United States Patent

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[54] **YARN DELIVERY MECHANISM**
9 Claims, 4 Drawing Figs.

[52] **U.S. Cl.** **226/90,** 226/155, 226/169, 226/187
[51] **Int. Cl.** **G03b 1/56**
[50] **Field of Search** 226/35, 90, 154, 155, 176, 177, 181, 186, 187, 169

[56] **References Cited**

UNITED STATES PATENTS

3,088,642	5/1963	Kingsley	226/176(X)
3,116,531	1/1964	Hills	226/176(X)
3,176,895	4/1965	Kurth	226/176

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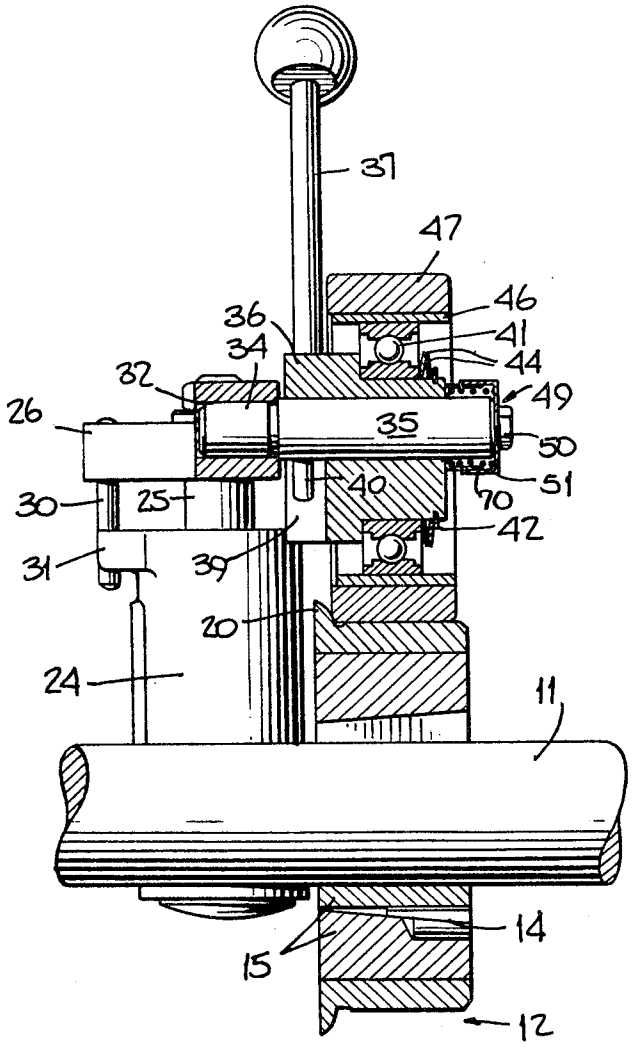
ABSTRACT: Apparatus for delivery of yarn to textile treating machines comprising means for bringing interacting rollers together at equal surface speeds, maintaining same together at constant preset pressure, and allowing separation of same in the event of serious irregularities in yarn delivery.



