

April 14, 1931.

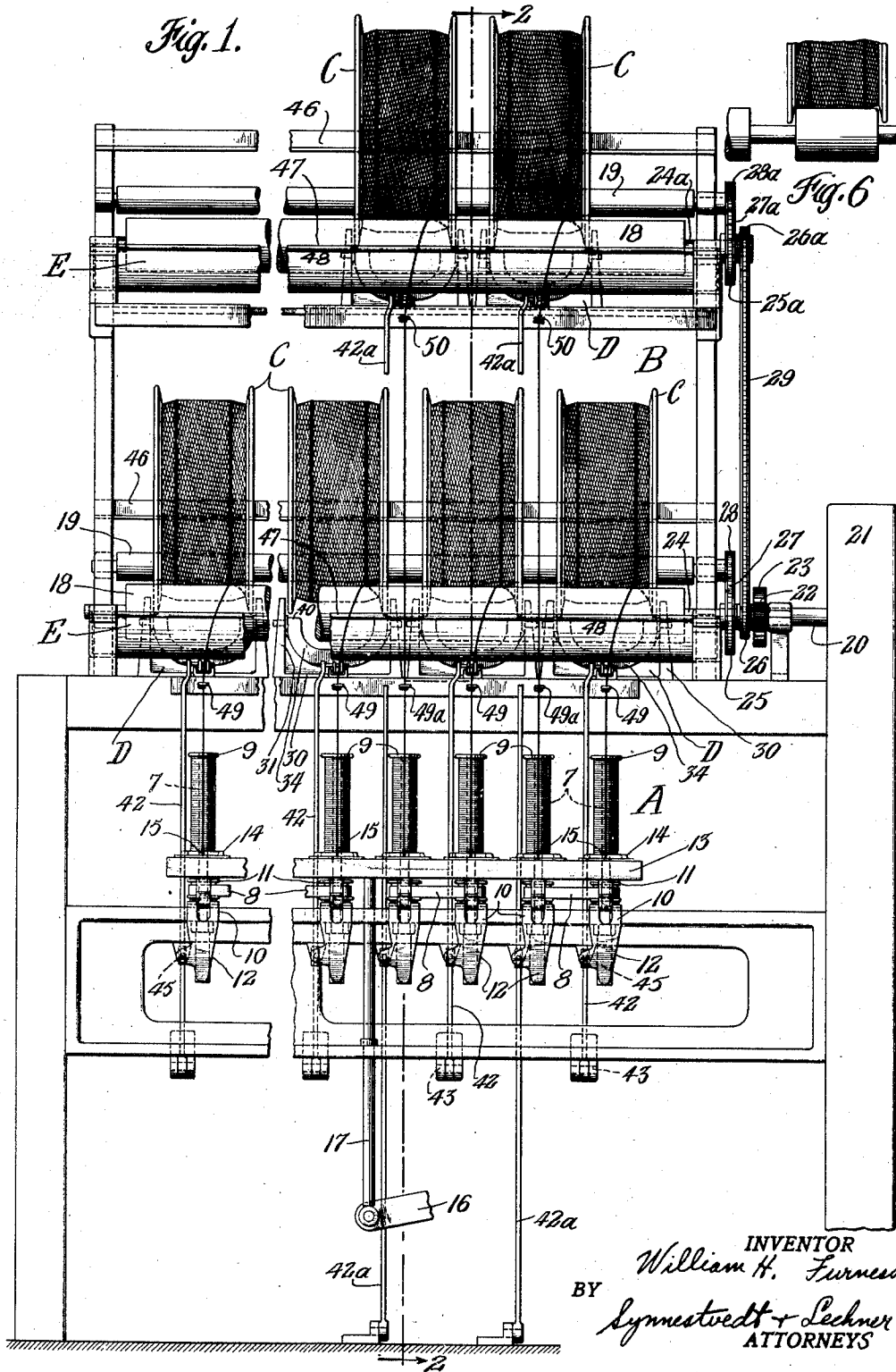
W. H. FURNESS

1,800,829

ARTIFICIAL SILK THREAD HANDLING APPARATUS

Filed July 14, 1928

