T. A. & H. A. BOYD.

MACHINE FOR SPINNING OR TWISTING STRIPS OF PAPER INTO YARN.

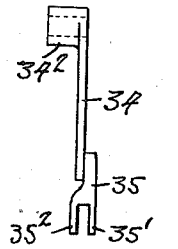
APPLICATION FILED APR. 27, 1915.

1,209,545.

Patented Dec. 19, 1916.

2 SHEETS—SHEET 1.

Fig. 1a.



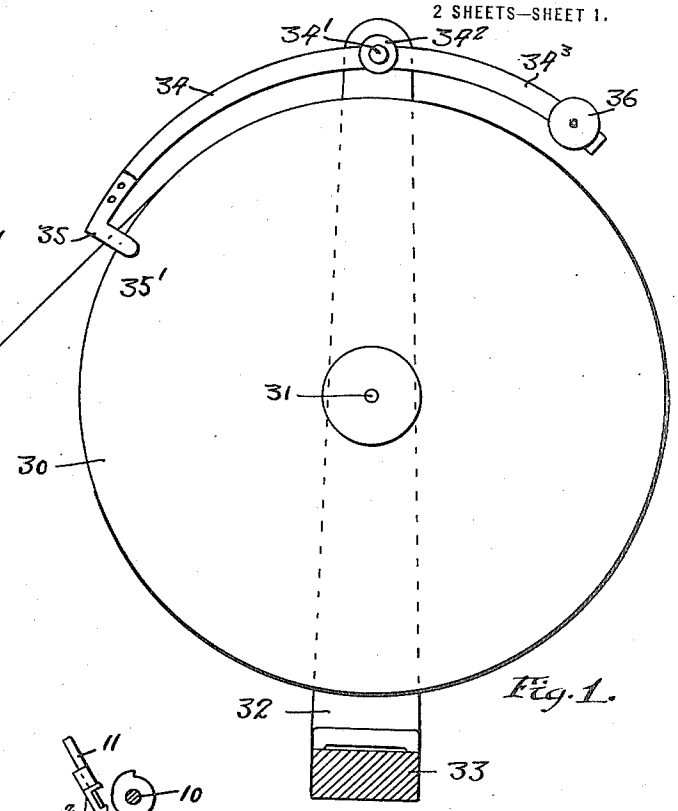


Fig. 1.