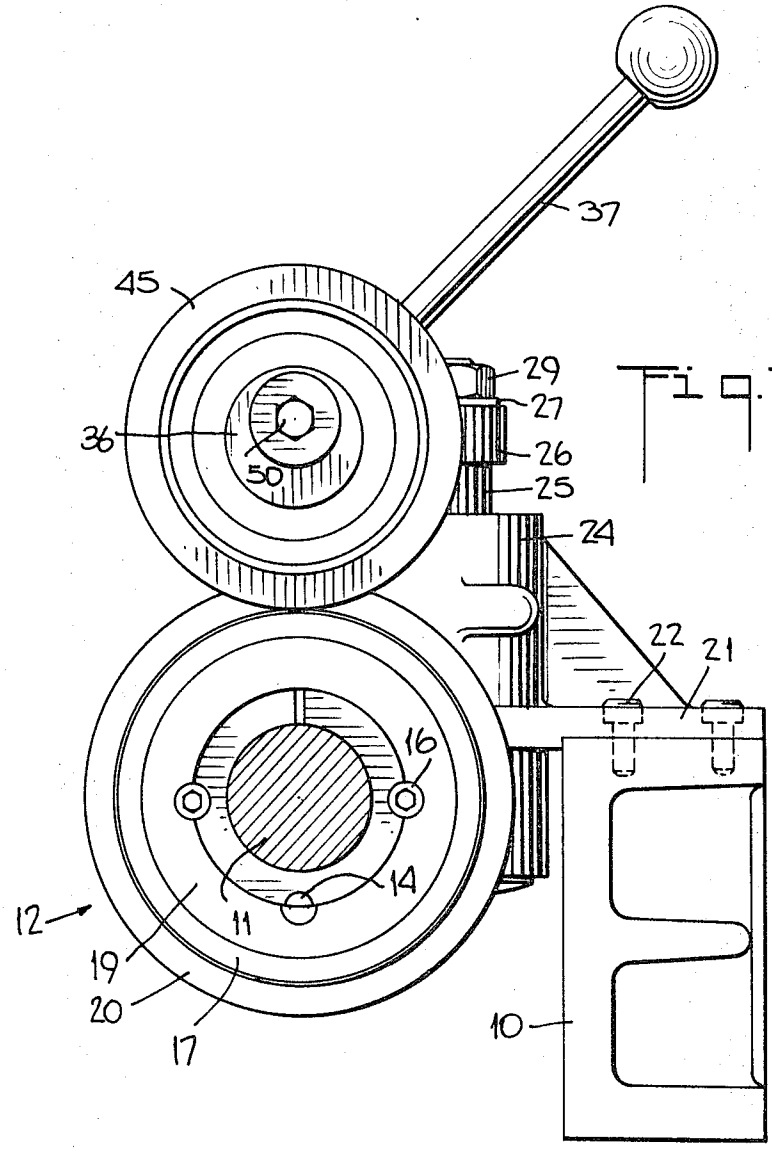


Fig. 1.

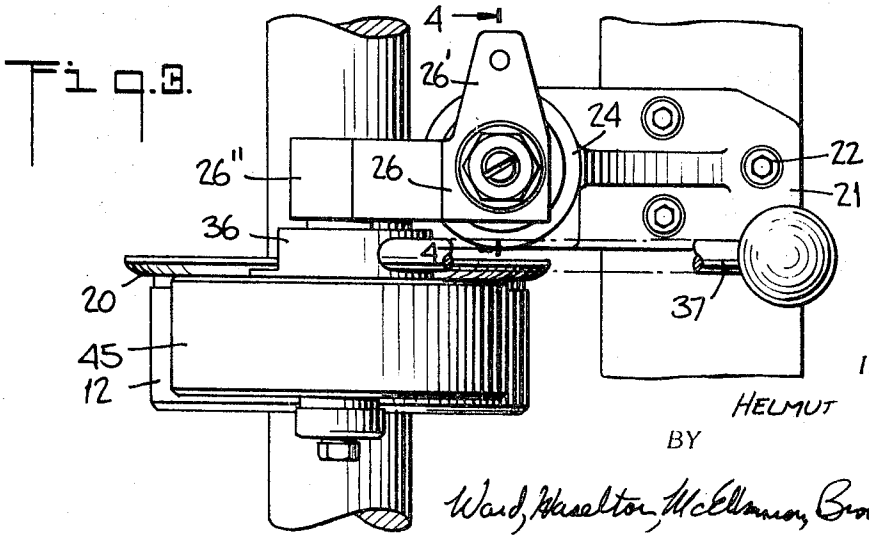


Fig. 2.

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Fig. 2.

