Jan. 5, 1954 G. C. ANDERSON 2,664,594

TEXTILE BALLING MACHINE

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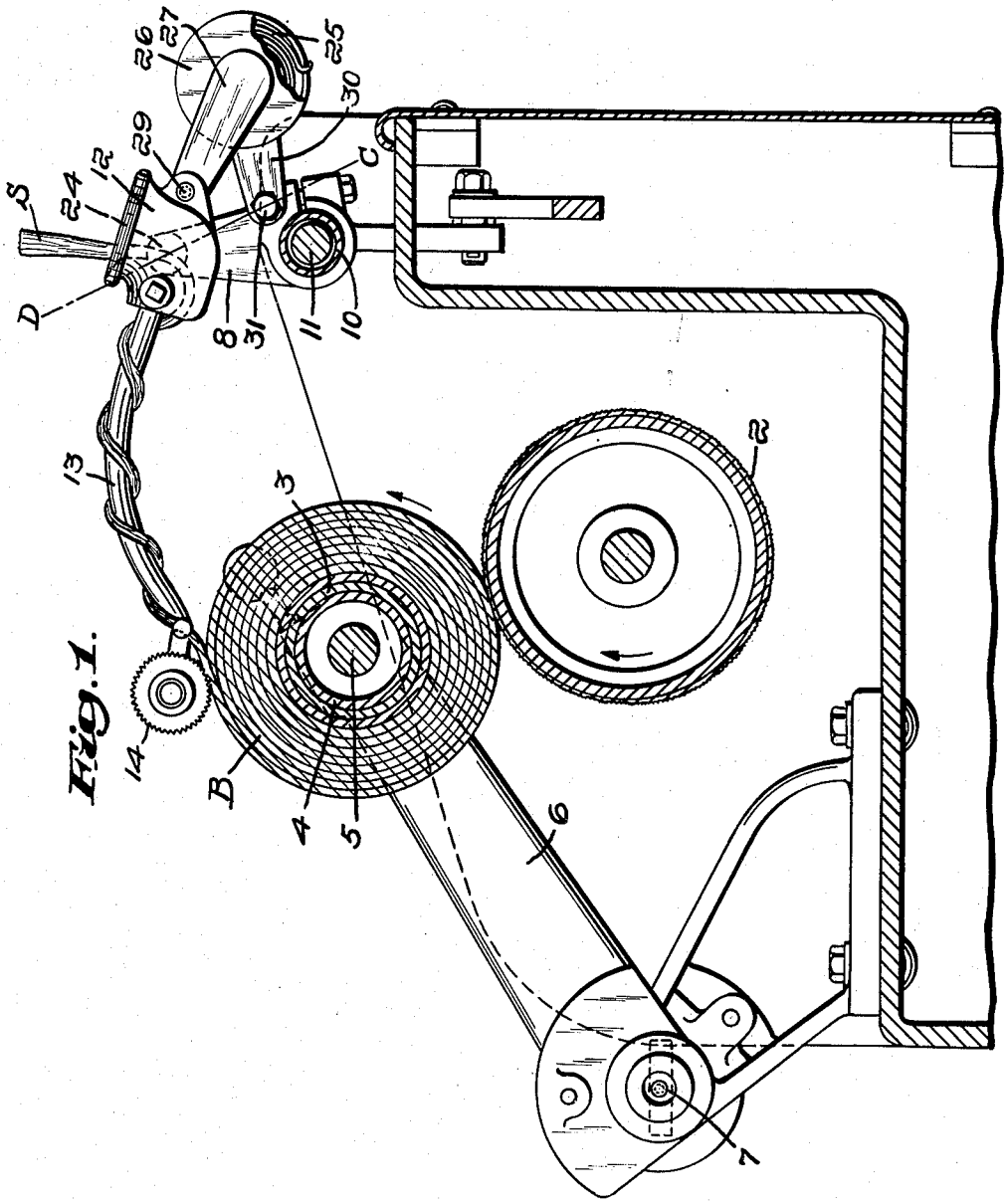


Fig. 1.