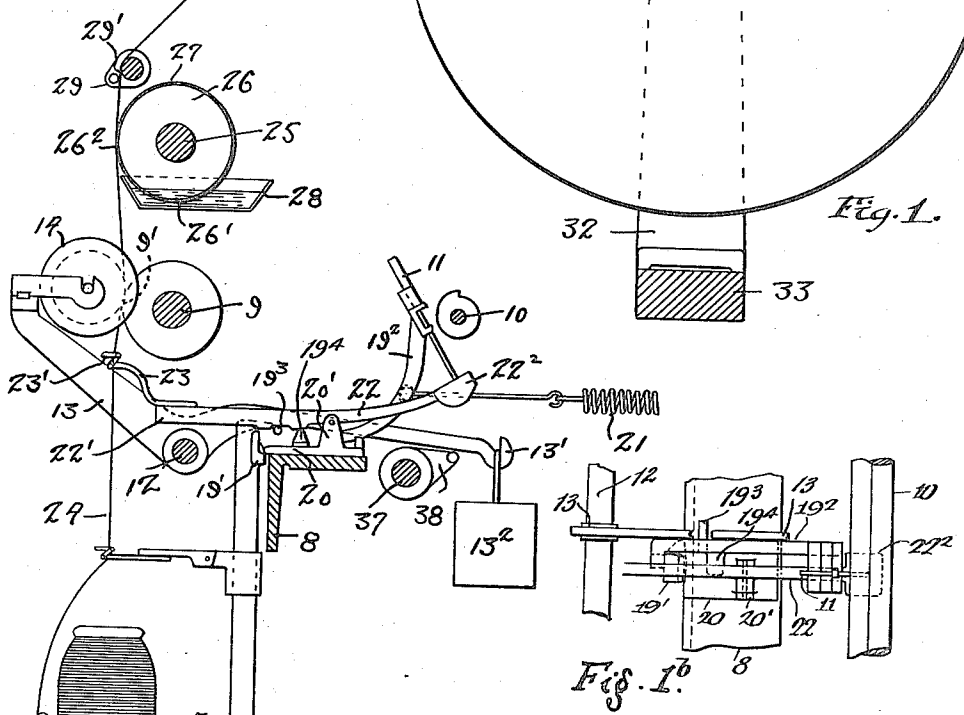
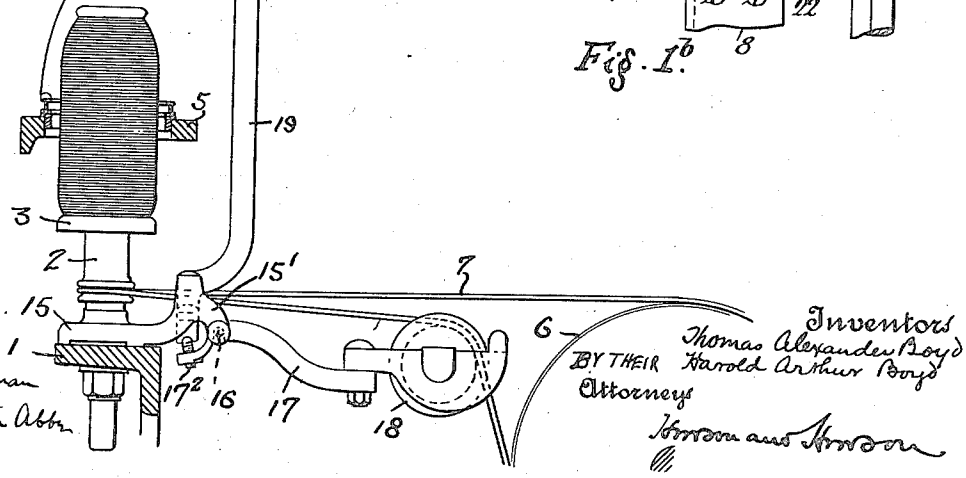


Fig. 1b.