3 Sheets-Sheet 1



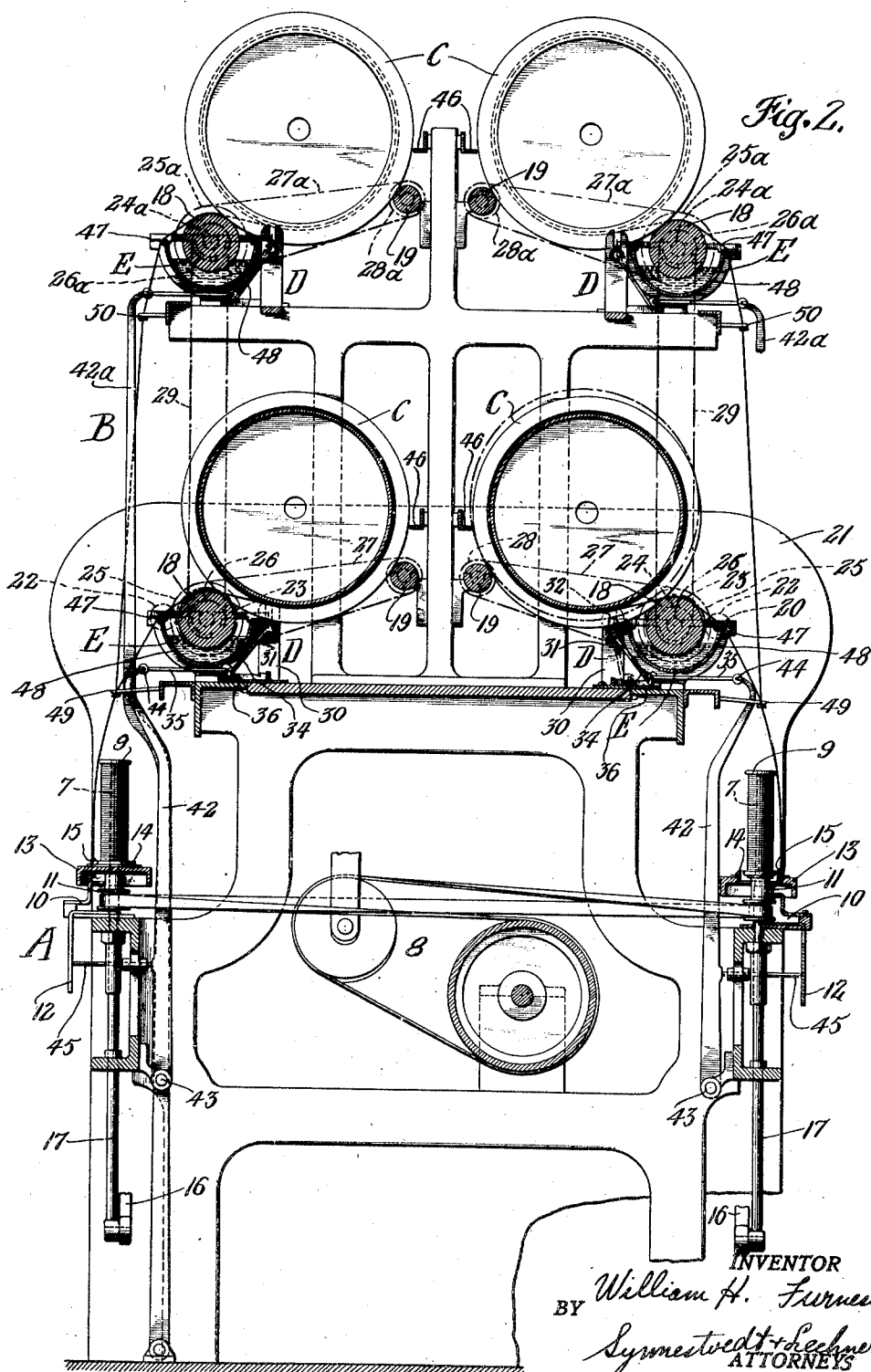
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ARTIFICIAL SILK THREAD HANDLING APPARATUS

