L. W. DOWNES.

YARN SPINNING MACHINE AND METHOD.

APPLICATION FILED AUG. 6, 1917.

1,298,475.

Patented Mar. 25, 1919.

2 SHEETS—SHEET 1.

Fig. 1

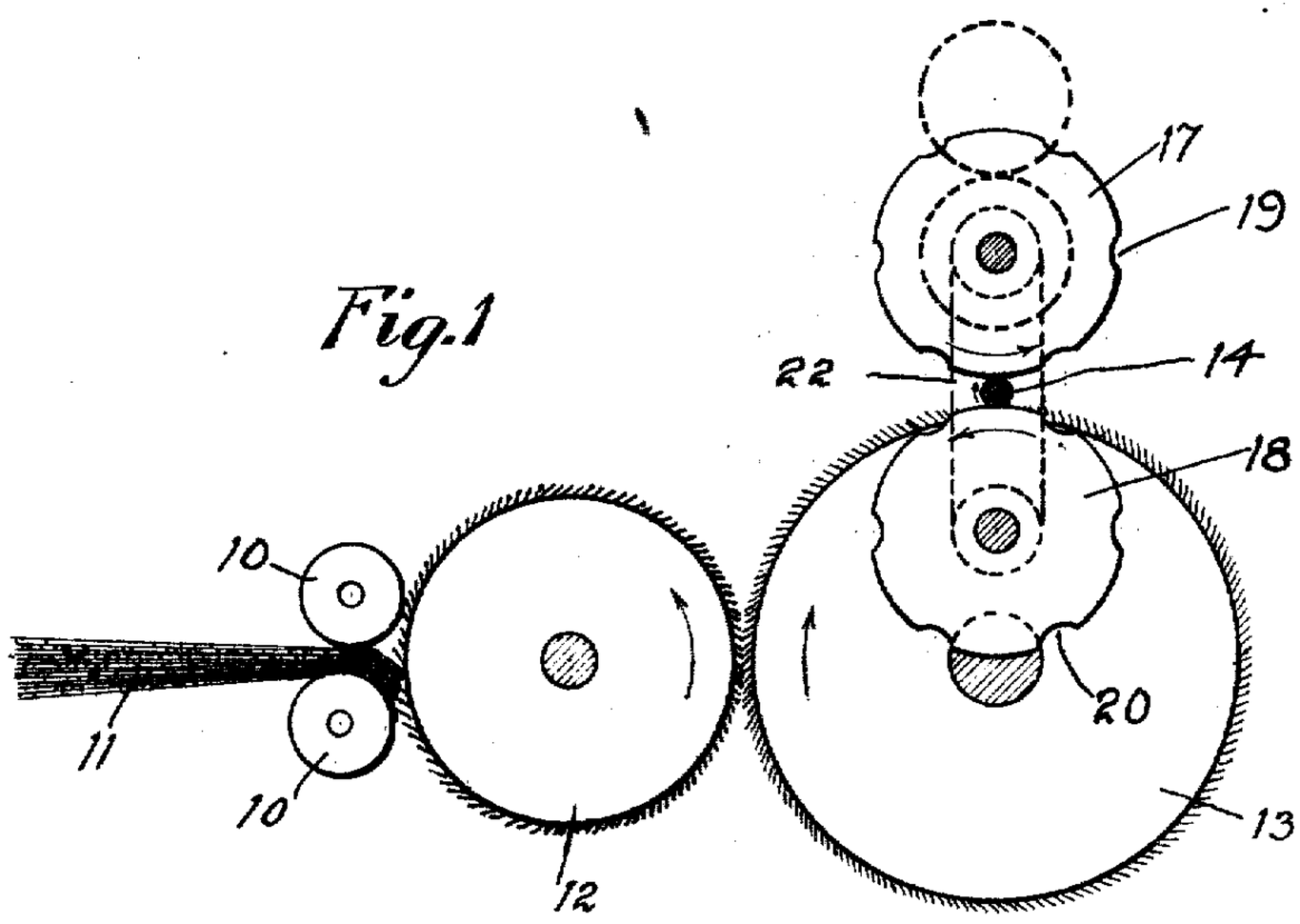


Fig. 2

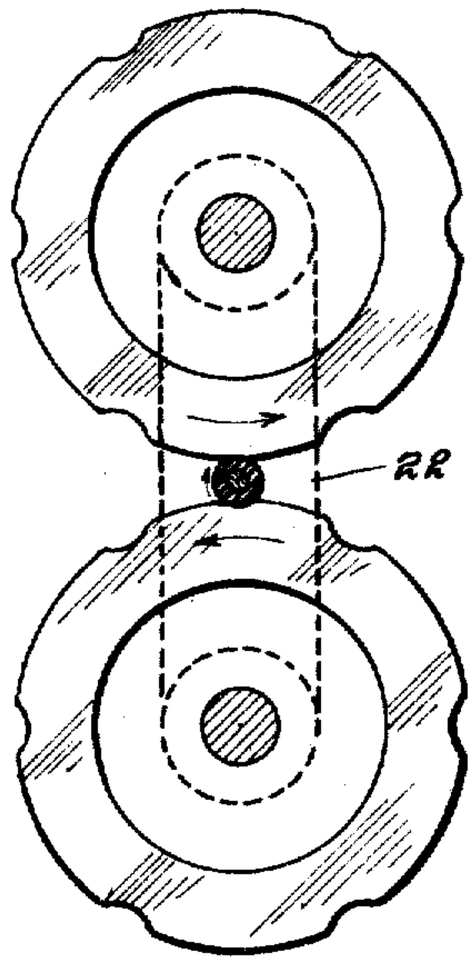


Fig. 3

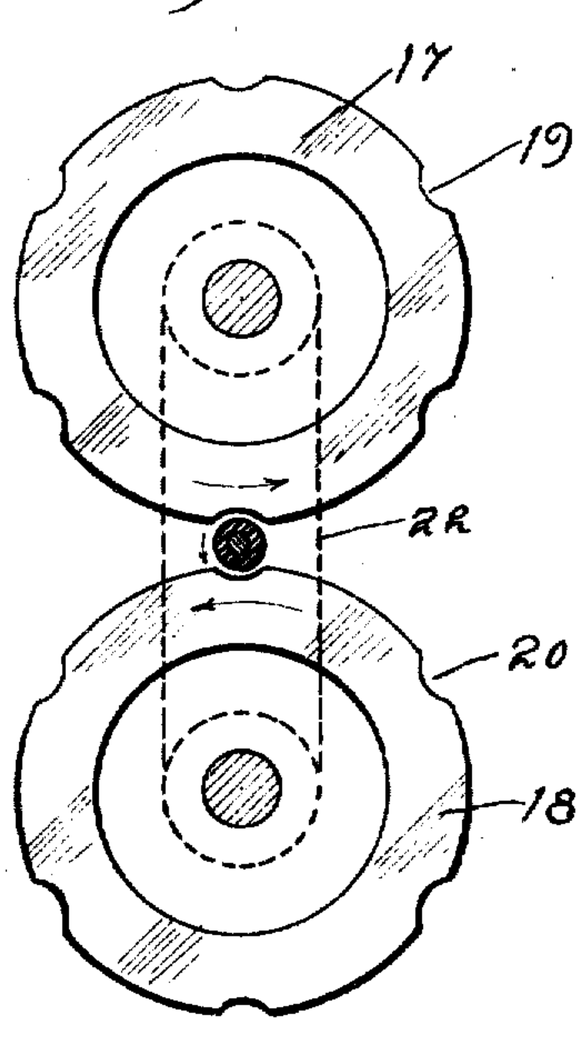
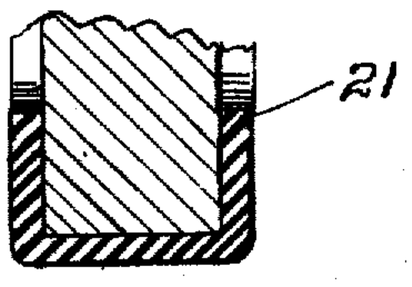