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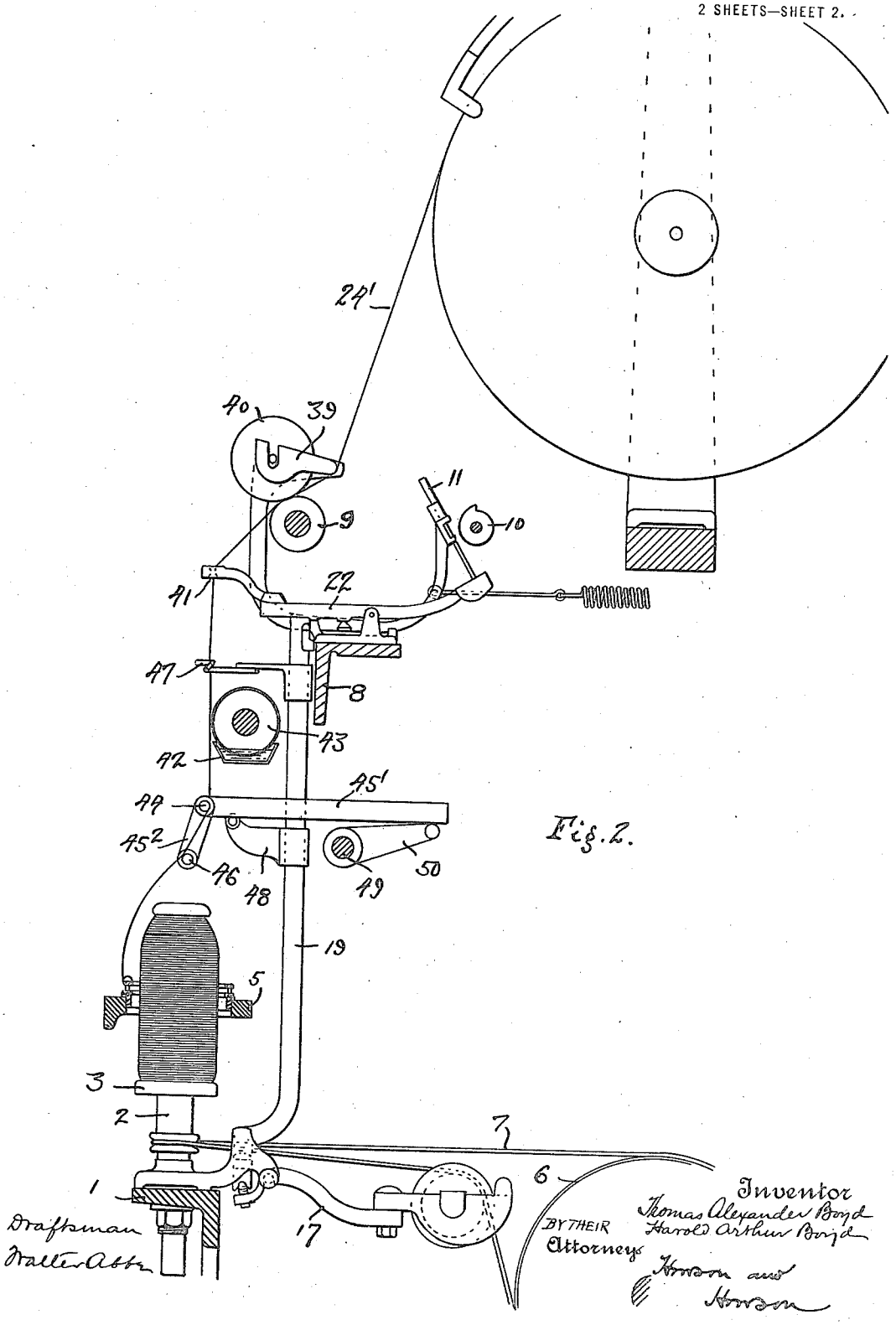


Fig. 2.

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UNITED STATES PATENT OFFICE.

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MACHINE FOR SPINNING OR TWISTING STRIPS OF PAPER INTO YARN.

1,209,545. Specification of Letters Patent. Patented Dec. 19, 1916.

Application filed April 27, 1915. Serial No. 24,278.

To all whom it may concern:

Be it known that we, THOMAS ALEXANDER BOYD and HAROLD ARTHUR BOYD, both subjects of His Majesty King George of Great Britain and Ireland, and both residing at Glasgow, Scotland, have invented certain new and useful Improvements in Machines for Spinning or Twisting Strips of Paper into Yarn, of which the following is a specification.

Our invention relates to machines for damping and spinning or twisting strips of paper into yarn and has for its object improvements in the mechanism and working and in the yarn produced.

In machines of the kind referred to the paper strip is drawn from a roll and is delivered to the bobbin on the spinning or twisting spindle. Between the roller and the spindle is a damping roller or other device which damps the paper strip while it is in a flat condition and as it is passing forward to the spindle. When the whole machine or one spindle is stopped the flat strips are liable to get overdamped and to lose their strength.

According to this invention, when the delivery rollers cease delivering the paper strips to the spindles on account of the stoppage of the said delivery on a whole machine or on a single spindle of a machine the overdamping above referred to is prevented, by causing or permitting the spin which is being put on to the paper strip to pass along the said strip of paper to a point beyond the damping roller or device so that the damping is not then effected upon the flat strip as it is during the process of spinning but upon a piece of the strip which is twisted or partially twisted and which does not absorb the moisture in the same way as the flat strip. When the spin is being allowed to pass from the spindle to the point desired beyond the damping device referred to, it is prevented from going too far beyond the said point by means of a slit guide placed in the path of the strip on its way to the damping roller or device. This guide is made wide enough to allow the paper strip to pass toward the damping device, but too narrow to allow the spin or twist coming from the spindle to pass beyond the said guide.