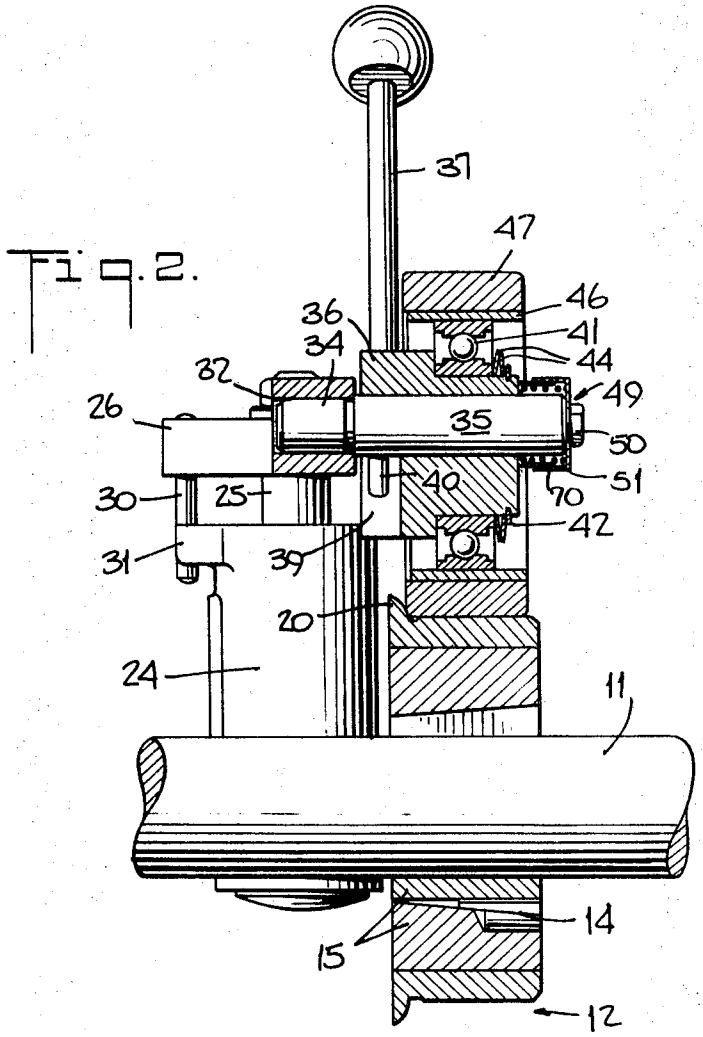
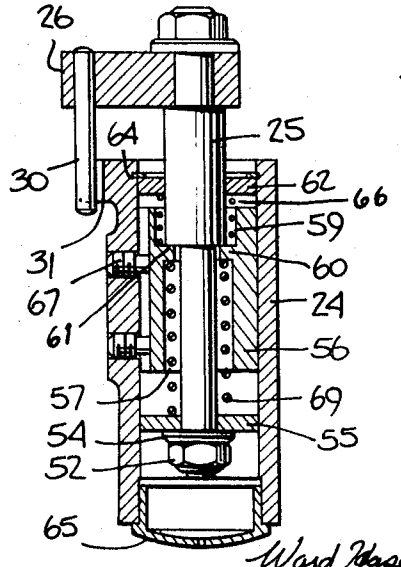


Fig 4.



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YARN DELIVERY MECHANISM

This invention relates to apparatus useful in the feed or delivery of lengths of yarn from one location to another, and more particularly with the delivery of individual or ply-twisted yarns or threads such as false twist yarns longitudinally into textile machines operating at high speeds.

It is known in the textile machine art to deliver individual or ply-twisted yarns or threads by means of individual rollers, belts or pairs of rollers, wherein the delivery means for all stations on a multistation machine may be driven by a common drive shaft. In cases wherein the delivery means comprise fixed drive rollers and idler delivery rollers engaging the surface of the drive rollers and between which the yarns pass, it is necessary when exchanging a supply bobbin, or when a yarn breakage has occurred, to separate the particular drive and delivery roller means at the appropriate station, and in accordance with known constructions, since all drive roller means are commonly driven and all delivery roller means are commonly mounted, as where each such roller means is a single elongate roller, the entire system is temporarily immobilized during rethreading. Then too, upon completion of rethreading, the delivery and drive means are brought back into surface contact while the drive means continues to rotate at its normal speed. The yarns, positioned between the drive and delivery rollers, are thus exposed to sudden high frictional forces which may cause breakage or structural changes to occur.

