

Aug. 13, 1940.

F. D. CHITTENDEN ET AL
MACHINE FOR MAKING ELASTIC YARN

2,210,883

Filed Feb. 3, 1939

Fig. 1.

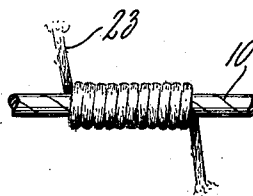
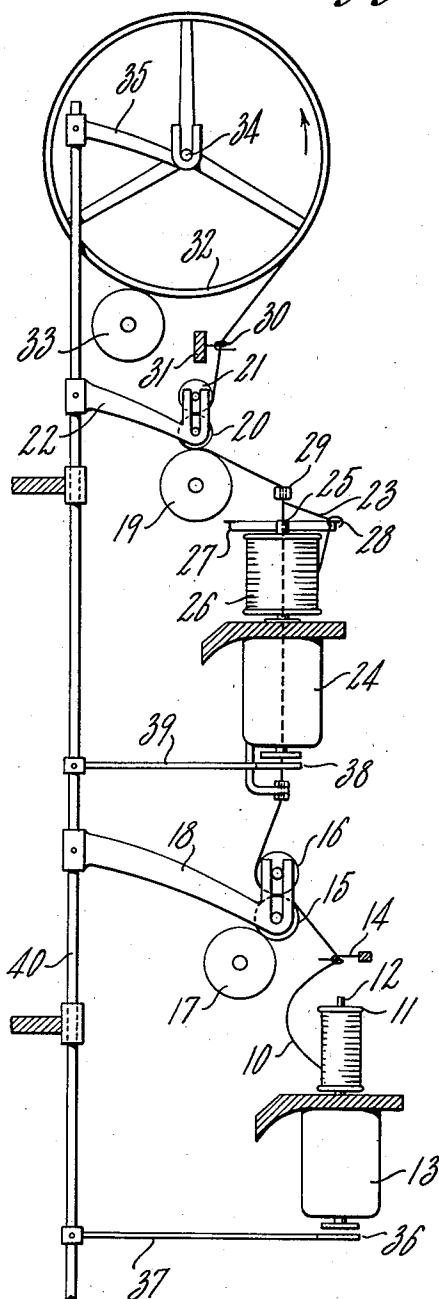


Fig. 2.

INVENTORS
FAYETTE D. CHITTENDEN
HARVEY MANCHESTER
BY *Gouldy & Renshaw*
ATTORNEYS

UNITED STATES PATENT OFFICE

2,210,883

MACHINE FOR MAKING ELASTIC YARN

Fayette D. Chittenden, Rumford, and Harvey
Manchester, Providence, R. I., assignors to
United States Rubber Company, New York,
N. Y., a corporation of New Jersey

Application February 3, 1939, Serial No. 254,400

1 Claim. (Cl. 57-18)

The present invention relates to a machine for making a balanced single cover elastic yarn in one continuous operation.

It has been proposed heretofore to make a balanced elastic yarn consisting of a rubber core twisted in one direction and having a textile cover forming helical windings extending in the opposite direction to balance the twist of the core. In these prior constructions, however, the rubber core has been twisted in one operation and then the covering has been applied thereto in a separate and distinct operation, or the elastic yarn has been produced by helically winding a covering yarn about an untwisted core and then this elastic yarn has been subsequently balanced by twisting the core and cover in the opposite direction.

In an elastic yarn such as herein contemplated, in which the twists imparted to the rubber core in one direction are relied upon to balance the helical windings of the cover in the opposite direction, it is necessary to accurately control the number of twists per inch imparted to the rubber core and also to control the tension or amount of stretch imparted to the rubber core at the time the cover is being wound thereupon.

The present invention contemplates a simple and practical machine for producing a single cover elastic yarn in one operation by removing the rubber thread endwise from a rapidly rotating package so as to twist the core and control the amount of twist imparted thereto, and at the same time stretch this twisted rubber thread to a desired degree and helically winding the textile cover upon the stretched portion of the rubber core, to thereby produce a balanced elastic yarn in which the conditions attending the twisting of the core and applying the cover thereby are accurately controlled.

