July 19, 1932. L. ROSEMAN 1,867,596

TAPE WINDING APPARATUS

Filed April 21, 1930 2 Sheets-Sheet 1

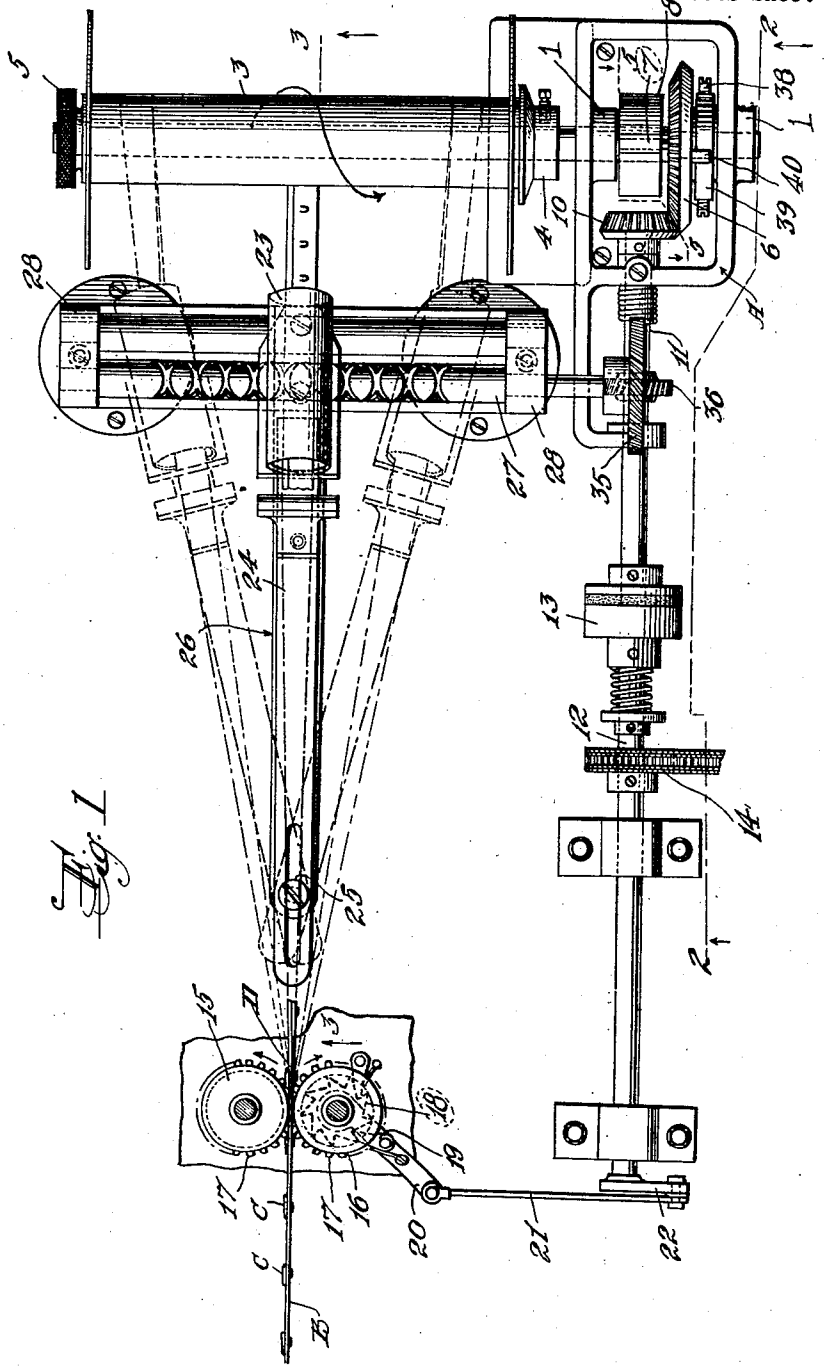


Fig. 1

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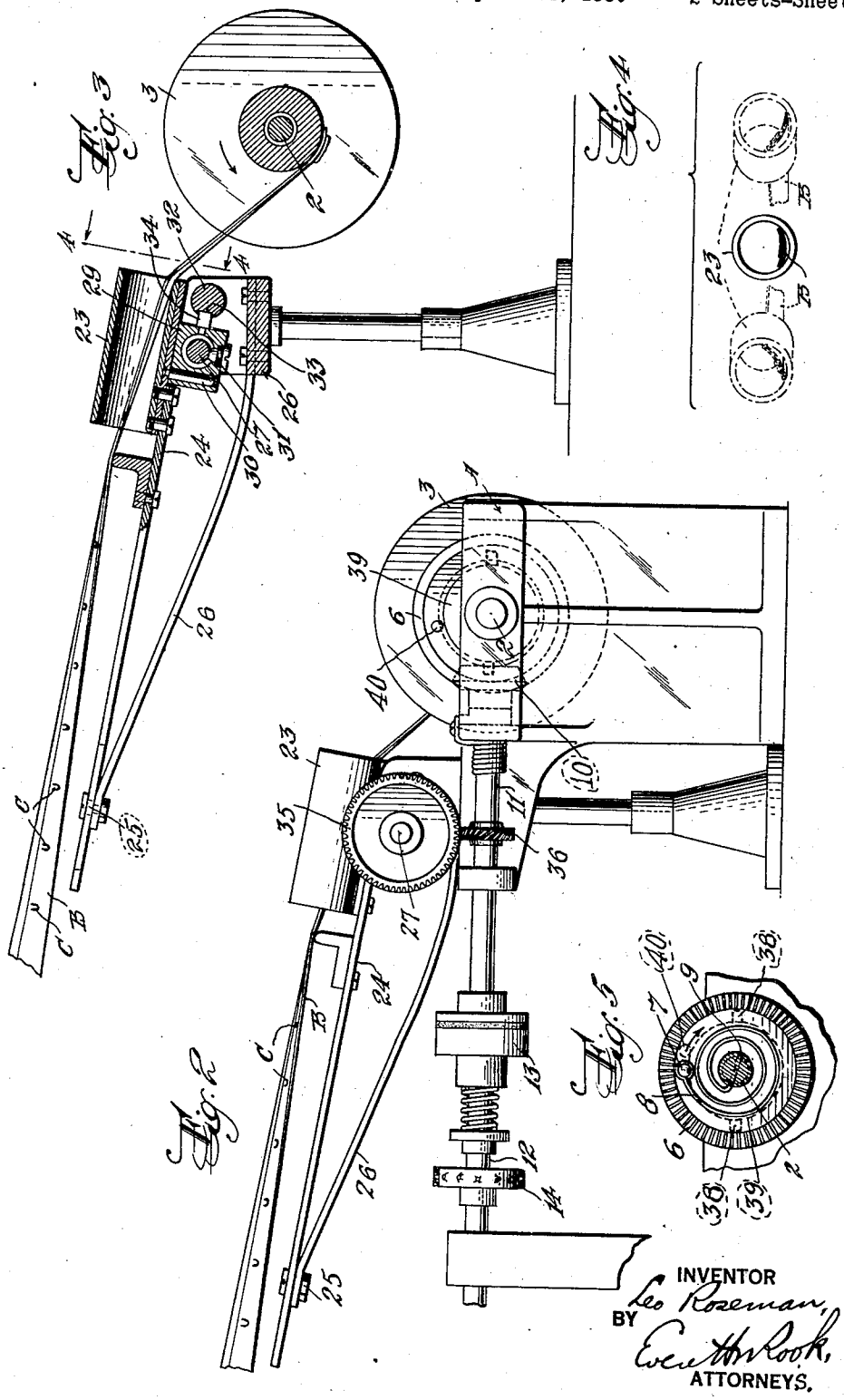


Fig. 2

Fig. 3

Fig. 4

Fig. 5

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Patented July 19, 1932

1,867,596

UNITED STATES PATENT OFFICE

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TAPE WINDING APPARATUS

Application filed April 21, 1930. Serial No. 445,888.