Fig. 4



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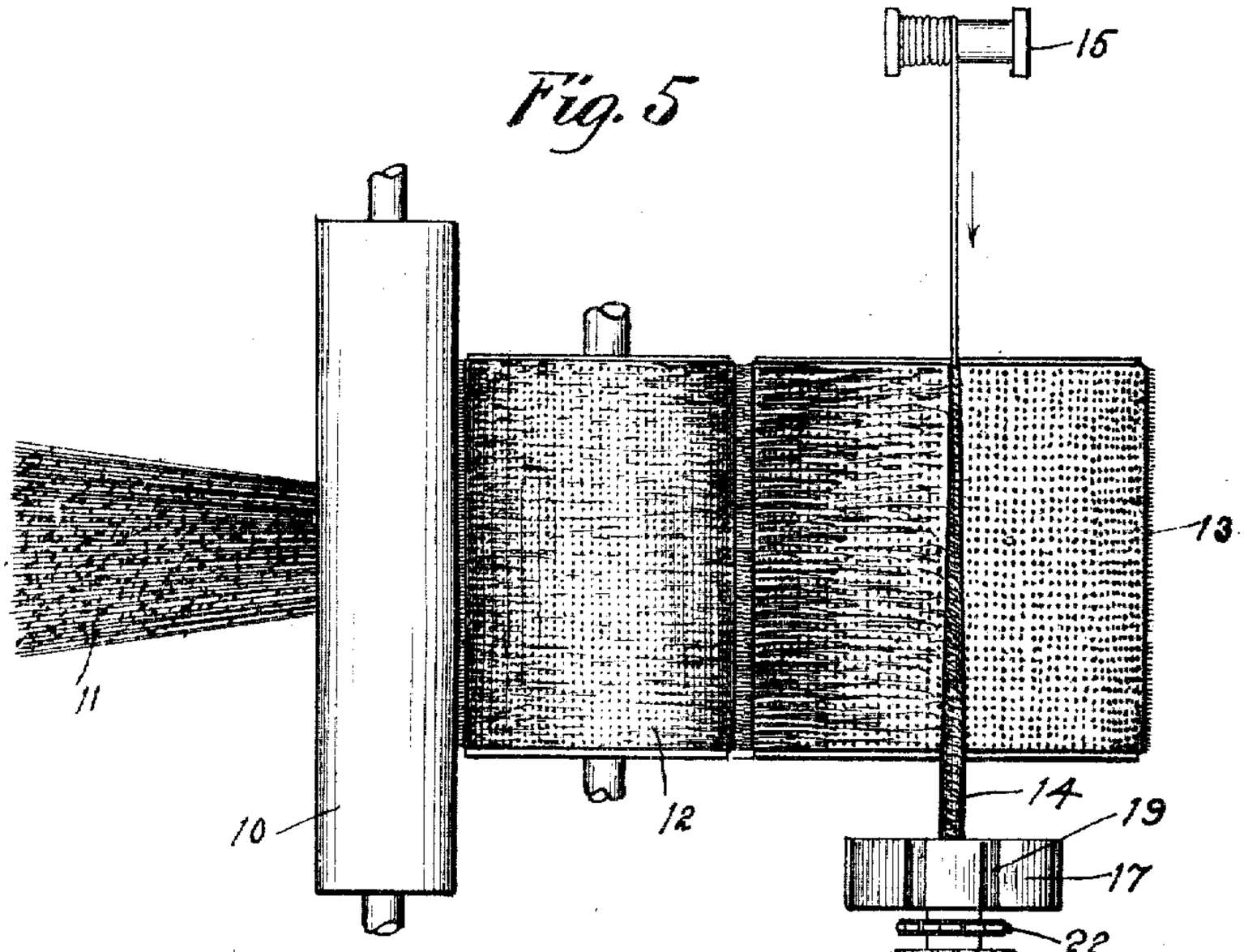
2 SHEETS—SHEET 2.

