B. F. FALTER & G. J. LEDERER.

TAPE SHRINKING MACHINE.

APPLICATION FILED DEC. 7, 1910.

1,038,104. **Patented Sept. 10, 1912.**

3 SHEETS—SHEET 1.

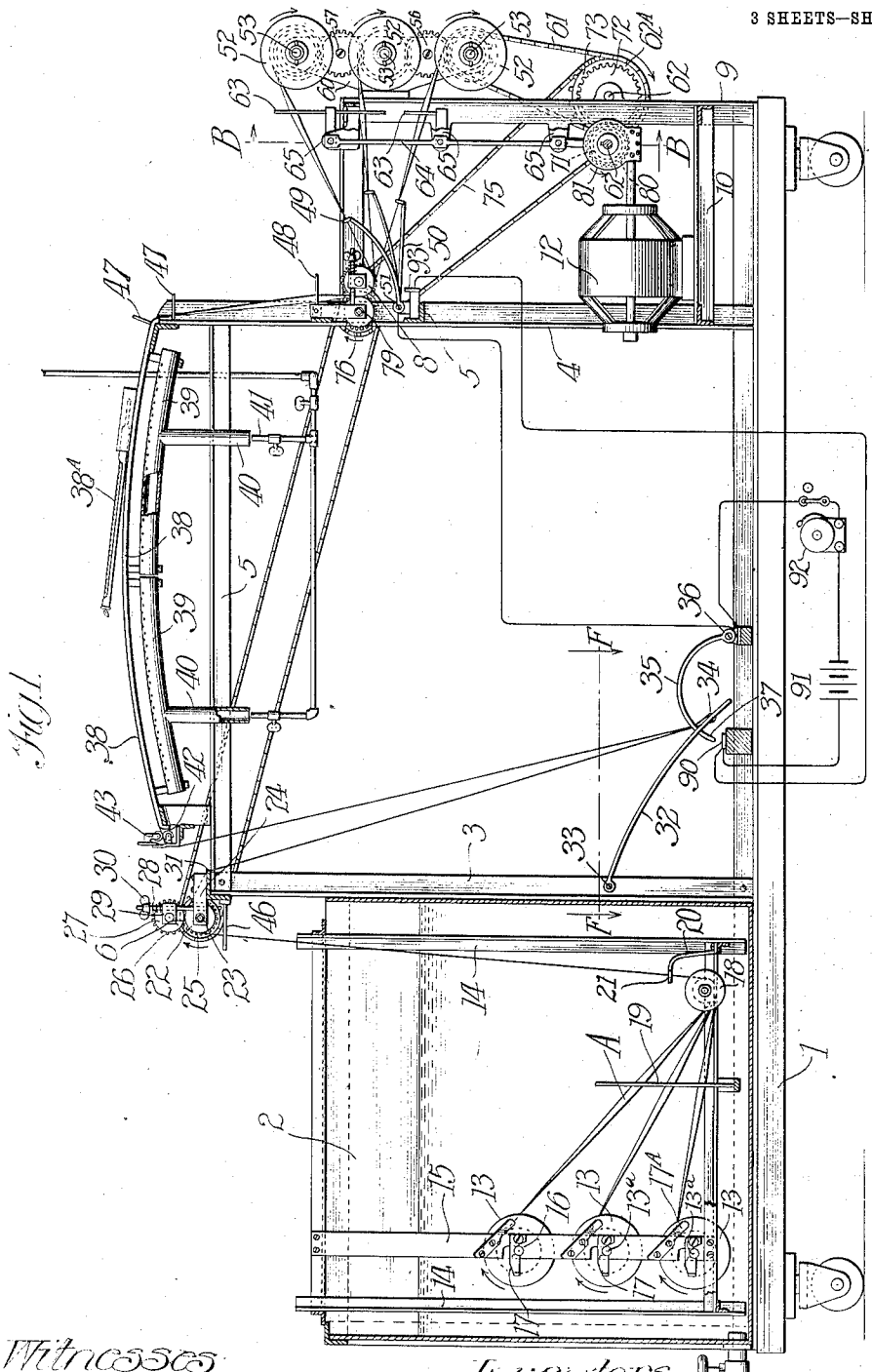

Fig. 1.

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Edwin Sheeps

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3 SHEETS—SHEET 2.

Fig. 4.