At yarn speeds of the order of 100 to 120 meters per minute, which is not unusual in false twist machines, for example, the machine may be threaded by winding the yarn around a takeup bobbin which is driven by hand or mechanically, whereupon the bobbin pulls the yarn through the machine until the delivery system is reactivated. Such hand operation, however, is not feasible in modern machines having delivery speeds of up to 500 m/min. and more, since although the yarns are drawn through the machine by means of a winding bobbin, the friction forces to which the yarns are subjected between the drive and delivery rollers when the same are pressed into contact are too high and often cause deformation and breakage.

A further problem arises from the fact that it is desirable to maintain the delivery roller in contact with the driving roller under a constant pressure.

Additionally, for yarn speeds of the order of 500 m/min., known systems are inadequate since they do not absorb the centrifugal forces of the delivery roller means due to the high speeds of rotation thereof which also cause pressure variations on the drive roller. This leads to vibration, noise and yarn deformation and damage.

Accordingly, I have conceived a yarn delivery mechanism which effectively overcomes the foregoing difficulties and disadvantages. Thus, I contribute by my invention apparatus employing interacting drive and delivery rollers for the delivery of yarns and the like in textile machines such as false twist machines, for example, according to which I am able to bring the interacting rollers to substantially the same surface speeds before their respective interacting surfaces come into contact with the yarn running between them while avoiding the undesirable vibration already referred to, and without damage to the thread.

Essentially, my invention comprises apparatus for the delivery of yarns and the like in textile machines comprising, a rotatable driving roller, a delivery roller mounted for idling rotation, the rollers having opposed interacting delivery surfaces, means for rocking the delivery roller to bring the interacting surfaces into and out of contact, means interacting with the delivery roller as the latter is shifted towards the driving roller to bring the surface of the delivery roller to substantially the speed of rotation of the surface of the driving roller as contact between the surfaces is effected. The last-mentioned means may preferably take the form of an annular projection extending radially outwardly of an edge of the driving roller and formed with a surface arranged to engage an edge of the delivery roller as the surface of the delivery roller moves towards that of the driving roller. This initial contact starts rotation of the delivery roller and brings it up to the desired speed as it advances towards the surface of the driving roller. Thus, a spring arrangement preferably carried at the end of each delivery roller axle is utilized to provide the axial force urging the edge of that roller towards the annular projection on its interacting driving roller. Thus, it will be seen that as the delivery roller is shifted towards the driving roller, its edge first engages the projection formed on the driving roller and the delivery roller begins to rotate although the opposed interacting surfaces of the two rollers have not yet made contact. The delivery roller gradually assumes the speed of the driving roller due to the preliminary contact with the projection, which contact is assured by the spring arrangement urging the delivery roller axially towards the projection. The projection is preferably located at one edge of the particular driving roller and is formed with a flank inclined towards that roller. Finally, when the two interacting surfaces of the respective rollers are brought into contact with the yarn between the interacting surfaces these surfaces will be rotating at substantially the same surface speeds.

To ensure proper contact between the delivery roller and the projection, I provide means for urging the delivery roller axially towards the projection.

In order to effect rocking movement of the delivery roller, I find it convenient to mount same eccentrically on an axis parallel to that of the driving roller, and I provide a manually engageable arm or lever for effecting the rocking action.

It will be understood that while each driving roller may be fixedly mounted on a single-drive shaft for rotation therewith, each of the delivery rollers is individually mounted so that a yarn may be threaded without interrupting the delivery of yarn for treatment at other stations of the machine.

A further aspect of the invention resides in the provision of a hub concentric with the delivery roller but eccentric about its axis and upon which the delivery roller is mounted for idling rotation. The hub is mounted on the delivery roller axle and this arrangement permits the delivery roller readily to be brought into and out of contact with the driving roller merely by rotation of the hub. For this purpose, a manually engageable radially extending arm is fixed to the hub to rock same to the position desired, and a stop in the form of a pin may be provided on the axle to limit movement of the hub in either direction of rotation when the delivery roller and the driving roller are brought into or out of contact.