Fig. 5



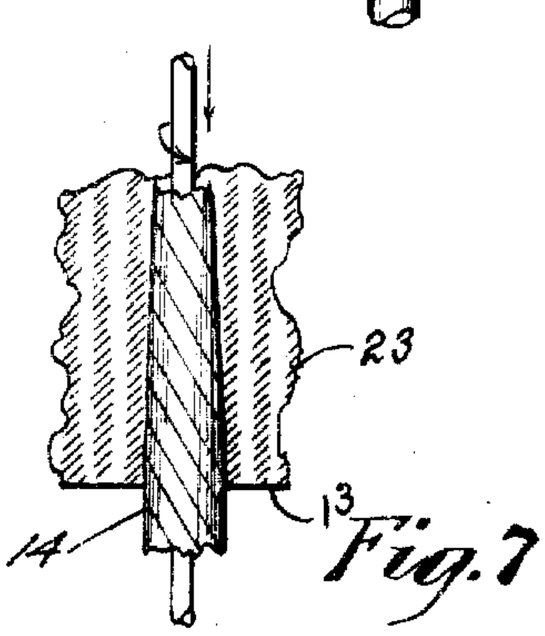


Fig. 7

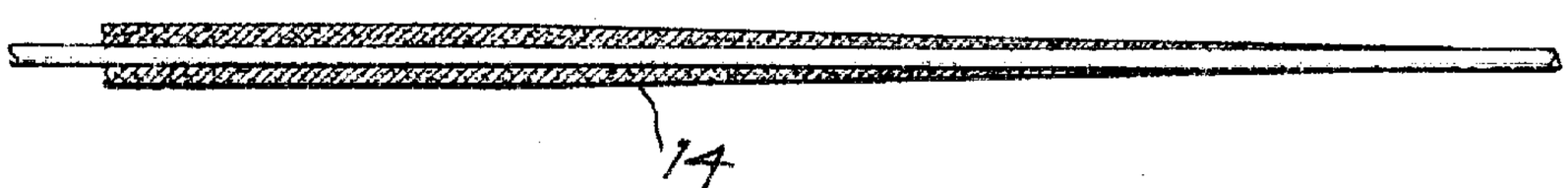


Fig. 6

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UNITED STATES PATENT OFFICE.

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YARN-SPINNING MACHINE AND METHOD.

1,298,475. Specification of Letters Patent. Patented Mar. 25, 1919.

Application filed August 6, 1917. Serial No. 184,661.

To all whom it may concern:

Be it known that I, LOUIS W. DOWNES, citizen of the United States, and resident of Providence, in the county of Providence and State of Rhode Island, have invented certain new and useful Improvements in Yarn-Spinning Machines and Methods, of which the followings is a specification.

This invention relates to yarn spinning machines, or that class of apparatus designed for covering a core or filament with a layer of asbestos or other fibers adapted to be woven or otherwise formed into any desired fabric.

Heretofore in making yarns of all asbestos fibers it has been found necessary in order to provide yarns of sufficient strength to employ the longest and strongest fibers of asbestos for this purpose, which selected stock is scarce and very expensive.

Then again owing to the delicacy or lack of strength of the fibers of this material, the old method of producing these all asbestos yarns by means of the usual mule or ring spinning process was extremely slow and expensive.

In some cases in order to obtain the necessary strength, cotton fibers have been mixed with asbestos fibers and the whole then spun into a yarn. But, in order to obtain such a thread of a strength which would equal that having a core of yarn, considerably more cotton must be mixed with the asbestos fibers than is used in the core. Then again by bringing the cotton fibers to the surface they are exposed directly to the action of a destroying heat which is not the case when they are entirely enveloped in a casing of heat resisting asbestos fibers.

In order to obviate these difficulties I have provided a core or filament of strong thread or yarn which may be made of linen, hemp, cotton, or other suitable material and around this core or base I wind or form a coating, envelop, or sheath of carded asbestos fibers which may be of the shorter variety and therefore much less expensive.

By the employment of the ordinary or cheaper grade of stock I am enabled to form a covering for the core and so provide a composite, incombustible yarn whose strength and durability is greater than an all or part asbestos yarn and which by my method of construction is comparatively inexpensive to produce.

A further object of the invention is to provide simple and effective means for driving the yarn in the direction of its length, and feeding asbestos fibers to the yarn, and also to rotate the traveling yarn at a predetermined speed on its axis to wind the fibers in a helical form upon its surface.

By this method the core or filament of yarn may be covered or coated with asbestos fibers with great rapidity, thereby not only producing asbestos yarn of great strength and at small cost, but also producing the yarn much faster than is possible by the old method.

A still further object of this invention is to engage the yarn on diametrically opposite sides, by oppositely moving members for twisting the yarn, said twisters being provided with means whereby they may intermittently release the yarn for the purpose of permitting it to untwist automatically.

By intermittently twisting and releasing the yarn I avoid the necessity of a double rotation of its delivery and take-up reels, that is one rotation about their own axes, and the other about the axis of the thread. The mechanism for accomplishing the double rotation being both complicated and impractical for such a process.

With these and other objects in view my invention consists of certain novel features of construction as will be more fully described and particularly pointed out in the appended claims.

A simple form of apparatus is illustrated in the accompanying drawings in which—

Figure 1.— is a diagrammatic view illustrating one form of carding rolls and the means for operating upon the yarn to intermittently twist and release the same.

Fig. 2.— is a detail of the yarn twisting rolls, representing them in the act of twisting the yarn.

Fig. 3.— represents the yarn twisting rolls in position to release the yarn and permit it to return to its normal degree of twist.

Fig. 4.— is a detail in section showing the construction by which the working face of each twist roll is rendered soft to engage the thread with a yieldable grip.

Fig. 5.— is a plan view of the mechanism shown in Fig. 1 illustrating the yarn as being fed across the face of the delivery card roll.