This invention includes the means of effecting the foregoing improvements in groups of spindles and also in individual spindles including the means of stopping such individual spindles by hand or automatically when the strip of paper or yarn fails, and, still further, our invention includes the control of the paper roll from which the strip is drawn for the purpose of damping and spinning by means of a surface drag guide on the edge of the roll.

Figure 1 is a sectional end elevation of a machine in which our invention is embodied in one form; Fig. 1^a is a plan of the strip guide 34; Fig. 1^b is a partial plan of the stop motion control levers; Fig. 2 is a sectional end elevation of a machine in which our invention is embodied in a modified form.

In carrying out our invention we shall first of all describe one arrangement of our invention including a separate stop motion for each spindle, adapted to work by hand or automatically when the strip of paper or yarn fails. In this arrangement, Fig. 1, the means of preventing the overdamping is employed when one spindle is stopped and also when all the spindles of the frame are stopped. In this arrangement we fix on the framing a spindle rail 1 and on it a ring spindle 2 and bobbin 3 standing vertically. We also employ a traversing ring rail 5 and a tin roller 6 and cord 7 to drive the spindle 2, all of ordinary description. Above and behind the ring spindle 2 we fix on the framing a top rail 8 and on it roller bearing brackets (not shown) at intervals. In these brackets we place above and in front of the top rail 8 a delivery roller 9 common to all the spindles along the frame and having a boss opposite each spindle. The delivery roller 9 referred to, is horizontal and parallel with the top rail 8. The front faces 9^1 of the bosses on the delivery roller are plumb with the center of the ring spindles 2 aforementioned. The roller bearing brackets (not shown) extend inward behind the top rail 8 and have cam shaft bearings in which we mount a revolving shaft 10 to act upon the detector 11 of the automatic stop motion belonging to each individual spindle hereafter referred to. In front of the top rail 8 we mount in brackets a round rod 12 parallel with the top rail 8. On this rod we mount above each spindle a pressing delivery roller lever 13. At the front end of the said lever we mount a pressing delivery roller 14 which is pressed against the boss of the delivery roller 9 by means of the le-

ver aforedescribed. The pressing delivery roller lever 13 extends inward over the top rail 8 and has at its inner end 13^1 a pressing weight 13^2.

On the top of the spindle rail 1 we fix below the spindle 2 a stool 15 having two lugs 15^1 projecting inward and having a cross pin 16 on which we fulcrum a cord tightening lever 17 projecting toward the tin roller 6 and having at its inner end a cord tightening pulley 18. When the cord tightening lever 17 and its pulley 18 are at their highest point the cord 7 is tightened and drives the spindle 2 and when it is at its lowest point the cord 7 is slackened and the spindle stops. The cord tightening lever 17 projects forward at its front end beyond its crosspin or fulcrum 16 and carries on the adjusting screw 17^2 at that point an upright rod 19 which passes upward in front of the top rail 8. On the upper side of the top rail 8 a catch plate 20 is fixed and projects in front of the said rail. The upright rod 19 is drawn against the catch plate 20 by means of a spiral spring 21. On the back of the upright rod 19 opposite the catch plate 20 we form a catch 19^1 which engages with the catch plate 20 when the upright rod 19 is at its lowest point and thus the upright rod 19 holds the cord tightening lever 17 and its pulley 18 at their highest point. When the upright rod 19 is pressed forward clear of the catch or catch plate 20 as hereafter described, by the detector mechanism, the upright rod 19 rises automatically by means of the upward pressure of the cord tightening lever 17.

