

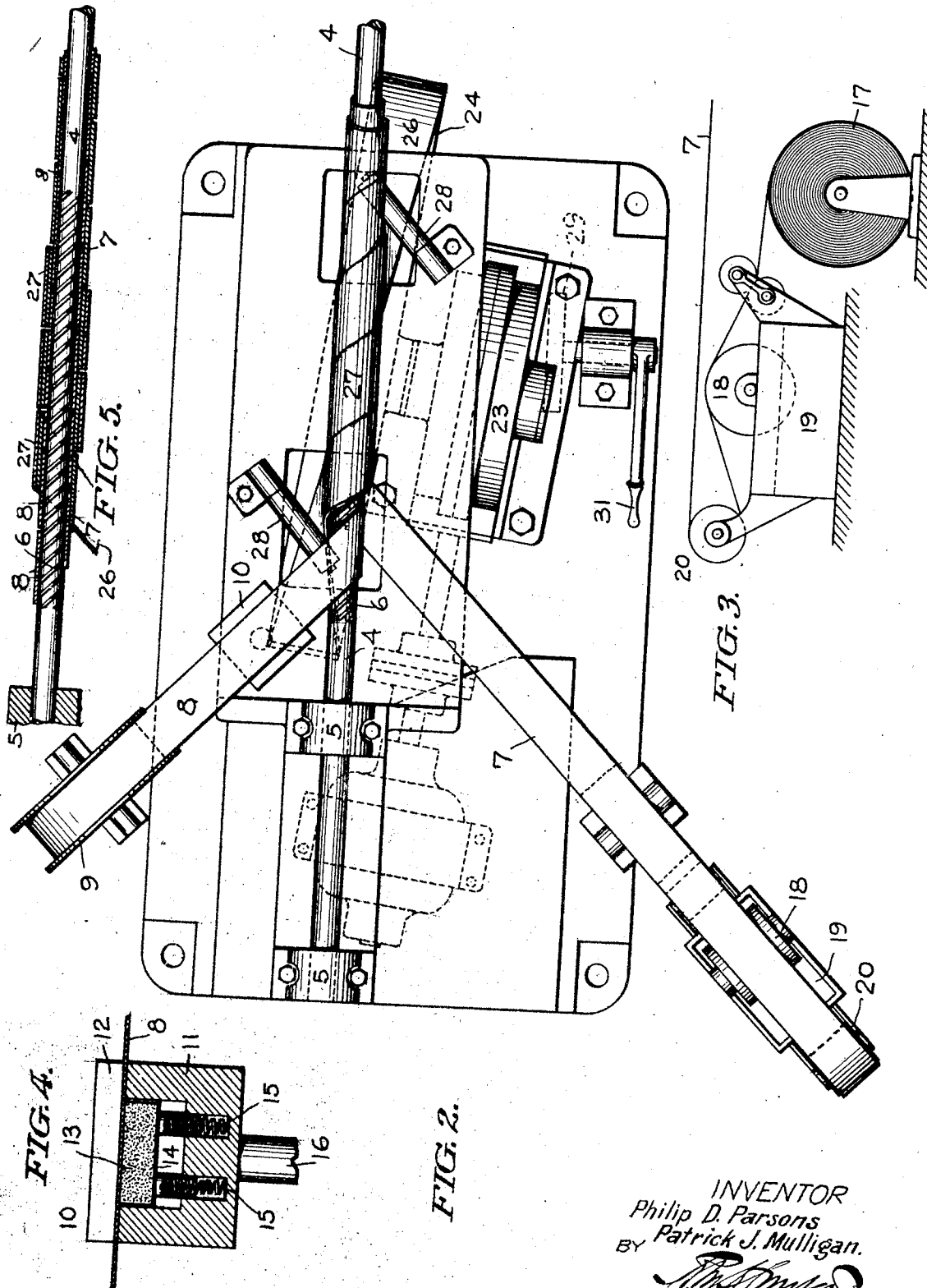
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CARDBOARD TUBE MAKING MACHINE

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CARDBOARD-TUBE-MAKING MACHINE.

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To all whom it may concern:

Be it known that we, PHILIP D. PARSONS and PATRICK J. MULLIGAN, both citizens of the United States, and residents of Philadelphia, county of Philadelphia, State of Pennsylvania, have invented an Improvement in Cardboard-Tube-Making Machines, of which the following is a specification.

Our invention relates to that class of tube making machines which wind cardboard strips spirally, one upon the other in glued rotation; and has for its object the construction of a machine of simple and effective construction for making spirally wound tubes of the above stated character.

Among the improvements embodied in our invention, the following are the more important features thereof: An endless belt driven by a single pulley or floating belt wheel and having a portion of its length spirally wrapped about a mandrel, preferably stationary, upon which the cardboard strips are wound and rotated by the belt; the support of the pulley or belt wheel and its driving means in such manner that gravity is permitted to become effective for putting the winding belt under proper tension; means for quickly removing the tension of the winding belt to permit the insertion or removal of cardboard strips when necessary; a stationary mandrel upon which the tube is spirally wound formed with spiral grooves in its surface to facilitate the travel of the cardboard strips in spiral form under the propelling influence of the winding belt; and a pivoted platform upon which the driving belt wheel and driving means therefor are supported, associated with lifting devices by which the platform may be raised for removing tension on the winding belt.

