged by said means to reciprocate the members, the cam being such that the reciprocable members are caused to retract successively at greater speed than they are caused to reciprocate forwardly.

5. In a tube winding machine, a frame, a mandrel revolubly supported by the frame and having a plurality of longitudinal grooves therein, a drum supported on the frame and having an annular slot in its periphery, slides longitudinally reciprocably supported in the grooves in the mandrel, a support secured to the mandrel, levers mounted on the support and engaging the slides respectively and links pivotally connected to the levers respectively and engaging the annular slot.

6. In a tube winding machine a rotatable mandrel, reciprocable members longitudinally disposed in the mandrel and means to reciprocate the said members including a fixed cam, pivoted members engaging the reciprocable members, pivots for the pivotal members and adjustable toward and from the mandrel and means engaging the cam slot and connected to the pivotal members respectively, to rock the pivotal members.

In witness whereof I have hereunto signed my name this 7th day of April, 1927.

CHARLES HOLLMANN.