From the upper end of the upright rod 19 a limb 19^2 projects inward over the top rail 8 and upward to the front side of the cam shaft 10 before referred to. Just opposite the cam shaft 10 we mount in the upright rod a detector 11 which, when the frame is working, is held clear of the cam shaft 10. On the catch plate 20 fixed on the top rail 8 we form two vertical lugs 20^1 and in these we pivot a balanced starting lever 22 at right angles to the top rail 8. The front end of the said starting lever 22 is carried forward to within reach of the worker and is used by her to press the upright rod 19 downward until it engages with the catch plate 20, bearing for this purpose against the stud 19^4 on the arm 19^2 of the rod 19. The balanced starting lever 22 extends inward and when depressed at its front end 22^1 its back end 22^2 sustains the detector 11 in the upright rod 19 holding it clear of the cam shaft 10 when the spindle is at work. The balanced starting lever 22 is so balanced as normally to have its front end 22^1 up and its back end 22^2 down. At the front end of the said balanced starting lever we fix a thread guide 23 with a curl eye 23^1 formed and so angled that the yarn 24 on its passage from the delivery roller 9 to the spindle 2 shall bear on the back and front of the curl and by its friction hold the curl 23^1 and the balanced starting lever 22 down at its front end. When, however, the delivery of the yarn 24 ceases by the opening of the delivery rollers 14 as hereafter described, the balanced starting lever 22 will rise at its front end 22^1, thus altering the angle of the curl 23^1 in relation to the line of the yarn 24, and allowing the spin from the spindles 2 to ascend. When the yarn fails between the delivery roller 9 and the spindle 2 the balanced starting lever 22 rises at its front end and thus allows the detector 11 in the upright rod 19 to come into the path of the cam shaft 10 which presses the upright rod 19 off the catch plate 20 and slackens the band 7 which ceases to drive the spindle 2. On the arm 19^2 of the upright rod 19 there is fixed a horizontal pin 19^3 which passes beneath the inner end of the pressing delivery roller lever 13. When the upright rod 19 rises, the pin 19^3 referred to raises the inner end 13^1 of the pressing delivery roller lever 13 and withdraws the pressing delivery roller 14 from the delivery roller 9 causing the delivery of the paper strip 24 to cease until the spindle is again started. Above delivery roller 9 we mount a shaft 25 with a damping roller 26 covered with cloth 27 and dipping at its lower edge 26^1 in water and oil or other liquid held in a trough 28 which we mount below the damping roller. The face 26^2 of the damping roller is slightly in front of a line from the spindle 2 past the face of the delivery roller 9.

Above the damping roller 26 we fix a guide 29 formed by a wire held in front of a rod so as to form a slit 29^1 wide enough to clear the flat paper strip 24^1 as it passes downward to the damping roller 26, the delivery roller 9 and to the spindle 2. Behind and above the damping roller 26 we mount the roll of paper 30 on a stud 31 with its axis level and parallel or thereabout with the damping roller shaft 25. The stud 31 is fixed in an upright bracket 32 carried on a wood bar 33 extending from end to end of the machine. The upright bracket 32 extends upward beyond the top edge of the roll 30. Above the top edge of the roll 30 we fix in the upright bracket 32 referred to, a guide lever stud 34^1 parallel with the stud 31 which carries the roll. On the guide lever stud 34^1 we mount a guide lever 34 having a boss 34^2 on the stud and a limb which extends over the top of the roll but clear of the roll. At the front of the guide lever 34 at a point somewhat above the center of the roll 30 we fix a guide 35 which embraces the edge of the roll 30 and which has lugs 35^1 and 35^2 extending down each side of the roll 30 for $\frac{1}{2}''$ or so. From the boss 34^2 of the