Our invention also embodies other features of improvement which, together with those above stated, are fully described hereinafter and defined in the claims.

Referring to the drawings: Fig. 1 is a side view of a machine embodying our invention with a portion of the cardboard feeding means and housing removed; Fig. 2 is a plan view of our improved machine; Fig. 3 is a side view of the glue applying means for one of the cardboard strips; Fig. 4 is a vertical section through the lubricating means for the inner cardboard ply; and Fig. 5 is a vertical section along the mandrel

and associated parts in the making of the tube.

2 is the base or bed frame and is provided with the upwardly extending housing 3 carrying a table part 3^a. Secured to clamping means 5 and held in a horizontal position is a fixed mandrel or rod 4 having a portion of its length provided with a plurality of spiral grooves 6, best shown in Fig. 5.

Two cardboard strips 7 and 8 are fed to the mandrel in a diagonal direction and spirally wound about the mandrel, one overlapping the other, the spiral winding being assured by the winding belt 26 and its spirally wrapped portion 27, the said belt being positively driven by a pulley 24.

The cardboard strip 8 is fed from a reel or roll 9, diagonally to the mandrel from one side thereof and passes over a lubricating means 10 (Fig. 4) such that its under surface is lubricated just before being wrapped upon the polished grooved mandrel, said lubrication being for the purpose of permitting the cardboard tube to freely revolve on the mandrel while being fed forward thereon with a speed commensurate with the pitch of the spiral part 27 of the driving belt multiplied into the speed of the same in terms of revolutions of said spiral portion per unit of time. The other cardboard strip 7 is fed from a roll 17 over a glue applying roller 18 rotating in the glue tank 19, thence about a guide roller 20 to bring the glued surface upward, and finally, delivering it diagonally to the mandrel and belt whereby it is caused to be spirally wound upon the cardboard tube being made from strip 8. The strip 7 is preferably fed to the mandrel from the side opposite from that to which the strip 8 was fed and so that the glued surface of the latter becomes glued to the outer surface of the spiral tube formed from the said strip 8; and further, these strips 7 and 8 are so positioned that when spirally wrapped, one about the other, they overlap so that the spiral gap in the wound strip 8 is covered by the strip 7 and vice versa, whereby the two ensleeved cardboard spiral tubes are glued together with all joints sealed.

The lubricating means 10, above referred to, preferably comprises the features shown in Fig. 4, as follows: A metal body block 11

has a transverse groove 12 at its upper part through which the cardboard strip 8 passes and a central depressed portion or recess in which is placed a cake of lubricating material 13, the same being pressed upward against the under surface of the moving strip by a plate 14 forced upward by coil springs 15. The body block 11 is provided on the bottom with a vertical pin 16 by which it is supported and adjusted. Any other lubricating means may be employed in lieu of that shown, if so desired.

Referring more particularly to the winding belt 26 and the means for supporting, guiding and driving the same, the following features are of importance. The belt 26 is preferably of strong leather and made endless; and aside from that part 27 which is spirally wound about the mandrel 4 and the cardboard tube formed of the strips 7 and 8, it is twisted and guided about a large driving pulley or belt wheel 24 revolving in a vertical plane in general alinement with the mandrel but having a slight angularity to a vertical plane through the mandrel, the tube and the spiral wrapping of the belt itself, as will be seen from Fig. 2, this being to insure the belt more readily maintaining its operative relation to the pulley 24. In view of the shortness of the belt and the close proximity of the mandrel to the pulley and the sharp twist in the belt, it is preferable to additionally provide guide rollers 28 positioned on the table 3^a to guide the belt as it approaches and leaves the spirally wound portion 27 thereof and thereby further insuring it maintaining its driving relation with the pulley 24 when driven at relatively high speed. The pulley 24 is driven by suitable worm and worm-wheel gearing 23 and by which it is journaled, said gearing being operated by an electric or other motor 25. The pulley 24, driving gearing 23 and motor 25 are preferably supported upon a pivoted platform 21, the same being hinged at 22 to a bearing 22^a secured to the base 2, said hinge 22 being greatly to one side of the belt pulley 24 and having its axis of oscillation at or substantially at right angles to the plane of revolution of the pulley. In this manner, the pulley or belt wheel, its driving means and supporting pivoted platform have a large part of their weight supported by the belt and mandrel and whereby the belt is under continued tension. The tension of the belt provides a tight gripping of the cardboard tube and hence clamps the overlapping cardboard layers tightly together at time of their attachment by the glue, with the result that the finished tube is strong, symmetrical and straight. In a general way, the belt wheel floats as it were with yielding movement toward and from the mandrel, while at the same time maintaining a driving tension on the belt.

When it is desired to loosen the belt for any reason, this is accomplished by rotating a cam (or eccentric) device 29 journaled at 30, by means of a hand lever 31, the said cam raising the platform 21 and thereby the pulley or belt wheel, with the result that the tension is removed from the belt. In normal operation of the machine, this cam 29 is thrown to the position shown in Fig. 1 and hence out of contact with the platform 21.