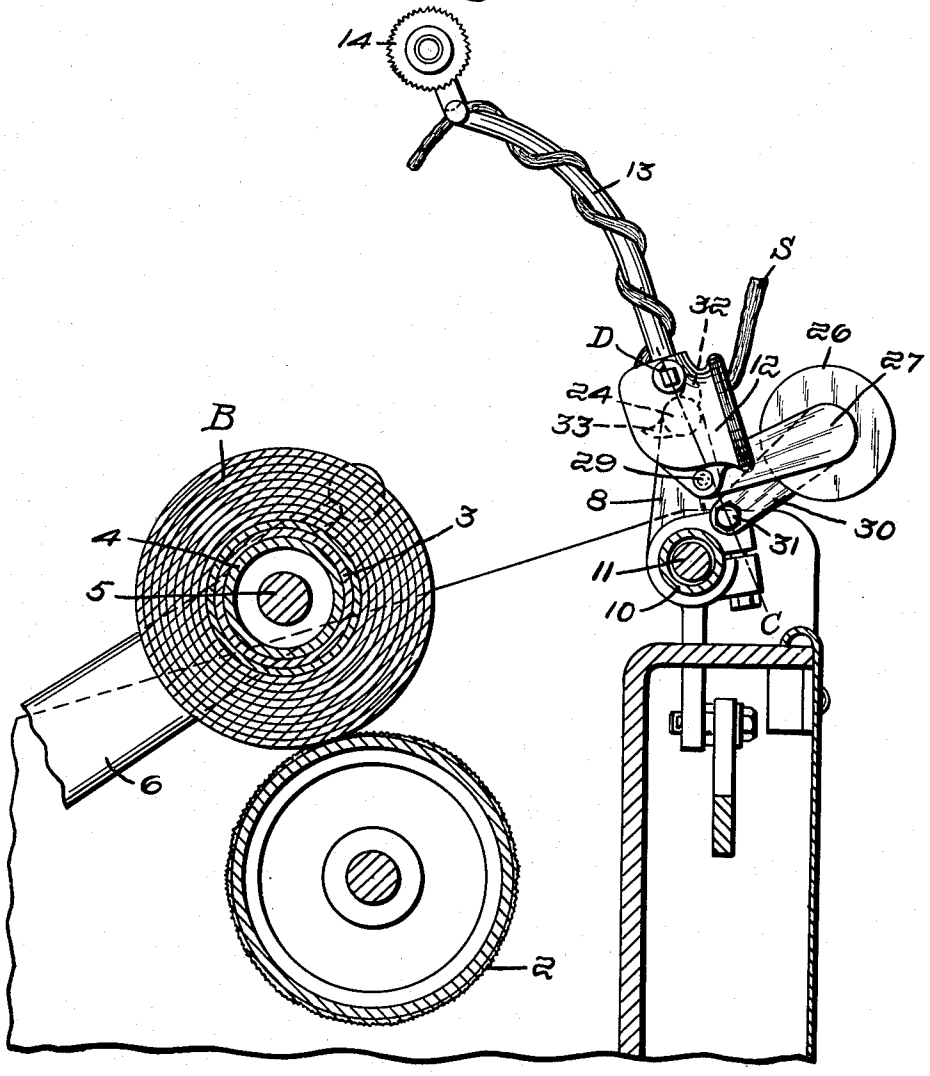
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Fig. 2.



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Fig. 3.

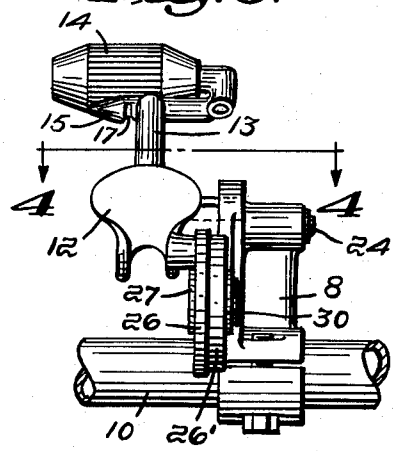


Fig. 4.