guide lever 34 a limb 34^3 extends backward and has on it an adjustable weight 36 to regulate the pressure of the guide 35 upon the edge of the roll 30. The objects of the guide lever 34 and the guide 35 are to give the requisite drag to the roll 10 to prevent coils of paper 24^1 from falling off the top edge of the roll. The guide lever 34 being pivoted on its stud 33 swings downward and inward to the center of the roll 30 as the roll decreases in diameter. One or more similar guides may be applied at the back of or from beneath the roll. It will thus be understood that the paper strip 24^1 is drawn from the roll 30 through the slit guide 29 above the damping roller past the face 26^2 of the damping roller 26, through the delivery rollers 9 and 14 and downward to bobbin 3 on the spindle 2. When the stop motion is operated by hand, to doff the bobbin 3 from the spindle 2, or to put on a fresh roll of paper 30 or for any other purpose the cord 7 is slackened and ceases to drive the spindle 2, which, however, on account of its weight and impetus, continues to revolve for some seconds. The pressing delivery roller 14 is opened whereupon the spin from the revolving spindle 2 passes upward on the paper strip 24^1, past the damping roller 26 until it is arrested by the slit guide 29. The paper strip 24^1 resting on the damping roller being partially twisted does not absorb moisture and so it is not so liable to break in restarting.

Before the whole side of the frame is stopped we open all the delivery rollers 14 and 9 so as to let the spin pass upward past the delivery rollers 14 and 9 as above described and for the same purpose. In accomplishing this we mount on the framing a shaft 37 from end to end of the machine. This shaft is placed behind the top rail 8 and parallel with same, and passes underneath the inner end 13^1 of the pressing delivery roller levers 13. On the shaft below each of these levers we fix a wiper 38. The shaft has a lever (not shown) at the end of the frame by means of which the shaft 37 is turned and the wipers 38 raise the pressing delivery roller levers 13 and open the delivery rollers 14 and 9, thus allowing the twist or spin to pass upward as before described. The delivery rollers are opened a second or two before the machine and the spindles are stopped so as to secure the requisite twist or spin on the yarn and make it ascend.

The function of the machine will thus be understood to be as follows:—(1) By raising the starting lever 22 by hand, the cam 10 knocks off the upright rod and slackens the cord. At the same time the delivery rollers 14 and 9 are opened and the over-running of the spindle 2 sends the twist upward beyond the damping roller 26. (2) If an end fails the spindle and the delivery of the strips stop. (3) Before the whole frame is stopped all the delivery rollers are opened and the twist ascends beyond the damping roller to prevent the overdamping of the yarn. As above explained these motions are effected through rod 19. This rod takes the position shown in Fig. 1 during the normal operation of the machine, resting at its lower end on the short arm of the bell crank lever 17 and at its upper end lying between the control lever 22 and the counterweight arm of the presser roller lever 13, and held in this position by the engagement of its catch lip 19^1 with the edge of the catch plate 20 under the upward thrust of the lever 17. When the inner end of lever 22 falls, (through break of the sliver 24 or through manual operation of the lever 22), the detector 11 at the inner end of the arm 19^2 of the lever 19, moves down into the path of the cam on shaft 10, and the latter forces the upper end of the rod toward the front of the machine. This frees the lip 19^1 from the catch plate, and the rod 19 rises under the upward thrust of the short end of bell crank lever 17, the other end of which, carrying the tensioning roller 18 simultaneously falls, slackening the band 7 and thus halting the spindle drive. As the rod 19 rises, the pin 19^3 thereon engaging beneath the counterweight arm of lever 13, lifts the latter thus moving the presser roller 14 away from the feed roller 9 and halting the feed of the tape 21^1. To restore the parts to their normal working position, the operator presses down the front end of lever 22. This bears against stud 19^4 on the lever 19 and presses the latter down until its catch lip 19^1 engages beneath the edge of catch plate 20 against which it is drawn by the spring 21. Simultaneously with the return of the lever 19 to position, the pressing roller 14 engages feed roller 9, and the tensioning roller 18 is lifted to position in which the driving band 7 is taut, so that both the feed of the strip 24^1 and the drive of the spindle 2 are simultaneously recommenced.