As has already been mentioned, it is desirable to maintain the delivery roller in contact with the driving roller under a constant pressure. If a different pressure should be required to correspond to different yarn characteristics, the pressure spring necessary for exerting the contact pressure can be changed. The sole purpose of this spring is to preset the mechanism at the required contact pressure, it exerts only the force corresponding to its size and is inactive when the machine is in operation. In addition, it is desirable to incorporate in the delivery mechanism a safety device which enables the delivery roller to be lifted from the driving roller when interruptions in operation occur.

To this end, I provide a mounting construction for the delivery roller whereby it can not only be swiveled as described, but is pressed against the driving roller with a specific force when the two are in contact. This force is determined by a pressure spring fitted in the mounting during installation of the delivery mechanism on any suitable machine, but is then locked by screws with the result that the spring is made inactive but the contact pressure is maintained. Whenever it is swiveled into the operating position the delivery roller, which is fitted with a resilient cover, is pressed against the driving roller at the originally set contact pressure. The mounting also incorporates means for raising the delivery roller from the driving roller only when a specific pressure limit is exceeded. The pressure limit can, if required, be altered by exchanging the spring which exerts this pressure and

which is also fitted in the housing. This pressure limit should be at such a level that the delivery roller is not raised from the driving roller as a result of the passage of normal yarn slubs or slubs caused by two knotted yarn ends, as this would be contradictory to the very purpose of the invention. The sudden increase in yarn volume is absorbed by the resilient cover of the delivery roller. The pressure limit is exceeded and the delivery roller raised from the driving roller when, e.g., as a result of a thread break, the yarn becomes entangled round one of these rollers.

Further specific features and advantages of the invention will be hereinafter more fully set forth with reference to the annexed drawings, showing a presently preferred embodiment of the invention and certain modifications thereof, in which:

FIG. 1 is a side elevational view of apparatus in accordance with my invention;

FIG. 2 is a front elevational view, partly in section, of the apparatus of FIG. 1;

FIG. 3 is a top plan view of the apparatus of FIGS. 1 and 2; and

FIG. 4 is a cross-sectional view taken along the lines 4–4 of FIG. 3.

Referring now to the drawings, and more particularly to FIGS. 1, 2 and 3, there is shown a support beam 10 extending parallel to a shaft 11 which rotates continuously during operation of the machine and on which are mounted several driving rollers 12 for rotation therewith. These driving rollers are spaced along the shaft 11 at the several delivery stations, but as they are identical in configuration only one such roller is shown. The roller 12 may be conveniently fixed on the shaft 11 by means of a half worm gear 14 and taperlock mounting 15 secured in place by screws 16. A chrome plated steel ring 17 is press fit on the peripheral surface 19 of the roller.

The driving roller 12 is formed with a radially outwardly extending protrusion or flange 20 at one edge thereof, the inner face (FIG. 2) of which tapers in a gentle arc downwardly towards the surface of the roller for a purpose to be later described.

Referring to FIGS. 1 and 3, it will be seen that a mounting bracket 21 is secured to the beam 10 by means of screws 22, and that the bracket is formed with a generally cylindrical housing 24. A shaft 25 about which more will later be said extends out of the upper part of the housing 24 and is rigidly connected to an L-shaped support 26 by means of a washer 27 and nut 29.

A pin 30 (FIG. 2) extends downwardly from the end of a leg 26′ of the support 26 and passes between two fingers 31 (FIGS. 2 and 4) extending outwardly of the upper end of the housing 24. Another leg 26″ of the support 26 is formed with a bore 32 (FIG. 2) into which is press fit an extension 34 of a shaft 35 axially parallel to the shaft 11.

The shaft 35 supports an eccentrically formed hub 36 which is rotatable and axially shiftable relatively to the shaft and to which is secured a manually engageable arm or lever 37. The hub 36 is formed with a downwardly facing sector-shaped groove 39 which serves as a limit stop by reason of its relationship to a pin 40 fixed to the shaft 35 and extending into the groove.