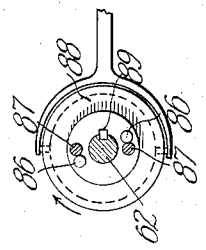


Fig. 6.

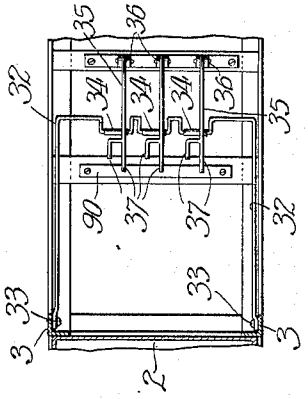


Fig. 3.

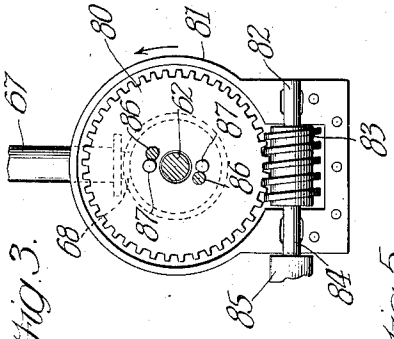


Fig. 5.

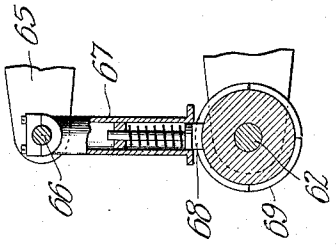
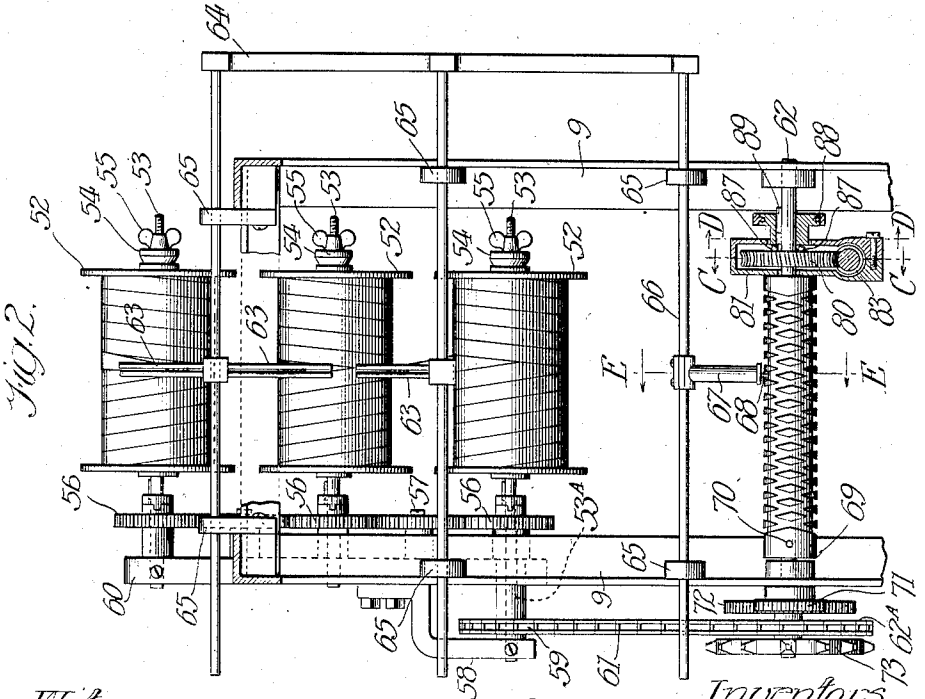


Fig. 2.



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3 SHEETS—SHEET 3.