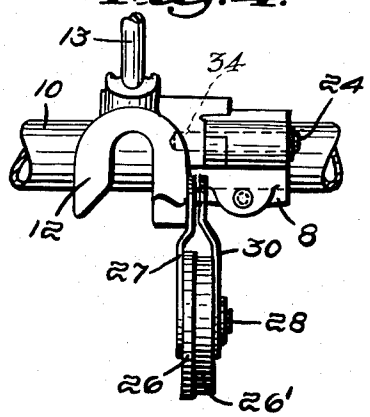


Fig. 8

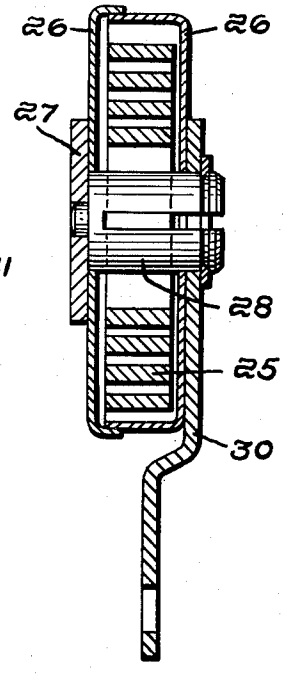


Fig. 5.

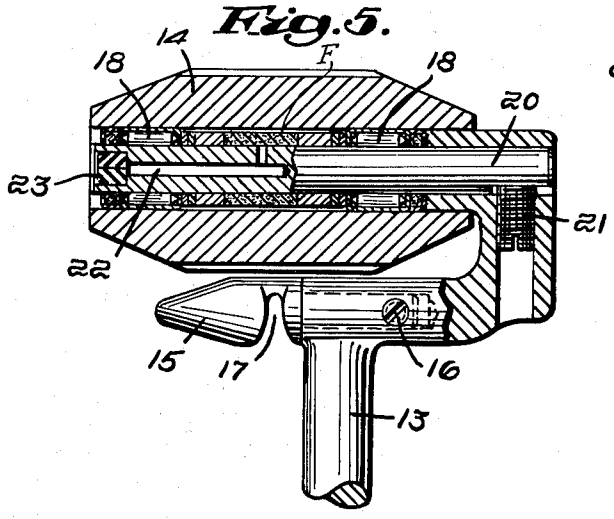
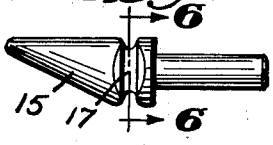


Fig. 6.



Fig. 7.



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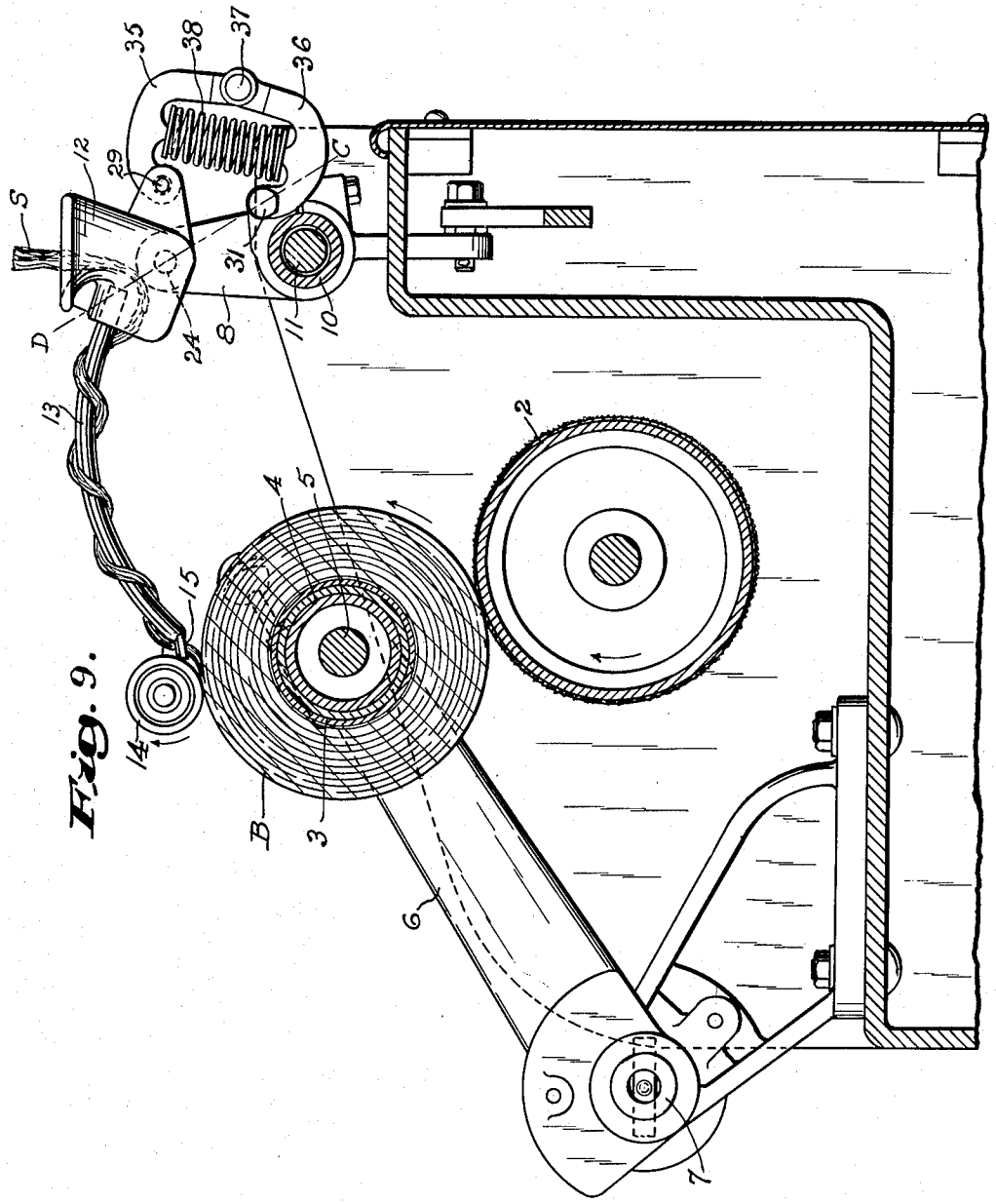