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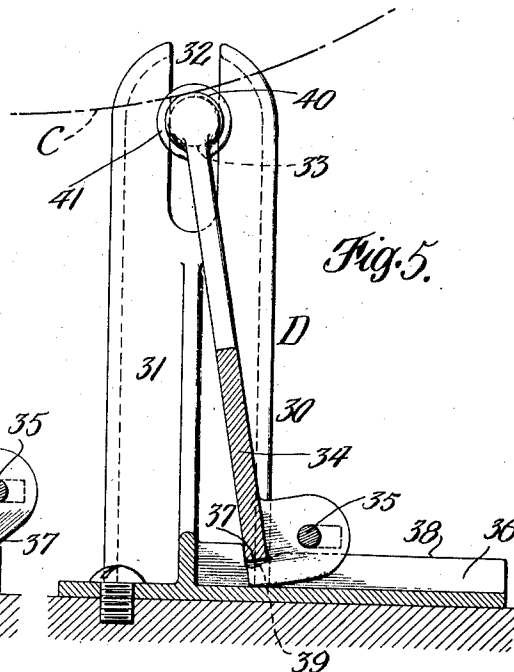
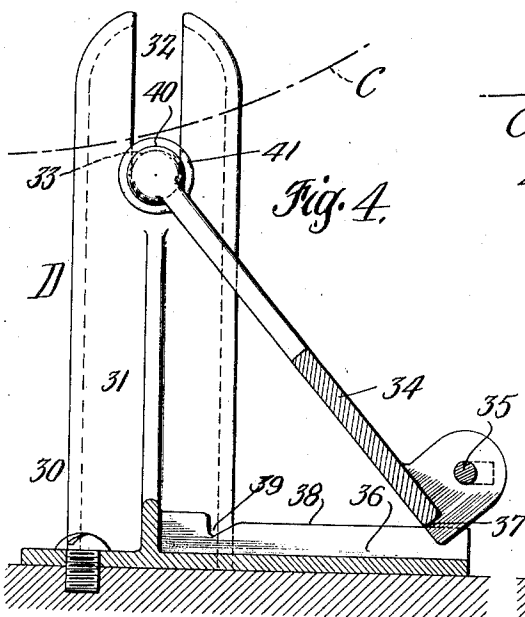
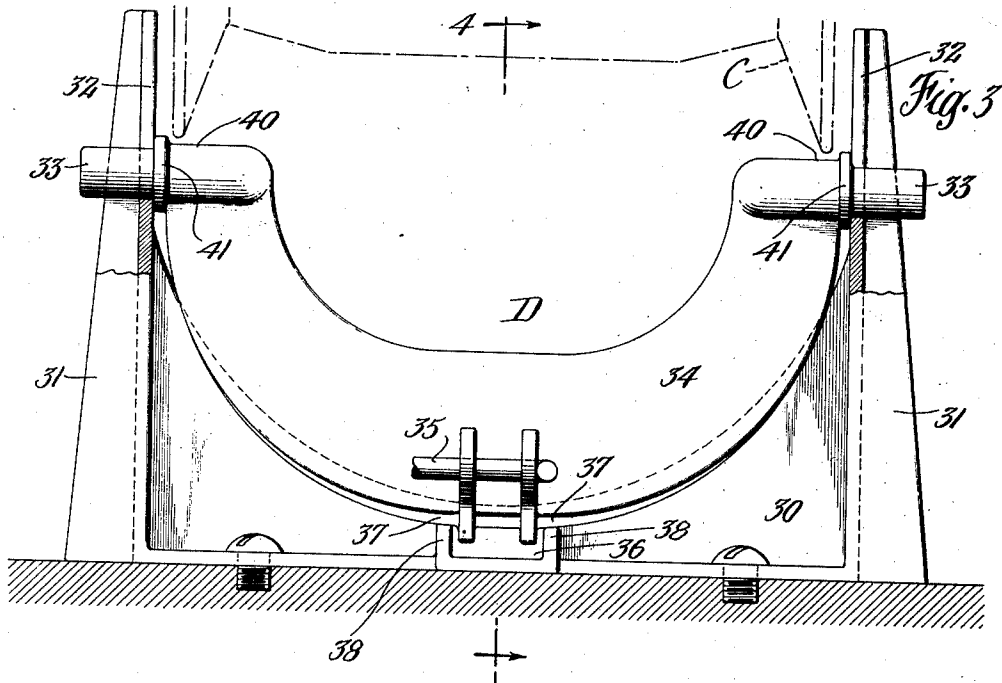
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ARTIFICIAL SILK THREAD HANDLING APPARATUS