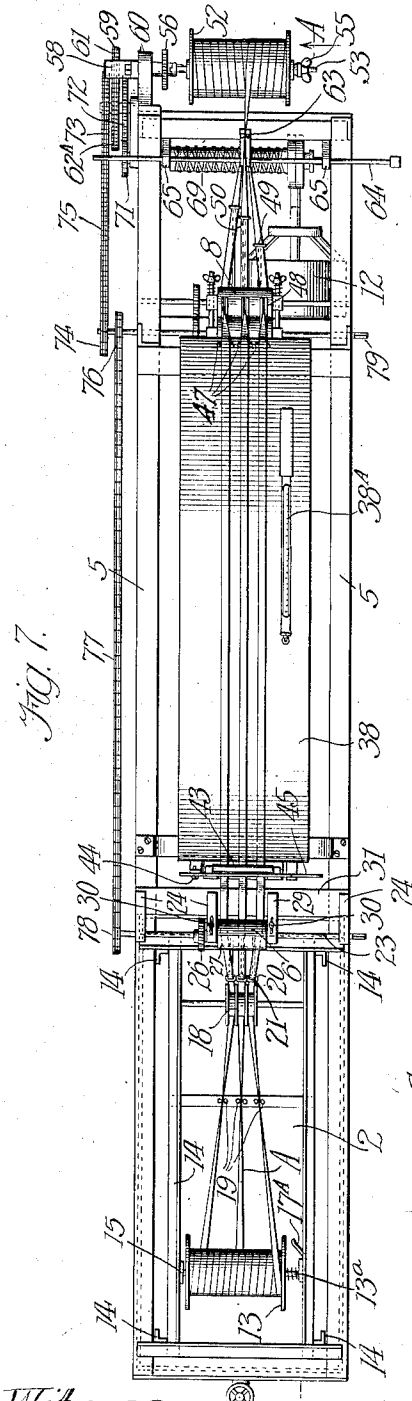

Fig. 7.

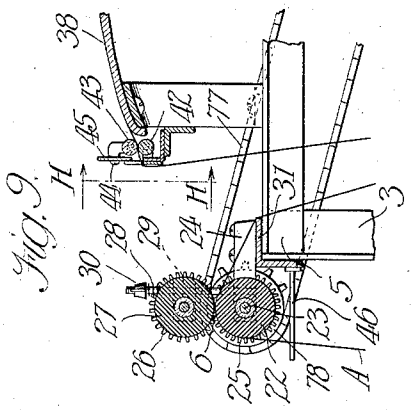

Fig. 9.

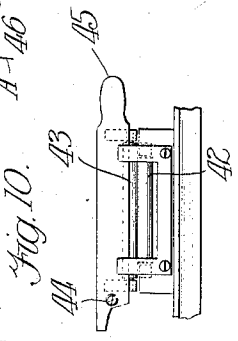

Fig. 10.

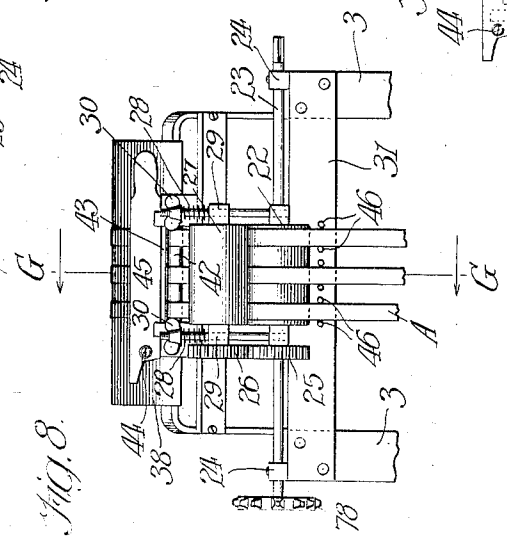

Fig. 8.

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UNITED STATES PATENT OFFICE.

BENJAMIN F. FALTER AND GEORGE J. LEDERER, OF CHICAGO, ILLINOIS.

TAPE-SHRINKING MACHINE.

1,038,104. Specification of Letters Patent. Patented Sept. 10, 1912.

Application filed December 7, 1910. Serial No. 596,162.

To all whom it may concern:

Be it known that we, BENJAMIN F. FALTER and GEORGE J. LEDERER, citizens of the United States of America, and residents of Chicago, county of Cook, State of Illinois, have invented certain new and useful Improvements in Tape-Shrinking Machines, of which the following is a specification.

The main objects of this invention are to provide improved and efficient means for shrinking or treating tape in the process of transfer from one stock spool to another stock spool; to provide improved mechanism which will rapidly unwind, uniformly moisten, dry, and re-wind several spools at the same time, without manual labor on the part of the attendant; to provide an automatically operated alarm to call the attention of the attendant to the breaking of any one of the tapes; to provide improved drying means for removing all moisture from the tape; to provide improved means for obtaining a uniform tension to prevent changing the shape or crumpling of the tape; and to provide improved and convenient means for mounting spools so that they can be readily immersed in a tank, to insure perfect moistening as the spools are unwound under water.