A ball bearing 41 is fixedly mounted on a portion of the hub 36 of reduced diameter and is secured in place by a shoulder formed on the hub by the reduction and by an external circlip 42 and a pair of cup springs 44, acting against each other as shown in FIG. 2. The ball bearing 41 supports a delivery roller 45 for rotation about the shaft 35. The roller 45 may be formed of a metal ring 46 covered by a ring 47 of suitable resilient plastic.

At the right end of the shaft 35, as viewed in FIG. 2, a cup 49 is mounted by means of a fixing screw 50 passing through the center of the cup and threaded into the end of the shaft 35. A spring 51 bears against the interior of the cup 49 and against a cup 70 which in turn bears against one end of the hub 36 so that the latter and with it the delivery roller 45, are urged axially along the shaft 35 to the left under spring force.

From the description thus far, it will be seen that, in the event of a yarn breakage or other need to rethread a particular station of yarn treating machine, the lever 37 is manually shifted whereupon the hub 36 rotates relatively to the shaft 35; and because of its eccentric construction, lifts the delivery roller 45 away from the driving roller 12 so that rethreading can be effected. It will be understood that upon separation of the opposed interacting delivery surfaces of the two rollers, the driving roller continues to rotate and other machine stations continue to operate.

When it is desired to return the delivery roller into contact with the driving roller, the lever 37 is shifted in the appropriate direction so that the eccentricity of the hub 35 causes the surface of roller 45 to advance towards that of roller 12. Upon shifting of the delivery roller, the pin 40 rocking in the segmental groove 39 serves a limit control.

As the delivery roller 45 approaches the driving roller 12, it will be seen that under the urging of spring 51, the left edge of the driving roller first engages the inner face of the rotating projection or flange 20 formed on the driving roller 12. This initial contact starts the delivery roller rotating and, as it approaches the driving roller, brings its delivery surface up to substantially the speed of the interacting delivery surface of the driving roller, so that as contact is made between the surfaces, the frictional forces on the yarn therebetween are kept to a minimum.

Turning now to FIGS. 2—4, it will be seen that the housing 24, which has already been referred to, receives the shaft 25, the lower end of which is provided with a nut 52 and washer 54 which abuts a disc 55 moveable longitudinally in the housing.

Within the housing 24, a spring block 56 is formed with an axial bore 57 and an opposed wider bore 59 forming a wall 60 therebetween which is centrally apertured for passage therethrough of the shaft 25. The shaft 25 is stepped to form an annular shoulder 61 which bears against the wall 60. An end plate 62 is fixed in the top end of the housing 24 by means of an internal circlip 64 and a protection cap 65 is removably positioned in the other end of the housing. A spring 66 extends between the end plate 62 and the wall 60 to urge the block 56 towards the bottom of the housing 24.

It will be noted that the block 56 is concentric with the axis of the housing 24 and a pair of setscrews 67 enables the block 56 to be locked against movement when it is located in the desired longitudinal position in the housing 24, which is the case when the delivery roller is in contact with the driving roller. In this position the spring 66 exerts the pressure required for the delivery roller. This pressure, as already described in more detail, is locked by means of screws 67. The whole operation is made possible by the fact that a spring 69, which serves to fix a safety pressure limit, bears against the disc 55 and the bottom of the wall 60 with a force several times as great as that of the spring 66. As a result of this construction, the compressive force of spring 69, the shaft 25, together with the nut 52, the washer 54, the disc 55, the block 56 and the spring 69 are to be regarded as a compact unit. The shaft 25 carries the support 26, and this in turn the shaft 35 and the delivery roller 45, so that, if the delivery roller is separated from the driving roller by an abnormal force, i.e., the compressive force (safety pressure limit) of spring 69 is exceeded, the shaft 25, together with the nut 52, the washer 54 and the disc 55, shifts upwards, compressing the spring 69 tightly together.