This invention relates in general to mechanism for reeling, spooling or winding tape, braid, ribbon material, and the like, and more particularly the invention is directed to apparatus for reeling hook and eye fastener tape comprising a plurality of folds or integral thicknesses with hook or eye fastener elements inserted therein. The invention is especially intended for use in reeling the tape upon cores, spools, or into cops, immediately after it has been made or partly made, so as to eliminate the usual practice of permitting the tape to run loose into a receptacle from the machine in which the tape is made or partly made and then winding the tape in the usual manner as by manual operation.

Another object of the invention is to provide novel and improved reeling, spooling or winding apparatus of this character whereby the tape or the like can be wound, for example upon a spindle or upon a spool, in superposed helically wound layers without bending or crinkling of the tape in its own plane in such a manner as to cause displacement or entanglement of the folds or dislodgment of the fastener elements, so that the tape can be wound or reeled in smooth, unrumpled and flat condition.

A further object is to provide a spooling or winding apparatus of the general character described to receive the tape or the like from another machine or supply means from which the tape is discharged step-by-step or intermittently and whereby the tape is maintained under substantially constant and uniform tension to prevent undue slack between said supply means and the winding spindle or the spool which might cause tangling or twisting of the tape or dislocation of the folds.

Another object is to provide such apparatus embodying novel and improved means to prevent excessive strain upon the tape which would have a tendency to pull more than the desired amount from the supply means and unduly stretch the tape.

Other objects are to provide such apparatus wherein the tape or the like is held at a point adjacent the winding spindle or the spool against lateral movement, or caused to move longitudinally in a fixed path, and is so manipulated and guided that the bending or flexing of the tape between said point and said spindle or spool incident to traverse of the tape longitudinally of the spindle or spool during winding, takes place on a line in the plane of the tape instead of on a line at right angles to the plane of the tape as usual in winding apparatus, whereby crinkling or rumpling of the tape by the bending or flexing is prevented; to provide a novel and improved traversing guide for directing the tape to the spindle or spool, and to obtain other advantages and results as will be brought out by the following description.

Referring to the accompanying drawings in which corresponding and like parts are designated throughout the several views by the same reference characters,

Figure 1 is a top plan view of a tape winding apparatus embodying my invention.

Figure 2 is a side elevation thereof with the tape feeding means omitted.

Figure 3 is a vertical longitudinal sectional view taken on the line 3—3 of Figure 1.

Figure 4 is a schematic composite end elevation of the traversing guide showing the various positions of the tape therein during the traversing movements of the guide, and

Figure 5 is a transverse vertical sectional view on the line 5—5 of Figure 1.

Specifically describing the illustrated embodiment of the invention, the reference character A designates a frame or support having bearings 1 in which is journaled a shaft 2, one end of which serves as a spindle to removably receive a winding spool or a suitable core 3. The spool or core may be clamped upon the spindle in any suitable manner so as to rotate therewith, but as shown, the shaft has a collar 4 fixed thereon and a thumb nut 5, so that the spool may be frictionally clamped upon the spindle between the collar and the thumb nut.

The shaft 2 is shown as rotated by a beveled gear 6 loosely rotatable upon the shaft and connected by a pin 7 to one end of a spiral spring 8, the other end of which is connected to the shaft 2 as at 9; the gear 6 meshes with a beveled pinion 10 which is

mounted on a shaft 11 journaled in the frame A. This shaft 11 is coupled to a drive shaft 12 through a friction clutch 13 of known construction, and the shaft 12 is connected to a suitable source of power as by a chain and sprocket gearing 14. With this construction the shaft 2, and the spool 3, are rotated in the direction indicated by the arrows in Figures 1, 3 and 5, and the spring 8 serves as a yielding coupling between the gear 6 and the shaft 2.

It is desirable to have some means for limiting the winding of the spring 8, and also for adjusting the tension of the spring. Such means may comprise a disc or collar 38 secured to the shaft 2 to rotate therewith and having one or more pins 39 projecting radially therefrom and which may be in the form of screws threaded into the disc for removal and adjustability, and a stud 40 projecting from the gear 6 to engage one of the pins 39. With this construction it is possible to initially wind the spring by rotation of the disc 38 to produce a certain tension in the spring which is maintained by engagement of one of the pins 39 with the stud 40. Also engagement of the stud 40 with one of the pins 39 prevents the spring from being wound too tightly under influence of the gear 6. After the predetermined maximum tension has been set up in the spring, the stud 40 will engage the adjacent pin 39 so as to positively connect the shaft 2 to the drive shaft 11, whereupon additional resistance to rotation of the shaft 2 will be compensated by the slipping of the clutch 13.