Figure 1 is a sectional elevation of a tape shrinking machine constructed according to this invention, taken on the line A—A of Fig. 7. Fig. 2 is an end elevation of the re-winding mechanism, on the line B—B of Fig. 1. Fig. 3 is a detail of the worm gear driving mechanism as viewed from the plane of the line C—C of Fig. 2. Fig. 4 is a detail of the clutch mechanism, as viewed from the plane of the line D—D of Fig. 2. Fig. 5 is a sectional detail of the shoe which engages the cam slot of the feed roll and is taken on the line E—E of Fig. 2. Fig. 6 is a detail plan of the tension mechanism as viewed from the plane of the line F—F of Fig. 1. Fig. 7 is a plan view of the entire machine. Fig. 8 is an end elevation of the wringer mechanism. Fig. 9 is a sectional elevation of the same, taken on the line G—G of Fig. 8. Fig. 10 is a detail of the guide rollers as viewed from the plane of the line H—H of Fig. 9.

In the construction shown, the structure comprises a portable platform or supporting structure 1 which supports an open rectangular tank 2, in which the tape A is moistened, and vertical members 3 and 4, which form, with the transverse members 5, a support for a tape wringer 6, a drier element 7, and drive rolls 8. The vertical members 9, with the transverse braces 10 and 11 between the vertical members 4 and 9, form bearings and supports for the driving motor 12, and a complete tape re-winding mechanism.

The tape spools 13 are mounted on a removable frame 14, which is slidable into and out of the rectangular tank 2. The frame 14, which might be termed the supply magazine, supports three tape spools on individual spool shafts 13^a between two vertical members 15, one end of each spool shaft 13^a fitting into a socket in one of the upright members 15, the other end being located in a recess or slot 16, in which it is locked in position by a pivoted catch bearing 17. The tape passes from the spools on one side of the tank to respective idlers 18 on the opposite side of the tank. Between the spools and the idlers are placed vertical rods 19 forming slits through which the tape must pass, giving it a half turn in the liquid as it passes from the spool 13 to the idler 18. Arms 20, secured to the frame, have eyes 21, which act as guides for the tapes as they leave the idlers. Above the frame and overhanging the tank is placed a wringer 6 which is mounted at the junctions of the vertical members 3 and transverse members 5. The wringer 6 has a roll 22 which is mounted on a shaft 23 in the journals 24. On the shaft 23 is also mounted a gear wheel 25 which meshes with a similar gear wheel 26 which drives a roll 27. Pressure between coacting surfaces of the rolls 22 and 27 is maintained by means of springs 28, which act between the bearing blocks 29 of the roll 27, and the lower surface of the wing nuts 30.

Substantially uniform tension is maintained on the tape by having it pass over the edge of the angle iron 31 to a tension frame 32, shown in Fig. 6. The tension frame 32 is secured to vertical members 3 by pivots 33. Suitable rollers 34 are mounted on the tension frame 32 in such manner as to prevent endwise displacement. A slight additional tension is also maintained by arms 35, which are pivoted to the platform at 36, and

which are provided with prongs 37 which engage and guide the tape in the passage from the rollers 34. By running the tape down over the tension frame, there is provided an extended loop between the bath and the drier where shrinkage occurs, and the tension mechanism tends to keep the tape taut and readily yields to any irregularities in the tape during shrinkage.

Above the transverse member 5 is supported a curved metal plate 38, which is provided with a heater, shown in the drawings in the form of two gas burners 39 with the usual mixing tubes 40 and gas supply pipes 41. The tape is delivered to the curved metal plate 38 over a guide roll 42, above which is mounted a smoothing roll 43. For convenience in threading the tape between the guide and smoothing rolls, the smoothing roll is mounted on a pivot 44, the opposite end of the roll being provided with a handle 45. Guide pins 47 are placed at the delivery end of the curved plate 38 to prevent shifting of the tape on the drying surface. A thermometer 38A is connected to the plate 38 to enable the operator to accurately control the temperature of said plate.

In its delivery from the drive rolls 8 to the re-winding rolls, the tape passes through guides 49 mounted on the ends of fingers 50 which are secured to the vertical member 4 by pivots 51.