The pin 30 already referred to as passing between the fingers 31 formed on the housing 24 prevents rotation of the support 26, and therefore the shaft 35 and the delivery roller 45, from becoming misaligned relatively to the driving roller 12.

From the foregoing description it will be understood that I have contributed yarn delivery apparatus of the class described using interacting rollers which can be separated and brought together at substantially identical surface speeds and which permits the rollers to bear against each other under a preset but not adjustable pressure. In addition, the apparatus

prevents a separation of the two rollers when yarn slubs pass between them, as this would be an unnecessary interruption in smooth yarn delivery. The passage of yarn slubs causes the preset contact pressure, but not the safety pressure limit, to be exceeded, and consequently the delivery roller maintains its position. The sudden increases in yarn volume produced by the slubs are absorbed by the resilient cover of the delivery roller. At the same time, my construction allows the delivery roller to move away from the driving roller in the event that the safety pressure afforded by spring **69** in the housing **24** is exceeded by serious irregularities in the yarn delivery such as by the formation of a pad of thread on one of the rollers, for example. The foregoing advantages are achieved in a manner to materially reduce the possibility of breakage and damage to the yarn, to deliver yarn more smoothly and to protect the delivery mechanism by a safety device.

I believe that the construction and operation of my novel yarn delivery apparatus will now be understood, and that the advantages of my invention will be fully appreciated by those persons skilled in the art.

I claim:

1. In apparatus for delivering yarns and the like in textile machines, a rotatable driving roller, a delivery roller mounted for idling rotation, the rollers having opposed interacting delivery surfaces, means for rocking said delivery roller to bring said interacting surfaces into and out of contact, means interacting with said delivery roller as the latter is shifted towards said driving roller to bring the surface of said delivery roller to substantially the speed of rotation of the surface of said driving roller as contact between said surfaces is effected said last mentioned means comprising an annular projection extending radially outwardly of an edge of said driving roller and formed with a surface arranged to engage an edge of said delivery roller as the surface of said delivery roller moves towards that of said driving roller.

2. In apparatus for delivering yarns and the like in textile machines, according to claim **1** and further including means for rocking said delivery roller to bring said interacting surfaces into and out of contact, and pressure setting means effective when said surfaces are in contact to maintain a constant contact pressure therebetween.

3. Apparatus according to claim **2**, wherein said last-mentioned means comprises a spring pressing said delivery roller against said driving roller and locking means effective to maintain said spring force constant.

4. Apparatus according to claim **3**, wherein said spring force is preset so that said delivery roller is pressed against said driving roller under a specific force.

5. In apparatus for delivering yarns and the like in textile machines, according to claim **1** and further including means for rocking said delivery roller to bring said interacting surfaces into and out of contact, pressure setting means effective when said surfaces are in contact to maintain a constant contact pressure therebetween and safety pressure control means including a spring permitting movement of said delivery roller in a direction away from said driving roller when serious irregularities in yarn delivery occur.

6. In apparatus for delivering yarns and the like in textile machines, a rotatable drive shaft, a driving roller mounted for rotation with said drive shaft, a delivery roller mounted for idling rotation, said rollers having opposed interacting delivery surfaces, means for rocking said delivery roller to bring said interacting surfaces into and out of contact, said driving roller having an annular projection adjacent its interacting surface, and means urging said delivery roller axially to cause its edge to engage a surface of said projection prior to effecting contact of said delivery surfaces when said delivery roller is moved towards said driving roller thus to bring the interacting surface of said delivery roller to substantially the speed of rotation of said driving roller before the interacting surface of said contact between said delivery surfaces is effected.

7. Apparatus according to claim **6**, wherein said projection is formed at an end of said driving roller with a surface sloping towards the interacting surface of same.

8. Apparatus according to claim **6**, wherein said means for rocking said delivery roller includes an eccentrically shaped hub bored concentrically with the delivery roller and a manually engageable arm extending from said hub by which said hub may be rotated to bring the said rollers into and out of contact.

9. Apparatus according to claim **8**, wherein means are provided to limit rotation of said hub in either direction when said rollers are brought into or out of contact.