The winding apparatus is particularly designed for use in spooling or reeling fastener tape B which comprises a strip of fabric including a plurality of folds or superposed layers in which are arranged fastener elements C, the tape being received from a machine for performing an operation upon the tape. This machine includes means for feeding the tape to the spooling means longitudinally and with a step-by-step or intermittent motion, and this means is shown in the drawings as comprising a pair of rollers 15 and 16 which receive the tape between them. These rollers are geared together by suitable intermeshing gears 17, and one roller is rotated through a ratchet 18 secured to the roller and cooperating with a spring pawl 19 mounted on a pawl lever 20 which is pivotally mounted to oscillate coaxially with the ratchet. The pawl lever may be connected by a link 21 to a crank 22 on the drive shaft 12. With this construction the rollers 15 and 16 are rotated in the direction of the arrows on Figure 1, so as to feed the tape B with a step-by-step motion to the spooling apparatus.

The tape passes between the rollers flatwise and the rollers hold the tape against lateral movement. Between the rollers 15, 16 and the spool 3 is a traversing guide mechanism for directing the tape onto the spool, said guide mechanism including a tubular guide 23 which is substantially circular in cross section and through which loosely passes the tape. This guide is mounted upon a lever 24 having a pin and slot connection 25 with a fixed support 26 which also supports a right and left hand threaded rod 27 rotatable in bearings 28 on the support 26. A block 29 is pivotally connected to the guide 23 by a pin 30, and said block is slidably mounted for movement longitudinally of the rod 27. A follower screw 31 is mounted in the said block and engages the threads of the rod 27, and the block is further guided in its movement longitudinally of the rod 27 by a bar 32 which has a groove 33 in which slides a pin 34 on the block 29. The rod 27 has mounted thereon a spiral gear 35 with which meshes another spiral gear 36 secured on the shaft 11. With this construction it will be observed that the guide 23 will be moved longitudinally of the spool 3 alternately in opposite directions, and this movement will be simultaneous with the rotation of the spool, so that the tape which has one end secured to the spool will be wound upon the spool in superposed helically wound layers. The tubular guide 23 permits the tape to slide along its interior walls during the movements of the guide longitudinally of the spool as shown in Figure 4, so that folding, crinkling, or other detrimental distortion of the tape is avoided.

It will be observed that the shaft 11 normally acts to constantly rotate the shaft 2. The spring 8 is initially placed under tension so as to normally constantly tend to rotate the spool 3, and should rotation of the spool be interrupted as by a temporary stopping of the feeding of the tape, the spring will compensate for this relative movement of the drive mechanism and the tape. Should the resistance to movement of the spool be too great or too prolonged the clutch 13 will slip so as to prevent injury to the apparatus or the tape.

In accordance with the invention, the tape is applied to the spool flatwise in a plane at an angle to the plane of the tape as it leaves the feeding mechanism 15, 16, the tape being twisted between the feeding mechanism and the spool to accomplish this result. Accordingly, the tape is bent along a line in its own plane adjacent the feeding rollers 15, 16 as the guide 23 moves the tape longitudinally of the spool, as indicated at D, so that wrinkling of the tape or dislocation of the folds thereof is avoided. This effect can be more readily understood if the reader will visualize a piece of folded material bent on a line at right angles to the plane of the material which would result in a dislocation of the folds and wrinkling of the material. Ac-

cordingly the invention is especially useful in the handling of fastener tape in which the fastener elements are loosely inserted in the tape, because the fastener elements cannot be dislocated by the bending of the tape incident to the movement thereof from one end of the spool to the other during the winding operation.