In cases where heavy cardboard is to be wrapped, there is more tendency to resistance to travel of the belt in the spirally wound portion 27 and consequently to cause the belt pulley or wheel to lessen its frictional driving effort. To prevent slippage from such cause (or any other), we provide pressure rollers 32 on the underside of the pulley and pressing against the belt 26, said rollers preferably spaced apart by a frame 33 in the ends of which they are journaled and said frame hinged or otherwise attached to an upright movable spring pressed part 34 positioned on a base 35. The adjustability in a vertical direction may be provided by having the part 33^a, to which the frame 33 is connected, screw threaded and adjustable on the part 34 by a nut 34^a. Any other means desired may be employed for securing the roller pressure on the belt at the lower part of the pulley, so long as the function to be performed is one which yieldingly opposes or modifies the gravity action of the pulley, its drive and platform. In fact, if these parts are made with a minimum weight which might be required, the change in gravity to increase the belt tension may be had by loading the platform with additional weight. Whatever the gravity action may be that is required and irrespective of how it may be secured, the fact remains that the necessary tension will under normal conditions continue constant; and by pre-determining the proper weight required for the thickness of cardboard to be employed, the machine may at once be adjusted for operation without any guess work on the part of unskilled attendants. It will also be understood that if, during the operation of the machine, a tendency to abnormally increase the friction occurred for any reason in connection with the wrapping of the tube, such increased tension would automatically act to reduce the tension on the up side of the belt and thereby relieve the excessive tension which may have temporarily arisen in the making of the tube. It is, therefore, evident that no breaking strains can come upon the machine and that the compensating capacity of the machine to act as its own governor in relieving itself of an excessive or objectionable temporary tension, is a feature of great importance.

It will now be apparent that we have devised a novel and useful construction which

embodies the features of advantage enumerated as desirable, and while we have in the present instance shown and described the preferred embodiment thereof which has been found in practice to give satisfactory and reliable results, it is to be understood that we do not restrict ourselves to the details, as the same are susceptible of modification in various particulars without departing from the spirit or scope of the invention.

Having thus described our invention, what we claim as new and desire to secure by Letters Patent is:

1. In a machine for making spiral tubes of cardboard, the combination of a mandrel about which cardboard strips are wrapped one upon the other in spiral form, a belt wheel arranged below the mandrel and yieldingly supported so as to be movable to and from the mandrel, an endless belt driven by the belt wheel and having a portion of its length spirally wrapped about the mandrel to act upon the cardboard strips and feed them spirally about said mandrel, means for feeding cardboard strips to the mandrel and spiral portion of the belt, and means for driving the belt wheel.

2. The invention according to claim 1, wherein further, the mandrel is stationary and arranged in approximately the same general plane as the plane of revolution of the belt wheel.

3. The invention according to claim 1, wherein further, the mandrel is stationary and provided with spiral grooves in its surface within the operating zone of the spiral portion of the belt.

4. The invention according to claim 1; wherein further, means are provided for lubricating the surface of the cardboard strip which is wrapped in contact with the mandrel.

5. The invention according to claim 1, wherein further, means are provided for positively lifting the belt pulley to remove the tension of the belt.

6. The invention according to claim 1, wherein further, adjustable means are provided for adjusting the driving friction of the pulley upon the belt to adapt the tension of the belt to the power required in forming the spirally wound cardboard tube on the mandrel.

7. The invention according to claim 1,

wherein further, guide rollers are provided between the belt wheel and mandrel for guiding the belt at those parts thereof which approach and leave the spirally wound belt portion.

8. The invention according to claim 1, wherein further, the belt wheel and driving means therefor are supported on a pivoted platform whose axis of oscillation is transverse to the mandrel and plane of rotation of the belt wheel.

9. The invention according to claim 1, wherein further, the driving means for the belt pulley comprises a motor driven worm and worm-wheel, and an adjustable hinged platform to which they are secured and whereby their weight is materially added to that of the belt wheel and platform in putting tension upon the belt.

10. The invention according to claim 1, wherein further, the belt wheel and driving means therefor are supported on a pivoted platform whose axis of oscillation is transverse to the mandrel and plane of rotation of the belt wheel, the pivot of the platform being arranged greatly to one side of the belt pulley to permit the same to rise and fall while maintaining tension upon the belt.

11. In a machine for making spiral tubes of cardboard, the combination of a mandrel about which the cardboard strips are wrapped one upon the other in spiral form, a belt wheel greatly larger in diameter than the diameter of the mandrel and arranged below the mandrel and rotating in a plane having general alinement with the mandrel, said belt wheel adjustable toward and from the mandrel, an endless belt driven by the belt wheel and having a portion of its length spirally wrapped about the mandrel to act upon the cardboard strips and feed them spirally about said mandrel, said belt wheel feeding the belt to the mandrel and withdrawing it therefrom simultaneously at opposite ends of the spiral portion, means for feeding cardboard strips to the mandrel and spiral portion of the belt, and means for driving the belt wheel.

In testimony of which invention, we hereunto set our hands.

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