In a second arrangement Fig. 2 in which the damping roller is placed between the delivery rollers and the spindle we employ a spindle rail 1 and top rail 8, ring spindle 2 and bobbin 3, ring rail 5, upright rod 19 with detector 11 and cam shaft 10, spindle cord 7, tin roller 6, cord tightening lever 17, delivery roller 9, all as in the foregoing first arrangement. We place the delivery roller, however, with its face at a convenient distance inside of a line plumb with the center of the spindle 2. On the upper end of the upright rod 19 we fix a top pressing roller holder 39 and in same a pressing delivery roller 40 resting upon the top of the delivery roller 9. The starting lever 22 has a guide 41 at its front end which is kept down by a paper strip 24^1 and being

balanced, rises when the strip fails, thus by means of detector mechanism, as described in the foregoing first arrangement, stopping the delivery and the spindle. Between the delivery roller 9 and the spindle 2 we mount a trough 42 and a damping roller 43 with the face of the said damping roller touching the paper strip 24^1 and damping same as it passes downward to the spinning bobbin. Below the damping roller 43 in the path of the paper strip, we place a guide pin 44 parallel with and immediately in front of and below the damping roller 43. On this guide pin we mount a bell crank lever 45^1, 45^2 with its horizontal limb 45^1 passing inward beyond the upright rod 19 and its limb 45^2 looking downward and forward at an obtuse angle from the horizontal limb. At the end of the forward limb 45^2 we fix a lower guide pin 46 with its outer face above the center of the spinning spindle 2. The effect of the upper pin 44 is to keep the paper strip 24^1 flat until it passes over the said lower pin 46 when it gets twisted by the spindle and bobbin. When, however, the horizontal limb 45^1 of the bell crank lever is lifted, the lower guide pin 46 is carried inward, thus allowing the twist to pass upward past the damping rolling 43. Above the damping roller 43 we fix a slit guide 47 as in the foregoing first arrangement to prevent the twist ascending beyond same. When the stop motion is operated by hand the upright rod 19 raises the horizontal limb 45^1 of the bell crank lever 45 by means of a bracket 48 fixed on the upright rod 19. Behind the upright rod 19 and below the horizontal limb 45^1 of the bell crank levers 45 we mount on the framing a shaft 49 passing along the frame. Opposite each bell crank lever we fix a wiper 50 which, when the shaft 49 is turned raises the horizontal limb 45^1 of the bell crank lever 45 and thus allows the twist to pass upward at all the spindles beyond the damping roller 43.

It will thus be understood that the functions of the machine are: (1) Before the frame is stopped the shaft 49 with wipers 50 is turned and withdraws the lower guide 46 just over the spindle from the yarn, thus allowing the spin to ascend beyond the damping roller 43 instead of preventing it from ascending. (2) By means of the stop motion an individual spindle can be stopped to doff or to put a fresh roll on the creel or to piece an end. When the thread fails the stop motion automatically stops the delivery of the paper strip and the spindle.

Having now particularly described and ascertained the nature of our said invention and in what manner the same is to be performed, we declare that what we claim is:—

1. In a machine for spinning or twisting paper strips into yarn, a twisting mechanism, a damping device past which the strip is delivered to the twisting mechanism, means having a twist-restraining engagement with the strip at a point between the damping device and twisting mechanism so that the strip normally passes the damping device in flat condition, and means for nullifying said twist-restraining engagement on the halt of the delivery to permit a twist to be imparted to the strip at the point at which it is in contact with the damping device, for the purpose described.

2. In a machine for spinning or twisting paper strips into yarn, a twisting mechanism, a damping device past which the strip is delivered to the twisting mechanism, means having a twist-restraining engagement with the strip at a point between the damping device and twisting mechanism so that the strip normally passes the damping device in flat condition, and means for nullifying said twist-restraining engagement on the halt of the delivery to permit a twist to be imparted to the strip at the point at which it is in contact with the damping device, together with means arranged in advance of the damping device and engaging the paper strip to prevent a twist being imparted to the strip at a point in advance of said last-named means.