Filed July 14, 1928 3 Sheets-Sheet 3



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ARTIFICIAL-SILK-THREAD-HANDLING APPARATUS

Application filed July 14, 1928. Serial No. 292,839.

This invention relates to apparatus for handling artificial silk thread, as, for example, where it is desired to unwind the thread, treat the thread with a sizing or other liquid treatment, grade the thread, or to soften it and the like, and is a continuation in part of my copending application Serial No. 181,614, filed April 6, 1927.

One of the primary objects of the invention is to provide simple, compact and effective apparatus for conducting any or all of the above operations.

Another object of the invention is to make it possible to effectively conduct such operations as the above on a cotton twisting machine.

A further object of the invention is to effect economy not only in the manufacturing operations of artificial silk thread, but also for the mill ultimately using the thread.

A still further object of the invention is to condition unsoftened washed and dried artificial silk thread for the market in a manner to entirely obviate the possibility for damage in the handling and shipping of the finished thread.

My invention also contemplates the provision of an effective driving means for use in carrying out operations, such as above indicated, with facility and without injury to the thread.

How the foregoing, together with such other objects and advantages as may hereinafter appear, or are incident to my invention, are realized is illustrated in preferred form in the accompanying drawings, wherein—

Fig. 1 is a front elevation of a machine constructed in accordance with my invention, with a portion thereof broken out to condense the figure.

Fig. 2 is a cross section taken on the line 2—2 of Fig. 1.

Fig. 3 is an enlarged front elevation, partly in section, of a reel moving or lifting device which I employ.

Fig. 4 is a cross section taken on the line 4—4 of Fig. 3 with the device shown in one of its positions.

Fig. 5 is a cross section similar to Fig. 4

with the device shown in another position, and

Fig. 6 is a fragmentary view illustrating a modification of my invention.

Referring now particularly to Figs. 1 and 2 of the drawings, the machine comprises in general spool supporting and driving mechanism A and reel supporting and driving mechanism B.

The mechanism A comprises a plurality of spindles 7 adapted to be rotated at high speed; as by means of a belt drive 8, each spindle carrying a spool 9 onto which the silk is wound. The spools 9 are readily removable from the spindle in a manner well known in textile machinery, and, in fact, the spooling mechanism A may be of a form commercially used for winding or spooling cotton.

A brake device 10 is provided for each spindle 7 whereby the spindles may be stopped independently of one another. The brake devices operate on the drive pulleys 11 of the spindles so as to grip them and hold them against rotation, the belt slipping on the pulleys when the brakes are applied. Suitable knee plates 12 are provided for operating the brake device.

