The invention is concerned with textile twisting machines, wherein two or more yarns to be twisted together are drawn from individual packages on a creel or the like, combined at a delivery roller assembly, and thence led to the traveller of a ring doubling and twisting unit. (The term “delivery roller assembly” is intended to include either a single delivery roller about which the combined yarns are wound in a desired number of turns, or an assembly of two, three or more rollers between contacting surfaces of which the combined yarns are nipped at one or more points.) The object of the invention is to provide certain improvements in such a machine whereby the delivery roller assembly and spindle may be stopped as quickly as possible in the event (I) of a breakage or failure in one of the supply yarns to be twisted, in order to ensure that the resultant thread is not produced with an incorrect number of component threads or with such threads wrongly twisted, or (II) of a breakage in the combined yarns (or one of them) between the delivery roller assembly and the spindle.

A textile twisting machine in accordance with this invention is characterised by the provision in respect of each of two or more single yarns to be twisted together, and in respect of the combined yarns in their passage from the delivery roller assembly, of detectors respectively sensitive to the tension in the single yarns and in the combined yarn and adapted to be actuated by a relaxation of such tension, a balance member adapted to be displaced from an inoperative position by the actuation of any one of said detectors, a catch associated with said balance member so that when the latter is displaced the catch will engage a moving part of the apparatus and thereby be modified in the release spring-loaded means for interrupting the delivery roller assembly drive and stopping rotation of the delivery roller (or rollers), for switching off the spindle-driving motor, and for applying a brake to the spindle.

In order that the several features of the invention may be more clearly understood, there follows a more detailed description of its application to a ring twisting machine in which each spindle is driven by an individual motor, and in which the delivery roller assembly consists of a single roller about which the combined yarns to be twisted are wrapped twice for delivery to the traveller, said delivery roller being driven through the medium of a clutch by a motor-driven shaft serving all the rollers of the machine. Said description is given with reference to the accompanying diagrammatic drawings, in which FIG. 1 is a side elevation of the apparatus provided by this invention, FIGS. 2 and 3 are respectively side and front elevations drawn to a larger scale (partly in section) illustrating the mechanism in fuller detail, with the parts shown in positions occupied during normal running. FIGS. 4 and 5 are similar views to FIGS. 2 and 3, depicting the parts as viewed by the parts in the event of a breakage or failure in supply of a component yarn, and FIG. 6 is a further view, again similar to FIGS. 2 and 3, showing the effect of a breakage in the combined yarns between the delivery roller and the final package. The drawings show two packages 10, 11 which carry two yarns to be twisted into a single thread, mounted upon a conventional creel (not shown) so that the yarns, A, B traverse a downward path from said packages 10, 11 to the point at which they are collected and wrapped about a delivery roller 12. From here the combined yarns pass through an eye 13 to the traveller 14 on the ring 15, and thence in twisted condition to the final package 16, which is mounted upon a spindle 17 having its individual driving motor 18.

There is provided in respect of each supply yarn A, B, a detector comprising a wire lever 19 coiled on itself at one end to form an eye 191 through which the yarn is passed and furnished with a counter-balance 192 such that if the tension of the yarn is relaxed by arranging the lever 19 will tilt rearwardly. The two (or more) detector levers 19 are arranged in close proximity, and mounted for pivotal movement about an axis 20. Adjacent to said lever is a delicately balanced cradle 21, arranged so that it will be rocked by the rearward tilting movement of either (or any) of the detectors by 19. The cradle 21 is rocked by impingement of the counter-balances 191 against an off-set 211; normally, the cradle is located by said off-set 211 bearing against a stop 22 which is a part of the rod 47 hereinafter referred to. The pivotal axis of the cradle is indicated at 23.

The cradle 21 carries an arm 212 which, when the cradle occupies the position shown in FIGS. 2 and 3, engages a catch 24 which is pivoted on a release lever 25 which is itself pivoted to the frame at 26, holding the catch 24 inoperative but ready for operation in the circumstances hereinafter described.

The delivery roller 12 is mounted upon a driving sleeve 27 which is rotatable upon a fixed spindle 28 which also supports a spiral gear-pinion 29 meshing with a similar gear 30 on a driving shaft 31 extending longitudinally throughout the machine. A part-clutch 32 formed integrally with said spiral gear-pinion 29 is arranged to cooperate with a complementary part-clutch 33 which is integral with the end of the delivery roller driving sleeve 27 and the latter being capable of limited axial sliding movement upon said spindle 28, the clutch 32, 33 is engaged or disengaged through the operation of the hereinafter mentioned bell-crank lever. Also carried upon the fixed spindle 28, and housed within the cylindrical flange of the delivery roller 12, is a radial arm 34 carrying abutments 341 one of which will engage an abutment 35 on an interior face of the delivery roller to stop the latter's rotation when the said driving sleeve 27 is de-clutched from the spiral gear 29.