Fig. 6.— is a detail illustrating the manner of the progressive winding of the asbestos fibers around the core or filament to produce the desired thickness of covering.

Fig. 7.— is a plan view showing a portion of the delivery card and illustrating the teeth as being inclined in the direction of the longitudinal travel of the yarn.

Referring to the simplified mechanism illustrated in the drawings; 10 designates the two rolls by which the roving or sliver 11 of asbestos is fed to the first card roll 12 from which the fibers are herein illustrated as being taken up by the delivery card 13 and carried around to the yarn 14 where these carded fibers are removed from the card by, and are wound upon the thread in a helical form, in the manner hereinafter described.

As illustrated in Fig. 5, the thread or core of yarn is led from one reel 15 on one side, across the face of the delivery card roll 13 and wound on the opposite side, upon the take-up reel 16, which may be driven by any suitable means not shown.

One of the essential feature of my invention is that the thread or yarn is engaged at some point intermediate the supporting spools or reels 15 and 16, and intermittently rotated and twisted to take up the fibers and then released to untwist automatically and instantaneously, this quick retrograde rotation of the yarn having no effect upon the fibers already wound thereon.

To accomplish this winding action in a simple and effective manner I have provided a pair of rolls 17 and 18 shown as being driven in unison by the sprocket chain 22 and positioned to engage the thread on diametrically opposite sides, and whose surfaces in contact with the thread move in opposite directions to rotate and twist that portion of the thread extending between the reels or supports, and preferably in the direction opposite to the rotation of the delivery card, to take up the fibers from the face of this card and wind them about the thread.

In order that this thread may be released at intervals after having been rotated I have provided a series of indentations or recesses 19 and 20 in the twist rolls, which recesses are arranged to register in the manner best illustrated in Fig. 3 to release the thread at predetermined intervals permitting the extra twist or lay, set into the thread, to instantly snap back or untwist and that without unwinding the fibers laid thereon, after which the rolls again engage the thread and the twisting and winding operation is repeated.

As this winding action is taking place the thread is also traveling in the direction of its length across the surface of the card roll, thus causing the fibers to be laid about the core in a helical form and be built up by winding one layer upon another until the required thickness has been formed upon the thread. I have described the formation of recesses in both of these twist rolls for releasing the thread, but any suitable means may be employed for providing extra space between these rolls at intervals during their rotation for releasing the thread.

In order to provide simple and effective means in these twist rolls for gripping and rotating this thread without injuring the same, I cover the working faces of each of these rolls, as at 21, see Fig. 4, with a thick layer of chamois or other soft tough material so as to yieldingly grip the thread to compensate for any slight inequalities in thickness of the thread or covering.

The operation of the apparatus is as follows:

The thread or yarn is drawn from the reel 15 across and close to the face of the delivery card 13, and is rotated by the twisting rolls preferably in a direction opposite to that of the adjacent surface movement of the delivery card, thereby causing the surface of the yarn to engage and wind the fibers of asbestos about its surface as fast as presented by the delivery card. The relative speeds of the thread and card, are so nicely adjusted that the thread takes up and completely cleans the surface of the card while passing across its face. It is found in practice to be of advantage in order to facilitate the removing of the fibers of asbestos from the teeth of the card, to pitch the teeth of the card slightly in the direction of the axial travel of the thread as illustrated at 23, see Fig. 7 so that the fibers may be released therefrom with the least possible resistance.

In the production of an asbestos yarn having a core, thread, or filament of a stronger cheaper material, I am enabled to use the short fibered commercial asbestos which lends itself readily to the carding action of an ordinary carding machine and by which machine the fibers are straightened out and presented to the thread which is traveling in the direction of its length across the face of the delivery card roll and which at the same time is being rotated on its axis by means of the twisting rolls 17 and 18 causing these short fibers to be helically wound about the surface of the core or filament. The thickness of the covering of asbestos fibers on the thread depends upon the width of the delivery roll and the relative axial speed of the thread. In other words, in order to apply a thin coating of asbestos fibers on the thread, the delivery roll must be narrow or the axial speed of the thread must be relatively fast across the face of this roll and when a heavier coat is required a wider faced delivery roll is em-

ployed or the axial speed across its face is reduced.

The above method of winding asbestos fibers on the thread core applies equally well to any other fibers with which it is desired to cover the core or foundation thread.