3. In a machine for spinning or twisting paper strips into yarn, a twisting mechanism, a damping device past which the strip is delivered to the twisting mechanism, means having a twist-restraining engagement with the strip at a point between the damping device and twisting mechanism so that the strip normally passes the damping device in flat condition, and means for nullifying said twist-restraining engagement on the halt of the delivery to permit a twist to be imparted to the strip at the point at which it is in contact with the damping device, together with a slit guide through which the strip passes to the damping device and serving to limit the length of the twisted strip in advance of the damping device.

4. In a machine for spinning or twisting paper strips into yarn, a twisting mechanism, a damping device past which the strip is delivered to the twisting mechanism, cooperating, separable delivery rollers associated with said damping device and twisting mechanism, means having a twist-restraining engagement with the strip at a point between the damping device and twisting mechanism so that the strip normally passes the damping device in flat condition, and means operative upon the separation of the delivery rollers and the consequent halt of delivery, to nullify said twist-restraining engagement.

5. In a machine for spinning or twisting paper strips into yarn, a twisting mecha-

nism, a damping device past which the strip is delivered to the twisting mechanism, a strip guide interposed between the damping device and twisting mechanism and having a twist-restraining engagement with the strip to prevent the passage thereby of the twist during the normal operation of the machine, and means for displacing said guide to nullify the twist-restraining engagement thereof with the strip on the halt of delivery of the latter.

6. In a machine for spinning or twisting paper strips into yarn, a twisting mechanism, a damping device past which the strip is delivered to the twisting mechanism, a pivoted strip guide interposed between the damping device and twisting mechanism and having a twist-restraining engagement with the strip to prevent the passage thereby of the twist during the normal operation of the machine, and means for displacing said guide to nullify the twist-restraining engagement thereof with the strip on the halt of delivery of the latter.

7. In a machine for spinning or twisting paper strips into yarn, a twisting mechanism, a damping device past which the strip is delivered to the twisting mechanism, a pivoted strip guide interposed between the damping device and twisting mechanism and having a twist-restraining engagement with the strip to prevent the passage thereby of the twist during the normal operation of the machine, a stop motion mechanism and means associated therewith for displacing said guide to nullify the twist-restraining engagement thereof with the strip on the halt of delivery of the latter.

8. In a machine for spinning or twisting paper strips into yarn, a twisting mechanism, a damping device past which the strip is delivered to the twisting mechanism, a pivoted strip guide interposed between the damping device and twisting mechanism and having a twist-restraining engagement with the strip to prevent the passage thereby of the twist during the normal operation of the machine, a manually controllable stop motion mechanism and means associated therewith for displacing said guide to nullify the twist-restraining engagement thereof with the strip on the halt of delivery of the latter.

9. In a machine for spinning or twisting paper strips into yarn, a series of twisting mechanisms, damping means past which corresponding strips of paper are delivered to the twisting mechanisms, a strip guide for each strip interposed between the damping means and twisting mechanism and having a twist-restraining engagement with the strip during the normal operation of the machine, a stop motion mechanism for each twisting mechanism, means for operating each stop motion mechanism independently and means associated therewith for displacing the corresponding strip guide to nullify its twist-restraining engagement with the paper strip, for the purpose described.

10. In a machine for spinning or twisting paper strips into yarn, a series of twisting mechanisms, damping means past which corresponding strips of paper are delivered to the twisting mechanisms, a strip guide for each strip interposed between the damping means and twisting mechanism and having a twist-restraining engagement with the strip during the normal operation of the machine, a stop motion mechanism for each twisting mechanism, means for operating each stop motion mechanism independently and means associated therewith for displacing the corresponding strip guide to nullify its twist-restraining engagement with the paper strip, together with means common to a plurality of said stop motion mechanism for operating the same simultaneously, for the purpose described.

In testimony whereof we have signed our names to this specification, in the presence of two subscribing witnesses.

THOMAS ALEXANDER BOYD.
HAROLD ARTHUR BOYD.

Witnesses:
JOHN HORNELL,
JAMES CUNNINGHAM.