The aforesaid release lever 25 also carries a detent 251 which normally engages a finger 36 on a spring-loaded operating rod 37 to which is pivoted one arm 38 of a bell-crank lever 39, of which the other arm 39 is provided with a bowl 40 working in a circumferential groove in the delivery roller sleeve 27. Said sleeve 27 also carries a number of radially protruding pegs 41, and when the cradle-actuated catch 24 is disengaged by the arm 212, due to the operation of either of the detector levers 19 by a breakage of one of the supply yarns A and B, the cradle will rock to the position shown in FIGS. 4 and 5 so that the catch 24 will move to a position shown in dotted lines in FIG. 5 in which it will impinge against one of said pegs 41, when it will be thrown into the position shown in full lines on FIG. 5, as the result of which the release lever 25 will be disengaged from the operating-rod 37 and the loading thereof will cause the bell-crank lever 38, 39 to slide the delivery roller sleeve 27 endwise, de-clutching it from its drive at 32, 33 and stopping the delivery roller 12.

A downward extension of the operating rod 37 carries two conical cam-members 42, 43 which partake of the reciprocatory movement of the rod 37 under its loading spring when disengaged by the release lever 25. The cam-member 42 is arranged to actuate a switch 44, interrupting the circuit of the spindle-driving motor 18 whilst...
3,002,383.

3. The other cam-member 43 which is ordinarily located between the relatively movable arms of a spring-loaded scissors brake 45 is withdrawn so as to permit the arms to close and apply the brake by which the spindles are brought to rest. Alternatively, said cam-member 43 may serve to energize electrical electrical braking means. The operation of the scissors brake 45 is more fully disclosed in Cooper's application Serial No. 758,085, filed August 29, 1958.

In their path between the delivery roller 12 and the traveller the combined yarns A, B are passed through the eye 13 which is nougneted, the end of a lever 46 which is normally balanced against the tension of the yarns such tension holding the lever 46 in the position of Fig. 1. The lever is connected to a light rod 47, the part 22 of which cooperates with the part 211 of the cradle associated with the individual yarn detector levers 19, the arrangements being such that in the event of a failure in the tension of the combined yarns A, B, the lever 46 will rise so as to rock the cradle 21 to the position shown in Fig. 6 as though the cradle had been operated by a breakage of or failure of supply in one of the individual yarns A, B proceeding from the creel.

By these means it is possible to ensure that in the event of a breakage, or a failure in the supply, of one of the yarns to be twisted, or of a breakage in the combined yarns in their path to the traveller, the spindle and delivery roller relating to that particular twisting unit are stopped almost instantaneously, the production of a thread without the full complement of twisted yarns, and avoiding waste.

To re-start the machine after stoppage due to either of the reasons here discussed, and after the fault has been rectified, a foot pedal 48 associated with the operating rod 37 may be depressed, raising said rod so as to switch off the spindle motor 18, release the spindle brake 45 and re-clutch the delivery roller driving sleeve 27.

What I claim as my invention and desire to secure by Letters Patent is:

1. A textile twisting machine including a delivery roller assembly and a twisting unit characterized by the provision in respect of each of two or more single yarns to be twisted together, and in respect of the combined yarns in their passage from the delivery roller assembly, of detectors respectively sensitive to the tension in the single yarns and in the combined yarns and adapted to be actuated by a relaxation of such tension, a balance member adapted to be displaced from an inoperative position by the actuation of any one of said detectors, and a catch associated with said balance member and effective when the latter is displaced to engage a moving part of the apparatus so as to be motivated to release spring-loaded means for interrupting the delivery roller assembly drive, for switching off the spindle-driving motor, and for applying a brake to the spindle, additional means for stopping rotation of the delivery rollers operative upon displacement of said balance member, said delivery roller assembly comprising a sleeve adapted to slide on a fixed spindle and including a part-clutch normally in engagement with a complementary part-clutch of a driving member by which said sleeve is rotated on said spindle, means for sliding said sleeve along said spindle in response to the motivation of said catch to disengage said clutch and thereby to interrupt the drive to the delivery roller, and means for an abutment on the delivery roller arranged to cooperate with a stop member on the fixed spindle upon disengagement of the clutch to arrest the delivery roller.

2. A machine according to claim 1 wherein said spring-loaded means is operatively connected with a cam arranged to open and close the limbs of a scissors-type spindle brake.

References Cited in the file of this patent

UNITED STATES PATENTS

377,881 Broadway Feb. 14, 1888
388,509 Smith et al. Aug. 28, 1888
753,338 Whitaker Mar. 1, 1904
1,790,815 Hendrickson Feb. 3, 1931
1,840,642 Stone Jan. 12, 1932
2,045,079 Huss June 23, 1936
2,257,654 Schaum Sept. 30, 1941

FOREIGN PATENTS

202,151 Great Britain Aug. 16, 1923