The coating of fibers as first wound from the delivery card upon the thread is light and fluffy but is better matted and felted about the core by the action of the twist rolls 17 and 18 between which the newly covered thread is passed.

After this yarn has been covered it may be wound directly upon the reel 16 and subsequently finished or it may be passed through the usual ironing or matting members (not shown) for the purpose of pressing or smoothing out, crowding together, and forcing the fibers more closely upon the core before being spooled.

Where it is desired to produce a soft faced yarn the use of glue or cement is unnecessary, but where a hard faced yarn is required a glue or oil sizing or other suitable adhesive may be employed.

The primary object in twisting the yarn to wind the fibers about it and then releasing the same to automatically untwist, is that by so doing I avoid the complicated mechanism which would be necessary for providing a double rotation of the supporting reels, that is to rotate each upon its own axis and also about that of the thread.

By the use of my improved composite yarn any kind of high heat resisting cord or fabric may be produced commercially at minimum expense.

The foregoing description is directed solely toward the special construction of carding and spinning apparatus illustrated, but I desire it to be understood that I am not restricted to the particular type shown but reserve the priyilege of resorting to all the mechanical changes to which the device is susceptible, the invention being defined and limited only by the terms of the appended claims.

Claims:

1. In a yarn spinning machine, means for moving the yarn in the direction of its length, means for feeding asbestos fibers to the yarn, means for engaging the traveling yarn to rotate it on its axis while being advanced, and means whereby the yarn is periodically released to freely return to normal.

2. In a yarn-spinning machine, means for moving the yarn in the direction of its length, means for feeding asbestos fibers to the yarn, means for acting upon the traveling yarn to press and twist it and then periodically release it from its twisted tension to freely untwist to normal for the purpose of winding the asbestos fibers upon its surface.

3. In a yarn-spinning machine, means for moving the yarn in the direction of its length, means for presenting asbestos fibers to the yarn, means for alternately acting upon the traveling yarn to twist it a predetermined number of times and then release the yarn from its twisted tension to freely untwist automatically.

4. In a yarn-spinning machine, means for driving the yarn in the direction of its length, a traveling toothed member for progressively presenting a thin layer of carded asbestos fibers to the yarn, means for intermittently setting a twist in the traveling yarn to wind the asbestos fibers upon its surface and then releasing it to freely untwist automatically to normal.

5. In a yarn spinning machine, a carrier having a thin surface layer of asbestos fibers, means for moving the yarn in the direction of its length across said surface, and means for alternately twisting and releasing said traveling yarn to wind the fibers as fed by the carrier upon its surface.

6. In a yarn-spinning machine, a carrier having a thin surface layer of carded asbestos fibers, means on opposite sides of said carrier for supporting and moving the yarn across its surface, and means for engaging and twisting that portion of the yarn intermediate said supports and then releasing it to freely untwist between said supports.

7. In a yarn spinning machine means for moving the yarn in the direction of its length, means for feeding carded asbestos fibers to the traveling yarn, a pair of oppositely disposed rotating rolls for acting upon and twisting the traveling yarn intermittently to wind the asbestos fibers upon its surface.

8. In a yarn spinning machine means for moving the yarn in the direction of its length, means for feeding carded asbestos fibers to the traveling yarn, a pair of oppositely disposed rotating rolls for engaging and twisting the traveling yarn to wind the asbestos fibers upon its surface and means for causing said rolls to intermittently release the yarn to untwist.

9. In a yarn spinning machine, means for moving the yarn in the direction of its length, a toothed member for feeding asbestos fibers to the yarn, the teeth on said member being inclined in the direction of travel of the yarn, and means for also rotating the yarn intermittently to draw the fibers from said teeth and wrap them about its surface.

10. The method of forming yarn which consists in covering a base thread or core with a coating of fibers by pressing the yarn and twisting it beyond its normal lay to wind the fibers upon its surface and periodically releasing the yarn from its twisted tension to freely return to its normal twist.

11. The method of forming a composite yarn which consists in non-rotatively supporting a thread or core at two separated

points, feeding the fibers to the unsupported portion, twisting that portion between said supports to take up and wind the fibers about said core, and intermittently releasing the thread from its twisted tension to freely return to its normal lay between said supports.

12. The method of forming a composite yarn which consists in covering a base thread or core with a coating of fibers by first twisting and then releasing it from its twisted tension to freely return to its normal twist whereby its rotation causes the fibers to be wound upon its surface.

LOUIS W. DOWNES.

Witnesses:
GEORGE W. STEERE,
GEORGE F. SHIRLEY.