Fig. 9.

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TEXTILE BALLING MACHINE

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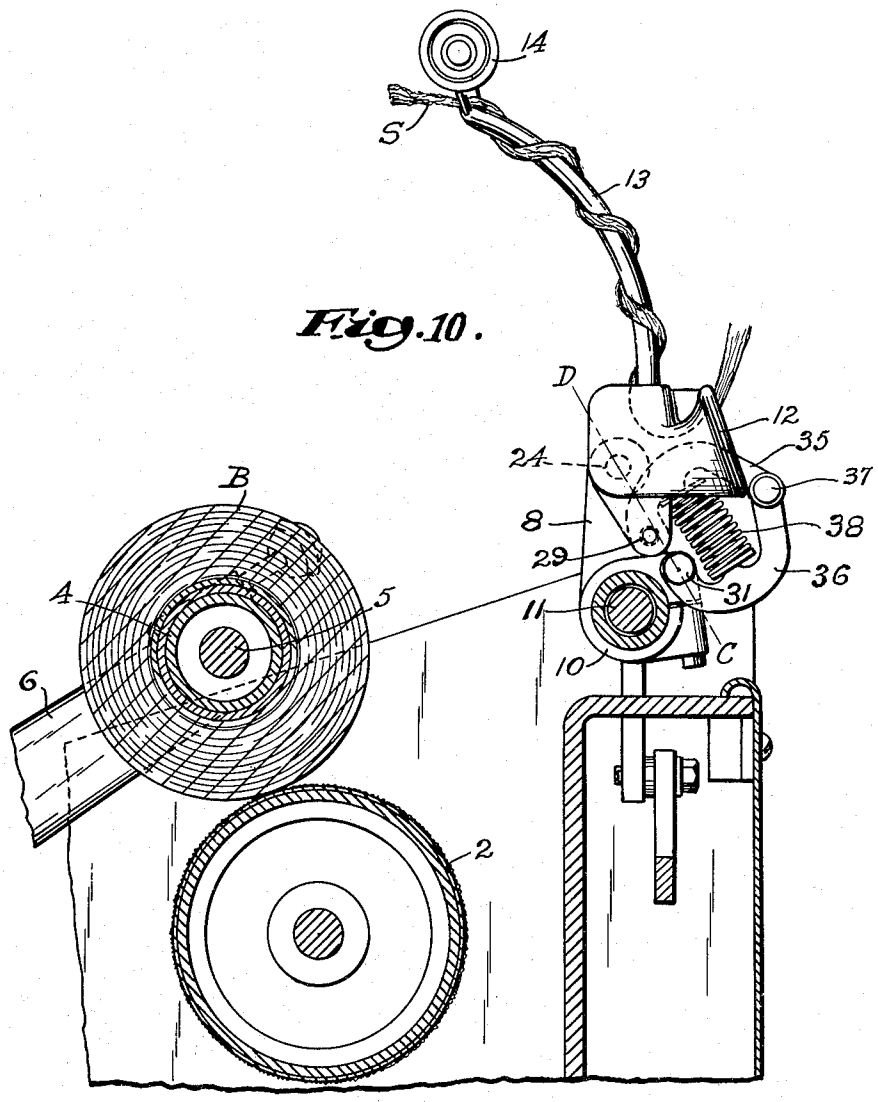