It will be understood by those skilled in the art that I may utilize other means than the rollers 15, 16 for holding the tape against lateral movement and in a plane at substantially right angles to the plane of the tape as it is wound upon the spool. For example, a flat tubular guide to nicely slidably receive the tape might be mounted on the lever 24.

It will also be understood that the distance between the holding means, such as the rollers 15, 16, and the spool or winding spindle will be varied according to the width of the tape or ribbon material, the wider the material, the greater being the distance required to permit the twisting and guiding of the tape as described. However, the invention permits of a much shorter distance between the holding means and winding spindle than would be possible were the invention not utilized.

The invention has been described for winding the tape or other material upon a spool, but obviously the tape might be wound upon any suitable core, or directly upon the spindle as in forming cops; and the invention may be utilized in winding the tape otherwise than in helically wound layers.

Also, while I have shown and described the invention as embodied in certain details of construction and for a particular purpose, it should be understood that this is primarily for illustrating the principles of the invention and that apparatus embodying the invention may be used for other purposes and may embody different details of construction without departing from the spirit or scope of the invention.

Having thus described my invention, what I claim is:

1. In apparatus for reeling ribbon-like material, the combination of means for guiding the material with longitudinal movement in a fixed path, a winding spindle, drive means for rotating said spindle, a traversing guide for receiving said material from said guiding means and directing it into layers upon said spindle, means for driving said guide longitudinally of said spindle alternately in opposite directions, said traversing guide being shaped to hold said material with its plane at an angle to the plane thereof as it leaves said guiding means and parallel with the axis of said spindle, whereby the material may be wound flatwise on said spindle and bent or flexed on a line in its own plane adjacent said guiding means as the material is moved longitudinally of the spindle.

2. The method of reeling ribbon-like material consisting in guiding the material longitudinally flatwise, holding the material at a certain point against movement out of its plane, twisting said material beyond said holding point in the direction of a spindle on which the material is to be wound, and winding the material on said spindle flatwise in helical superposed layers with the plane of the material approximately perpendicular to the plane thereof at said holding point, so that the material is bent at the holding point on a line in its own plane as the material is wound on said spindle.

3. In apparatus for reeling ribbon-like material, means for feeding the material with longitudinal step-by-step movement and holding the material against lateral movement, a winding spindle to receive the material from said feeding means, drive means for rotating said spindle including a driving member constantly rotatable relatively to said spindle and a yielding connection between said drive member and said spindle to maintain the material substantially constantly under tension and compensate for variations in the speed of feeding said material and the speed of said drive member, a traversing guide between said feeding means and said spindle, means for moving said guide longitudinally of the spindle alternately in opposite directions to guide the material onto said spindle in layers, said traversing guide holding said material with its plane at an angle to the plane thereof as the material leaves said feeding means and guiding the material flatwise upon said spool.

4. In apparatus for reeling ribbon-like material, means for guiding said material longitudinally in a substantially fixed path, a winding spindle to receive said material from said guiding means, drive means for rotating said spindle including a driving member constantly rotatable relatively to said spindle and a yielding connection between said drive member and said spindle to maintain the material substantially constantly under tension and compensate for variations in the speed of feeding said material and the speed of said drive member, a traversing guide between said feeding means and said spindle, means for moving said guide longitudinally of the spindle alternately in opposite directions to guide the material onto said spindle in layers, said traversing guide holding said material with its plane at an angle to the plane thereof as the material leaves said guiding means and guiding the material flatwise upon said spool.

5. In apparatus for reeling fastener tape which includes a plurality of integral folds or layers and fastener elements thereon, the combination of means for guiding the tape with longitudinal movement in a fixed path, a winding spindle, drive means for rotating

said spindle, a traversing guide for receiving said tape from said guiding means and guiding it into layers upon said spindle, means for driving said guide longitudinally of said spindle alternately in opposite directions, said traversing guide holding said tape so that the tape is wound flatwise on the spindle and the plane of the tape as it is wound on the spindle is at an angle to the plane of the tape as it leaves said guiding means, whereby the tape is bent or flexed on a line in its own plane adjacent said guiding means as the tape is moved longitudinally of the spindle so as to prevent dislocation of the folds and fastener elements during the winding operation.

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