A traverse plate or bar 13 is associated with each battery of spindles. The traverse bars are provided with a plurality of bushed apertures 14, one for each spindle, and an eyelet 15 for guiding the thread is carried by each of the aperture bushings, the eyelets being free to rotate around the bushings. The traverse bars are reciprocated as by means of cam operated levers 16 having roller engagement with guide bars 17 having their bearings in the framework of the machine.

The reel supporting and driving mechanism B comprises a plurality of pairs of supported and driving rolls or rollers for the reels of silk C adapted to be driven from a common drive; reel lifting or moving mechanism D associated with each reel and through the medium of which any reel may be stopped without interrupting the drive for the remaining reels; and trough means E associated with one of the supporting rolls of each pair of rolls and adapted to contain liquid for sub-

jecting the thread to a sizing or similar treatment.

In this instance I have shown the reels arranged in four batteries, two of which are
5 arranged above the other two and the reels of each battery being supported and rotated by means of a pair of rolls 18 and 19. As the roller arrangement for each battery of reels is the same, only one will be described. The
10 rolls 18 and 19 extend from one end of the machine to the other and are provided with bearings and a suitable number of intermediate bearings. The roll 18 preferably is of larger diameter than the roll 19, but as these
15 rolls must run with the same surface speed if effective drive is to be obtained, I have taken care of the difference in diameter by using drive mechanism of such ratio as will cause the surface speed of the rolls to be the
20 same. The drive illustrated is a chain drive, and considering the two right hand batteries of Fig. 2, is as follows. The shaft 20 is driven by any suitable form of ratio changing mechanism located within the housing 21 and
25 carries a gear 22 which meshes with the gear 23 mounted on the shaft 24 of the lower roll 18, and thus this roll is driven. The shaft 24 also carries sprockets 25 and 26. The sprocket 25 drives the lower roll 19 through
30 means of the chain 27 and sprocket 28 and the sprocket 26 drives the upper roll 18 through means of the chain 29 and sprocket 26a.

The shaft 24a of the upper roll 18 carries
35 a sprocket 25a which drives the upper roll 19 through means of the chain 27a and sprocket 28a. In order to drive the rolls 18 and 19 with the same surface speed, the sprocket 25 is made larger than the sprocket 28. The
40 drive for the two left hand batteries is the same as for the two just described. In some instances it may be sufficient merely to drive one of the supporting rolls 18 and 19.

The reels C have driving relation with the
45 rolls 18 and 19 through their weight, and in the preferred form shown in Figs. 1 and 2, the flanges of the reels engage the rolls so that the reels are driven peripherally at the flanges. In some cases it may be desirable to
50 drive the reels in the manner illustrated in Fig. 6 in which the cake of thread on the reel directly engages the rolls for peripheral drive. If desired, unflanged cylinders may be employed.

55 From the foregoing it will be seen that by virtue of the peripheral drive I am enabled to readily place the reels on the rolls or remove them therefrom without stopping the machine, as would be necessitated if the reels
60 were mounted on a shaft.

In the operation of the machine it is oftentimes desirable to stop a particular reel or reels for inspection, grading or other purposes while the remaining reels continue in
65 their rotation, and, therefore, as hereinbefore

stated, I have provided suitable mechanism D for moving the reels out of driving engagement with the rolls. This mechanism comprises a supporting and guiding member 30 having upright portions 31 which are slotted
70 at 32 to receive the pinned ends 33 of a movable member 34 adapted to swing and be vertically moved in the slots 32 upon actuation of an operating rod 35. The lower end of
75 the member 34 is guided by means of the channeled laterally extending portion 36 of the support 30, and the lifting action is imparted to the movable member 34 through the engagement of this member at 37 with the
80 ribs 38 of the portion 36.

Referring now to Fig. 4, I have illustrated the lifting mechanism D in the position which it assumes when its reel is rotating, and in Fig. 5 I have illustrated its position when
85 the reel is lifted out of engagement with the rolls. This latter position is also indicated in dot and dash lines at the lower right hand reel of Fig. 2. The ribs 38 are provided with notches 39 with which the member 34 engages
90 so as to hold the device against displacement in its lifting position.