Fig. 10.

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UNITED STATES PATENT OFFICE

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TEXTILE BALLING MACHINE

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Application September 15, 1949, Serial No. 115,883

2 Claims. (Cl. 19—158)

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This invention relates to those machines used in the textile industry to wind textile sliver or roving into a compact package, ordinarily referred to as a "ball." Such a package is not a sphere but is fundamentally an approximately cylindrical body built up by winding the sliver or roving in courses superposed, one on the other, with the strands of one course crossed over those in the preceding course.

While ballers have been used to a substantial extent in connection with the preparation of wool fibers for spinning, the use of ballers in connection with the preparation of cotton for spinning has never been practiced commercially, so far as I have been able to learn, at least up to the development in connection with which the present invention was made. An important reason for this situation is the fact that the cotton sliver, or other strand of which the ball is composed, usually consists of substantially parallel fibers assembled side by side but not twisted together. While such a strand can be handled satisfactorily if composed of wool, or other long rough fibers, a similar strand composed of smooth fibers, such as cotton, and particularly fibers as short as cotton, is extremely weak in tensile strength. Naturally such a strand must be subjected to some degree of tensile strain in connection with winding it into a ball, and the danger of break-downs due to rupture of a cotton strand of this nature is so great that it has not been considered feasible to ball this material. Instead of using it in the form of a ball between successive preparatory operations in connection with the process of working cotton into a suitable form for spinning, it has been customary to feed it into cans, or some equivalent type of container, capable of holding a suitable quantity while it is transferred from one operation to another.

The present invention is especially concerned with the conditions above set forth, and it aims to improve the fiber-handling and feeding apparatus of a baller with a view to enabling such a machine to operate on cotton sliver with entire satisfaction.

It is also an object of the invention to improve apparatus of the character just mentioned with a view to increasing the efficiency of ballers, regardless of the particular fiber to be handled, whether wool, cotton, synthetics, or mixtures of such fibers.

The nature of the invention will be readily understood from the following description when read in connection with the accompanying drawings, and the novel features will be particularly pointed out in the appended claims.

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In the drawings,

Fig. 1 is a view, partly in side elevation and partly in vertical section, illustrating those parts of a baller with which this invention is most closely related;

Fig. 2 is a similar view showing the presser foot roll in an inoperative or elevated position;

Fig. 3 is a plan view of the supporting parts for the presser roll arm;

Fig. 4 is a sectional elevation taken on the line 4—4 of Fig. 3;

Fig. 5 is a sectional view through the presser foot roll and the parts immediately adjacent to it;

Fig. 6 is a section on the line 6—6 of Fig. 7;

Fig. 7 is an elevation of the guide eye unit;

Fig. 8 is a section through a spring and lever unit which will be referred to later; and

Figs. 9 and 10 are views similar, respectively, to Figs. 1 and 2, but illustrating a different form of tensioning or weighting mechanism for the presser foot arm 13.

Referring first to Figs. 1 and 2, the baller mechanism there shown comprises a driven friction roll 2 against which the ball B is held while it is being wound, the ball being supported on a fiberboard or similar core 3 releasably mounted on a sleeve 4, as is known in mechanisms of this type. The sleeve is supported on ball bearings (not shown) which, in turn, are mounted on a shaft 5, and the latter is secured on the end of an arm 6 provided at 7, Fig. 1. Associated with this pivotal support for the arm is a brake mechanism which frictionally resists the upward movement of the arm as the diameter of the ball B increases, thus holding this ball firmly, but yieldingly, against its driving roll 2 and producing a firm ball.