The re-winding mechanism comprises three spools 52 which are mounted on three spool winding shafts 53, being removably mounted on said shafts by means of a slidable cone bearing 54, which coacts with the wing nuts 55 which are threaded on the end of the shafts 53. The spool winding shafts 53 are all rotated in the same direction by means of five similar gear wheels 56, three of the gear wheels 56 being mounted to rotate with the spool shafts 53, two of the gear wheels being mounted on shafts 57 intermediate of the spool driving gears 56. One of the spool shafts 53 is provided with a prolongation 53A, and is journaled in an outer bearing 58. Between the outer bearing 58 and the frame is a driving sprocket wheel 59. All of the shafts 53 and the shafts 57 are mounted on a plate 60 which is bolted to one of the vertical members 9. The driving of the train of spool gears is accomplished by means of a sprocket chain 61 which engages a sprocket wheel 62A located on the main shaft 62.

The uniform distribution of the tape on the re-winding spools 52 is accomplished by means of guides 63 which are mounted upon the guide frame 64, which is slidably mounted in bearings 65. Rigidly secured to the lower bar 66 of the guide frame is an arm 67 which carries a shoe 68 which coacts with a feed shaft 69, on the periphery of which there is cut an endless right and left cam slot.

The simultaneous operation of the re-winding rolls, the drive rolls, the feed rolls, and the wringer is accomplished by means of the mechanical connections between them. The feed shaft 69 is secured to the main shaft 62 by means of a set screw 70. A gear wheel 71 meshes with the gear wheel 72, which drives a sprocket wheel 62A which in turn operates the re-winding spools by means of a sprocket chain 61. The sprocket wheel 73 is mounted on the shaft of the gear wheel 72, and is connected to operate the drive rolls 8 by means of a sprocket wheel 74, and chain 75. A driving sprocket wheel 76 is connected to operate the shaft 23 of the wringer rolls 6 by means of a chain 77 engaging the sprocket wheel 78. Provision is also made for operating the wringer rolls 6 and the feed rolls 8 manually by the formation of a square head on one end of the main wringer roll shaft 23 and on one end of the main drive roll shaft 79.

The connection of the motor with the main shaft is made by means of a worm gear 80 mounted to turn loose on the main shaft. The worm gear is surrounded by a casing 81, which forms journals 82 for a worm shaft 83 which is mounted on an extension 84 of the motor shaft 85. The face of the worm gear is provided with two pins 86 which are arranged to engage two pins 87 mounted on the face of a clutch 88, which is in turn mounted on the main shaft 62 and is prevented from rotation on said shaft by means of a spline 89.

An electric alarm system is provided which is shown diagrammatically in Fig. 1. Contacts adapted to close the alarm circuit are provided by an insulated block 90, which is adapted to coact with the free end of the arm 35 in case of the breaking of the tape before it reaches the heating element. The electric alarm is operated by means of a battery 91, one terminal of which is connected to the insulated contact block 90, the other terminal being connected to the pivot 36 which supports the contact arm 35. The electric alarm is sounded by including in the circuit the usual electric alarm bell 92. In case of breaking of one or more of the tapes between the feed rolls 8 and the re-winding spools 52, the electrical circuit, including the battery 91, and the bell 92, is closed by means of an insulated block 93, which coacts with any one of the finger guides 50.

In operation, the tape A is unwound from spools suspended in the moistening tank 2, and is threaded through the machine, as indicated in Fig. 1.

To thread the tape on the machine, the frame 14 is removed from the moistening tank, and spools 13 are mounted on spool shafts 13a between the vertical members 15. The catch bearings 17 are swung to engage

the top of the shaft to prevent floating of the spool shaft out of its journals. The tension clip 17A is so placed as to normally offer resistance to the rotating of the spool 13. The respective tapes are then drawn through between the vertical rods 19 around the respective idlers 18 through the eye 21, over the top of the frame, to the wringer rolls 6. The wringer roll may be manually operated by turning the roll shaft 23 by means of a crank handle, having a square socket to fit the end of said shaft, and is connected by chain and sprocket mechanism to the main drive shaft 79. From the wringer roll, the tape is pulled over the top edge of the frame, contacting with the frame at 31, from which contact the tape is drawn around its respective roller 34, located on the tension frame 32, up to the guide roll 42. In order to place the tape between the guide roll 42 and the smoothing roll 43, the smoothing roll is lifted by means of the handle 45 to a vertical position.