On inspection of Fig. 3 it will be seen that the flanges of the reel are engaged by the rounded surfaces 40 of the movable member 34, and that guiding collars or ribs 41 are
95 provided to prevent lateral displacement of the reel. When the reels are being driven the upper ends of the portions 31 of the members 30 position the reels.

Although the operating rods 35 of the lifting mechanisms D may be controlled independently of the knee brakes of the spindles 7, I prefer to interconnect them so that when
100 a spindle is stopped its corresponding reel will also be stopped. To accomplish this I have provided, considering now the lower reels, a lever 42, pivoted at 43 and having its free end 44 connected to the operating rod 35,
105 which lever is actuated by a rod 45 contacting at one end with the knee 12 and at its other end with the lever 42. Thus when any particular knee plate is actuated to apply the brake to a spindle, the lifting mechanism for the corresponding reel is actuated to lift the
110 reel out of contact with the driving rolls. Similar levers 42a are provided for actuating the lifting devices of the upper reels.

In connection with the operation of the lifting devices D it is pointed out that as the
120 member 34 moves the reel upwardly the reel is thrown slightly rearwardly into engagement with a fixed bar 46 and, therefore, the reel is moved entirely clear of both driving rolls 18 and 19, as indicated in dot and dash
125 lines at the lower right hand reel of Fig. 2.

Referring now to the path of the thread from the reels to the spools and considering, first, the lower reels, the thread passes from the reel over the roll 18, then over the rounded
130 edge 47 of the trough 48, then through the

eyelet 49 located coaxially with the spindle, then through the rotatably mounted eyelet 15 hereinbefore referred to, and finally onto the spool. The path of the thread from the upper reel is very similar, excepting that the thread passes through the upper eyelets 50 before passing through the lower coaxial eyelets 49a. Although I have shown the thread passing over a rounded edge of the trough 48, it is to be understood that I may employ a suitably located rod or bar over which the thread passes instead of over the edge of the trough.

The troughs 48 are adapted to contain a liquid such as oil for treating the thread as it passes over the rolls, and it will be seen from Fig. 2 that the rolls dip into the liquid and carry the liquid to the thread.

The reels which I employ are preferably of such a construction as to be adapted to carry a cake of thread which is relatively wide and relatively shallow, as such a cake will not have its thread become entangled. The thread may be laid up into such cakes in accordance with my co-pending application Serial No. 239,405, filed December 12, 1927.

As will be seen from Fig. 1 the center to center spacing of the reels along the driving rolls far exceeds the necessary center to center spacing of the spindles, and also exceeds the spacing of the spindles of standard cotton winding machines, and, therefore, in order to be enabled to employ standard cotton winding machines, or, on the other hand, to be enabled to construct a new machine of the least possible extent as to length, I have provided the novel double deck arrangement above described in its details, in which the reels of one row of reels are located above alternate spindles of the row of spindles, and in which the reels of the row of reels thereabove are located above the remaining spindles.

From the foregoing it will be seen that I have provided a very compact machine for unwinding artificial silk thread from reels onto spools in which the thread may be effectively subjected to a sizing or similar treatment at a point intermediate the reels and rolls and in which a final twist is imparted to the thread as it winds onto the spools. This final twist due to the change in position of the fibers produced, softens the thread.

By driving the reels or cylinders in the manner set forth the thread is laid on the spools with substantially no tension on the thread other than that imparted by the loop, i. e., the machine operates in such manner that there is no tension on the thread which would result in the turning of the reels by the thread. This is of great advantage as it is objectionable even with coarse thread, not to mention fine denier threads, to cause the reels to rotate by the pull of the thread be-

cause of the detrimental effect on the thread. Owing to the shape of the cake of thread, constant speed reels and constant speed spindles may be employed without affecting the denier of the thread.