As the winding operation progresses, the sliver S is led to the ball through a guiding mechanism supported on a bracket 8 which is clamped on a tube 10 that is loosely telescoped on a stationary guide rod 11. The tube is reciprocated in a direction parallel to the shaft 5 by a mechanism of any common or suitable type serving to traverse the sliver-guiding mechanism forward and backward in properly timed relationship to the speed of rotation of the ball so as to build up the ball in the desired manner.

Usually the sliver is produced by a card or draw frame, preferably without going through a coiler or having any material degree of twist put into it, and it is led from overhead through a guiding horn 12 which forms the supporting element of a presser foot mechanism comprising an arm 13, rigidly supported in the horn, and a roll 14

mounted for free rotation at the outer end of the arm.

So far as the construction just described is concerned, it forms no part of the present invention, and it may be replaced by any other suitable mechanism. The present invention, however, provides novel means for guiding the sliver to the presser foot roll 14 and unique mechanisms for supporting and tensioning or weighting the presser foot arm and its roll.

As best shown in Figs. 3 and 4, the horn is provided with a deep groove, the surfaces of which are smooth and highly polished, and this groove guides the sliver around a part of the horn and on to the adjacent outer polished surface of the arm 13. After leaving the horn the sliver makes a few wraps or turns around the arm and then is led through a guide 15, Figs. 5, 6 and 7, which is releasably secured by the screw 16 to the arm close to the roll 14, the guide having a deep groove or "eye" 17 in it through which the sliver runs after leaving the arm 13 and just before it meets the surface of the ball B. This eye is so positioned as to guide the sliver on to about the middle of the roll. At its free end the arm is reversely curved, as best shown in Fig. 5, into approximately a U-shape comprising two parallel legs, and the roll 14 is supported on the outer of these legs, the supporting means including a shaft 20 releasably secured by the set screw 21 to the end portion of the arm. Mounted on this shaft are two sets of antifriction bearings 18—18 which support the roll 14. Preferably the outer end portion of this roll is drilled axially, as shown at 22, Fig. 5, to provide an oil hole through which lubricant can be fed to a fibrous body F and from which it will travel slowly to the bearings 18—18. A split resilient plug 23 of some oil-resistant synthetic rubber, such as Duprene, normally closes the end of the hole 22 but is sufficiently resilient to permit the end of an oil-can nozzle to be thrust between the two sections of the plug to replenish the supply of oil in the shaft.

The roll 14 is held firmly, but yieldingly, pressed against the peripheral surface of the ball B by a spring, but because of the antifriction mounting of the roll it is revolved very freely by its contact with the ball.

As above indicated, the sliver is guided into contact with both the ball and the roll at the bite of these two members, and it is thus pulled through the horn 12, along the arm 13, and through the eye 17, but is so guided and supported that no straight length of sliver longer than the fiber length of which it is composed is subjected to any degree of tension capable of breaking it.

Because the sliver is pressed firmly against the ball by the roll 14 as soon as it comes in contact with the ball, the fibers then are condensed and compacted, and the tensile strength of the sliver in this condensed area is correspondingly increased. As the diameter of the ball builds up, this action, plus the natural increase in the pressure of the roll 14 against the ball, results in a tendency to increase the density of the outer layers of the ball, and such tendency may be sufficiently severe as to produce an end bulging of the ball by the time it is completed.

One object of the present invention, therefore, is to maintain the pressure with which the roll 14 bears against the ball B substantially uniform throughout the entire range from empty to full package diameters. Also, when the winding of the ball has been completed the presser foot assembly must be permitted to rise far enough to leave the ball free for doffing. One of the important features of this invention, therefore, is a lever and spring arrangement which not only performs this function but also realizes the object above mentioned.

Referring to Figs. 1 to 4, inclusive, and 8, it will be observed that the horn 12 is pivoted on the bracket 8 at 24. Also, connecting it with the bracket is a spring and lever unit including a coiled torsion spring 25, one end of which is anchored in a case 26 including two telescoping sections, while the other end is secured to a stud 28 passing centrally through the case. Rigid with the stud 28 is an arm 27 pivoted to the horn 12 at 29. Another arm 30 rigid with the case 26 is pivoted to the bracket 8 at 31, Fig. 1. As just mentioned, the spring is of the torsion type—that is, it is constantly biased in a direction tending to unwind, and it thus tends continually to separate the ends of the two arms 27 and 30. Because the latter is fulcrumed on the fixed pivot 31, the spring 25 tends to swing the horn 12 in a counter-clockwise direction, Fig. 1, thus forcing the arm 13 downwardly and holding the press roll 14 firmly against the ball B.