After the tapes are all threaded over the guide roll 42, the smoothing roll is replaced in the horizontal position. From the smoothing roll, the tape A passes over the heating element, contacting with the curved surface 38. At the end of the curved surface 38, the tapes are held in their respective paths by passing between guide pins 47 similar to the guide pins 46, which are placed in advance of the wringer roll 6. The tape A next passes between guide rods 48, which give the tape a half turn and secure perfect alinement when the tape reaches the drive rolls 8. From the drive rolls 8, the tape is threaded through eyes 49 at the extreme ends of the guide fingers 50. From the guide fingers 50, the tape passes between distributing guides 63, which are secured to the guide frame 64. Then the tape passes directly to the re-winding spools 52, to which the end of the tape is made fast. After the ends of the tapes A have been secured to the re-winding spools 52, the re-winding spools are secured against rotation relative to their respective shafts 53 by turning the wing nuts 55, so as to force the cone bearings 54 against the spools.

The tape having been threaded through the machine, the frame 14, with the spools mounted thereon, is immersed in the tank 2, which contains sufficient water to entirely cover all of the spools. When the frame 14 is lowered into position, the tapes are threaded between the guide rods 46 in front of the wringer 6. Then the arm 35 is swung into position so that its forks engage the tapes A. The heating element is heated by the gas burners 39. The proper temperature of the heating surface 38 is indicated by the thermometer 38A, which is attached to the heating plate 38. Progressive movement of the tape from the moistening tank to the re-winding rolls is produced by starting the motor 12 and sliding the clutch 88 on the main shaft 62, so that the pins 87 engage the pins 86 on the worm gear directly connected to the motor.

Since all of the moving parts are mechanically connected to the main shaft 62, as soon as the clutch 88 is placed in operating position, the re-winding rolls will be rotated, taking up the tape as rapidly as it is delivered by the drive rolls 8, and the distributing guides 63 will uniformly distribute the tape to the surface of the re-winding spool 52 through the action of the shoe guide 68, which engages the cam slot on the face of the feed roll 69. In case of the breaking of any one of the tapes in the passage from the original tape spool 13 to the re-winding spool 52, or when the end of the tape is reached, the arm 35 will be released, and the free end of the arm will drop, closing an electric alarm circuit between the pivot 36 and the insulated contact plate 90. In a similar manner, in the absence of the tape or of tension on the tape between the drive rolls 8 and the re-winding spool 52, the finger guides 50 will drop, making contact with the insulated stop block 93, thereby closing the electric alarm circuit between the insulated block 93 and the pivot 51. In the event of the breakage of any tape, the electrical alarm is operated, calling the attention of the operator, and the machine can be stopped by either stopping the motor 12, or sliding the clutch 88 on the main shaft to throw the clutch pins out of engagement.

Although but one specific embodiment of this invention is herein shown and described, it will be understood that numerous details of the construction shown may be altered or omitted without departing from the spirit of this invention, as defined by the following claims.

We claim:—

1. In a tape shrinking machine, the combination of a moistening bath, a wringer element, a heating element, drive rolls, re-winding rolls, a tape distributer for said re-winding rolls, and means for producing a progressive movement of the tape from said bath to said re-winding rolls, all being assembled as one structure.

2. In a tape shrinking machine, the combination of a magazine having supports for a plurality of spools of tape, a moistening bath, a drier, and re-winding mechanism comprising a plurality of spindles corresponding in number to the tape supports on said magazine, means for individually guiding the tapes from their respective magazine spools, through said bath to said drier and then to the respective individual re-winding spindles, power driven mechanism for simultaneously rotating all of said re-winding spindles, and clutch mechanism

adapted to permit the stopping of any of said re-winding spindles without interfering with the operation of the others.

3. In a tape shrinking machine, the combination of a moistening element, a wringer element, a drying element, a re-winding element, and means for causing a tape to pass in succession to said elements, and a roller located at a distance from said elements and adapted to have the tape pass thereover in traveling from said wringer element to said drying element so as to provide an extended loop in said tape where the shrinkage occurs.

4. In a tape shrinking machine, the combination of a moistening element, a wringer element, a drying elemnt, a re-winding element, means for causing a tape to pass in succession to said elements, a roller located at a distance from said elements and adapted to have the tape pass thereover in traveling from said wringer element to said drying element so as to provide an extended loop in said tape where the shrinkage occurs, and tension means for permitting said roller to yield to any irregularities of the tape during the shrinkage thereof.

Signed at Chicago this 2nd day of December, 1910.

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GEORGE J. LEDERER.

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