The arrangement of Fig. 6 is advantageous, particularly with thread of extremely fine denier, or where the cake of thread on the reel is different from that described, for as the diameter of the cake decreases, the speed of the reel increases, notwithstanding the constant speed of the driving rolls, which compensates for the increasing rate at which the thread is laid upon the spools as their diameter increases. For all practical purpose, with a cake such as hereinbefore described, the drive of Fig. 1 is quite satisfactory.

Among other advantages, the silk is wound directly onto spools such as are employed in the machines of the mills ultimately fabricating the thread into cloth. Furthermore, I entirely eliminate the skeining operations heretofore required for softening and treating the washed and dried silk. I, therefore, not only effect economy in manufacturing operations, but also for the mill using the silk, besides which the damage which frequently resulted to the thread in the handling and shipping of skeins is obviated.

Furthermore, the compactness of the machine reduces the number of operators required and the amount of effort required of the operators, and keeps a multiplicity of reels under close observation.

Owing to the character of the drive and the facility with which the reels may be inserted and removed from the machine, the operators can readily grade while winding, ensuring that the thread on a spool shall be of uniform grade throughout its length. For example, if when starting a new reel on a partially filled spool, it is discovered that the thread is not of the same grade as that already wound, that reel is set aside for winding onto a spool having the same grade, and is replaced by another reel having the proper grade of thread.

While the thread is fed from the reels it is nevertheless laid on the spools with sufficient tension to retain the twist finally imparted and to avoid the tangling which would result from loose winding.

I claim:—

1. In artificial silk thread apparatus of the character described, a row of relatively closely spaced spindles each adapted to receive a spool or the like upon which thread is to be wound, driving means above said row adapted to receive and support a row of cylinders each having a cake of thread to be unwound, said cylinders, the cylinders being located over alternate spools of the row of spools, a second driving means located above the first driving means and also adapted to

receive and support a row of similar cylinders, and said cylinders, located over the remaining spools of the row of spools, all cylinders being capable of being readily inserted and removed without disturbing the driving means, together with means whereby any cylinder can be independently moved out of driving relation, said last mentioned means having guide means for preventing unintended displacement of the cylinders when either in their driven or non-driven relation.

2. In artificial silk thread apparatus of the character described, a cylinder or the like containing a cake of thread to be unwound, a pair of rollers spaced laterally to receive and support the cylinder, means for driving said rollers, a fixed member associated with the cylinder, a movable member having a position in which it is clear of the cylinder and a position in which it engages the cylinder, said movable member and said fixed member being so located relative to each other and to the rollers that the cylinder engages the fixed member and leaves the driving rolls when said movable member is moved to its position of engagement with the cylinder, and means for moving said movable member.

3. In artificial silk thread apparatus of the character described, a cylinder or the like containing a cake of thread to be unwound, a pair of rollers spaced laterally to receive and support the cylinder, means for driving said rollers, a fixed rail mounted in close proximity to the periphery of said cylinder when the cylinder is in position on the rollers, a movable member mounted adjacent the periphery of said cylinder, and means for moving said member to a position in which it is out of contact with the cylinder when the cylinder is supported by the driving rollers and to a position in which it contacts with the cylinder to move the cylinder out of contact with the driving rollers and into contact with the fixed rail.

4. In artificial silk thread apparatus of the character described, a cylinder or the like containing a cake of thread to be unwound, a pair of rollers spaced laterally to receive and support the cylinder means for driving said rollers, a fixed rail mounted adjacent the periphery of said cylinder, a movable member mounted adjacent the periphery of said cylinder, and means for moving said member to a position in which it is out of contact with the cylinder when the cylinder is supported by the driving rollers and to a position in which it contacts with the cylinder to move the cylinder out of contact with the driving rollers and into contact with the fixed rail, said movable member having means for preventing axial movement of the cylinder in all of its positions.

In testimony whereof I have hereunto signed my name.

WILLIAM H. FURNESS.