This arrangement is so designed that the variations of both spring load and linkage movements are combined in such a manner as to cause substantially the same pressure to be exerted by the roll 14 while swinging through the range from empty to full package diameters. However, when the ball is completed and the roll 14 is lifted preparatory to doffing, the pivot 29 swings in a clockwise direction through the center line D—C connecting the pivots 24 and 31. Once the pivot has passed through this dead center position, the spring 25 then tends to hold the presser foot arm 13 in its raised position, as shown in Fig. 2. The movement of the arm in this direction is limited by the stop 32, Fig. 2, engaging a pin 34, Fig. 4, the pin being rigid with and projecting laterally from the horn 12. Another stop 33 cooperates with the same pin to limit the downward movement of the arm 13. These stops are integral with the bracket 11.

A somewhat different spring and lever arrangement for performing the same functions is illustrated in Figs. 9 and 10 where the same elements shown in Figs. 1 and 2 are designated by like numerals. Here the movable pivot 29 on the horn 12 is connected with the stationary pivot 31 by two links 35 and 36 which are connected by an intermediate pivot 37. A compression spring 38 of the helical type is interposed between these two links and acts on them with a strong tendency to force the pivots 29 and 31 apart. This tendency operates through the connection with the horn 12 to urge it in a counter-clockwise direction, Fig. 9, where it normally holds the presser foot roll 14 yieldingly, but with considerable pressure, against the surface of the ball B. However, when the presser foot arm 13 is raised preparatory to doffing the ball, it swings the horn 12 in a clockwise direction around the stationary pivot 24, thus carrying the pivot 29, Fig. 10, across the dead center line D—C. Here again, as soon as this line has been crossed by the pivot the spring 38 then operates to hold the arm in its elevated and inoperative position where it facilitates the doffing operation.

With either of the spring and lever weighting mechanisms for the presser foot roll, which have been described above, the pressure with which

the roll 14 is held against the ball being built up is approximately uniform from a substantially empty, to an approximately full, condition of the ball. This is a very desirable operating feature which is now with this applicant, so far as he is informed. Also, the fact that the presser foot roll will remain in its inoperative position when moved there contributes to the same operation of the machine.

In addition to the foregoing, the arrangement here provided for guiding the sliver to the presser foot roll enables the machine to handle slivers composed of short fibers very satisfactorily without interruption of the operation of the machine due to rupture of the sliver.

While I have herein shown and described a preferred embodiment of my invention, it will be understood that the invention is susceptible of embodiment in other forms without departing from the spirit or scope thereof.

Having thus described my invention, what I desire to claim as new is:

1. In a baller, the combination of means of revolving a ball while it is built up by winding sliver on it, a roll running in contact with said ball, an arm on which said roll is mounted for rotation, means supporting said roll arm for pivotal movement about an axis parallel with the axis of said ball but remote from said ball whereby the roll can adjust itself to variations in the diameter of said ball, a pivot movable with said roll arm toward and through a dead center position, a lever mechanism connected with said roll arm comprising two lever arms pivoted to swing toward and from each other, and a spring connected with said lever mechanism acting on said lever arms in a direction tending to separate them, said spring being operable when said pivot is on one side of said dead center to hold the roll down yieldingly against said ball and when it is on the opposite side to hold the roll up away from the ball.

2. In a baller, the combination of means for revolving a ball while it is built up by winding sliver on it, a roll running in contact with said ball, an arm on which said roll is mounted for rotation, means supporting said roll arm for pivotal movement about an axis parallel with the axis of said ball but remote from said ball whereby the roll can adjust itself to variations in the diameter of said ball, a pivot movable with said arm toward and through a dead center position, a lever mechanism connected with said roll arm comprising two lever arms pivoted to swing about a common axis toward and from alignment with each other, and a spring connected with said lever mechanism tending constantly to separate said lever arms and operable when said pivot is on one side of said dead center to hold the roll down yieldingly against the ball and when it is on the opposite side to hold the roll up away from the ball.

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