A primary feature of the present invention resides in mechanism for rapidly rotating the package of rubber thread and in feed means for drawing the thread endwise from the package at a uniform speed to thereby accurately control the twist per inch imparted to this thread, and also in second feed means spaced from the first and operable to accurately control the tension of the portion of the twisted thread about which the cover is being helically wound.

As a result of the present construction the various steps of producing the elastic yarn are performed in one continuous operation and an excellent control of the rubber core is secured throughout its travel from the let-off package

to the winding of the finished elastic yarn upon its take-up package.

The various features of the present invention and novel combination of parts will be more fully understood from the following description when read in connection with the accompanying drawing illustrating one good practical form thereof.

In the drawing:

Fig. 1 is a diagrammatic side elevation of one form of the machine for carrying out the invention; and

Fig. 2 is an enlarged side elevation of a piece of elastic yarn formed upon the machine of Fig. 1.

In the embodiment of the invention illustrated in the drawing, the elastic thread formed of rubber or any other suitable rubber-like material is wound in an untwisted condition upon a spool 11 to thereby form a package which preferably is small enough to permit the same to be rotated at high speed, say 10,000 R. P. M. or higher. The rubber thread should be wound upon this spool under sufficient tension to prevent the entire mass of rubber from ballooning or bulging outwardly appreciably from the body of the spool under the centrifugal force caused by the high speed of rotation.

In the construction shown, the thread supply spool 11 is mounted upon and is rotatably supported by the spindle 12 which may be rotated by a driving belt, but is preferably driven at high speed by a small electric motor 13.

It is found unnecessary to provide a ring and traveller or a guiding flier to control the thread as it is unwound from the spool 11, since the unwinding of this thread and ballooning of the same can be controlled by providing a pigtail or guide 14 mounted in axial alignment with the spool 11 and a short distance therefrom.

As above stated, an important feature of the present invention resides in feed means for accurately controlling the speed at which the rubber thread 10 is withdrawn endwise from its package to thereby control the number of twists per inch imparted to this thread. In the embodiment of the invention shown, this thread feeding means consists of the cooperating rolls 15 and 16 between which the rubber thread 10 passes. The lower feed roll 15 may be driven by any suitable means and is shown as driven by its engagement with the driving roll 17. The rolls 15 and 16 are rotatably supported by the bracket 18 so that the roll 16 may rest by gravity upon the thread passing between it and the

lower roll 15. It will be understood that by operating the driving roll 17 at the desired speed relative to the speed of rotation of the let-off package 11 the amount of twist per inch imparted to the rubber thread 10 can be accurately controlled. It should also be noted that the ballooning of the thread 10 will help to take up slight variations in the tension of this thread as it unwinds from the package 11.

The mechanism so far described serves to impart the desired amount of twists to the rubber thread ready to have the cover wound thereupon in the opposite direction but, as above stated, it is important to accurately control the tension of the portion of the twisted thread about which the cover is being applied. This is secured, in the construction shown, by employing the second feed means which may be similar in construction and operation to the first feed means just described. This second feed means, as shown, consists of the driving roll 19 above which is provided a pair of feed rolls 20 and 21. These feed rolls are supported by the bracket 22 to be driven by the roll 19 as the elastic yarn passes between the rolls 19 and 20 and then upward around the roll 20 and between it and the upper roll 21. The arrangement is such that the rolls 20 and 21 rest by gravity upon the elastic yarn they are feeding. It will be seen that by operating the driving roll 19 at the proper speed with respect to the lower driving roll 17 the amount of stretch imparted to the twisted rubber thread 10 at this time may be accurately controlled. Various forms of covering mechanism may be employed to wind a cover such as textile yarn 23 about this stretched portion of the twisted rubber core. This covering mechanism in the construction shown, comprises an electric motor 24 adapted to rotate rapidly the hollow spindle 25 upon which is mounted the package 26 of covering yarn. In this construction a ring 27 and traveller 28 are provided for guiding the covering yarn 23 as it unwinds from the package 26 and they serve also to wind this yarn about the tensioned rubber core 10.

The arrangement is such that the rubber thread 10 passes upwardly through the hollow spindle 25 to the yarn guide 29 and the rotation of the yarn package 26 serves to wind the cover 23 about the twisted rubber core in the opposite direction to the twist of the core so as to cause the helical windings of this cover to balance the twists of the core and thereby produce a balanced elastic yarn. The let-off package 11 may be ro-

is driven in the construction shown by resting upon the driving roll 33 and the drum 32 is rotatably supported by its central shaft 34 which rests in the slotted portion of the supporting bracket 35.

The machine of the present invention has been designed more particularly for the manufacture of a fine elastic yarn and the operating motors 13 and 24 are preferably constructed to operate at high speed. It is therefore important to provide each motor with brake means for quickly stopping its rotation after the power has been cut off. Therefore, in the construction shown, the motor 13 is provided at the lower end of its operating spindle 12 with a friction disc that rotates with this spindle and which is adapted to be frictionally engaged by the braking member 36 secured to the outer end of a flexible brake applying rod 37. Likewise the motor 24 is provided at the lower end of its operating spindle 25 with a brake disc adapted to be frictionally engaged by the brake member 38 carried at the outer end of the flexible brake applying rod 39.

In the construction shown, the feed roll supporting brackets 18 and 22, the drum supporting bracket 35 and the brake applying rods 37 and 39 are all secured to a vertical operating rod 40. The arrangement is such that when it is desired to stop the winding operation, the rod 40 is moved upwardly slightly to thereby apply the brakes 36 and 38, move the feed rolls out of engagement with their driving rolls and lift the skein receiving drum 32 out of engagement with its driving roll 33.

It will be seen from the foregoing that the mechanism of the present invention is simple in construction and well adapted to give accurate control of the amount of twist imparted to the rubber thread 10 as it is unwound from its supply spool 11, and that it is also well adapted to maintain the twisted portion of the rubber core under the desired tension or degree of elongation while the cover is being helically wound thereupon. This serves to produce the single cover balanced elastic yarn shown in Fig. 2 in which the twists of the rubber core 10 in one direction serve to balance the helical windings of the covering material or covering yarn 23 in the opposite direction.

In order that the type of elastic yarn that may be produced on the present machine may be better understood the following examples are given.

		A	B	C
1	Core-rubber thread.....	125's.....	125's.....	150's.....
2	Cover.....	1 end 50/1 cotton.....	1 end 70/1 cotton.....	1 end 100/1 cotton.....
3	Yds./lb.-elastic yarn.....	12,500.....	15,500.....	20,000.....
4	Elongation.....	125%.....	125%.....	125%.....
5	Length of core in one yard of elastic yarn.....	18 ins.....	18 ins.....	20 ins.....
6	Percent core.....	36.....	44.....	50.....
7	Percent cover.....	64.....	56.....	50.....
8	Gauge-elastic yarn relaxed.....	0.010".....	0.009".....	0.008".....
9	Elastic yarn strength at break.....	0.415 lb.....	0.330 lb.....	0.190 lb.....

tated in either a clockwise or contra-clockwise direction so long as the package 26 is rotated in an opposite direction to apply the cover in a direction to balance the twist of the core.

The finished elastic yarn, thus produced, passes between the feed rolls 21 and 22 as above described, and then through the yarn guide 30 which is mounted upon the traverse bar 31 to traverse this elastic yarn as it is wound into a skein about the take-up drum 32. This drum

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

In an apparatus for making a balanced elastic yarn having a single cover, in combination, a let-off package for a rubber thread, power driven means for rotating said package about its central longitudinal axis to twist the thread, power-driven thread gripping rolls for drawing the thread endwise of said package at a uniform speed to impart a definite number of twists per

2,210,883

3

inch to the thread, other power-driven thread gripping rolls spaced from said first rolls and operable to stretch the portion of thread extending therebetween a predetermined amount, and a hollow spindle through which said thread passes and operable to wind a covering strand helically

about that portion of the rubber thread stretched between said spaced rolls but in the opposite direction to the twist of the rubber thread to form a balanced elastic yarn.

FAYETTE D. CHITTENDEN. 5
HARVEY MANCHESTER.