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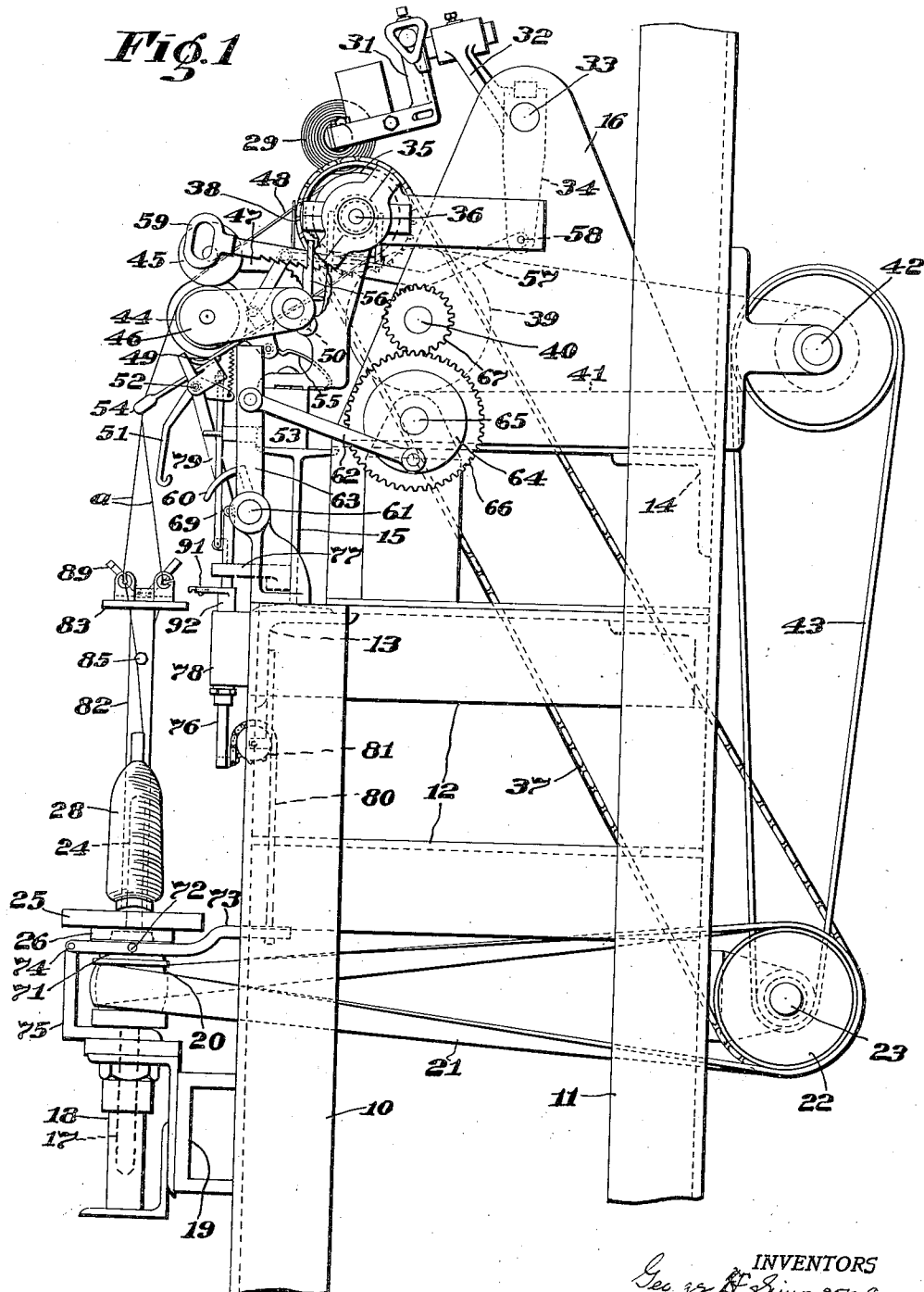
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STOP MECHANISM FOR YARN TWISTING AND WINDING MACHINES

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3 Sheets-Sheet 1



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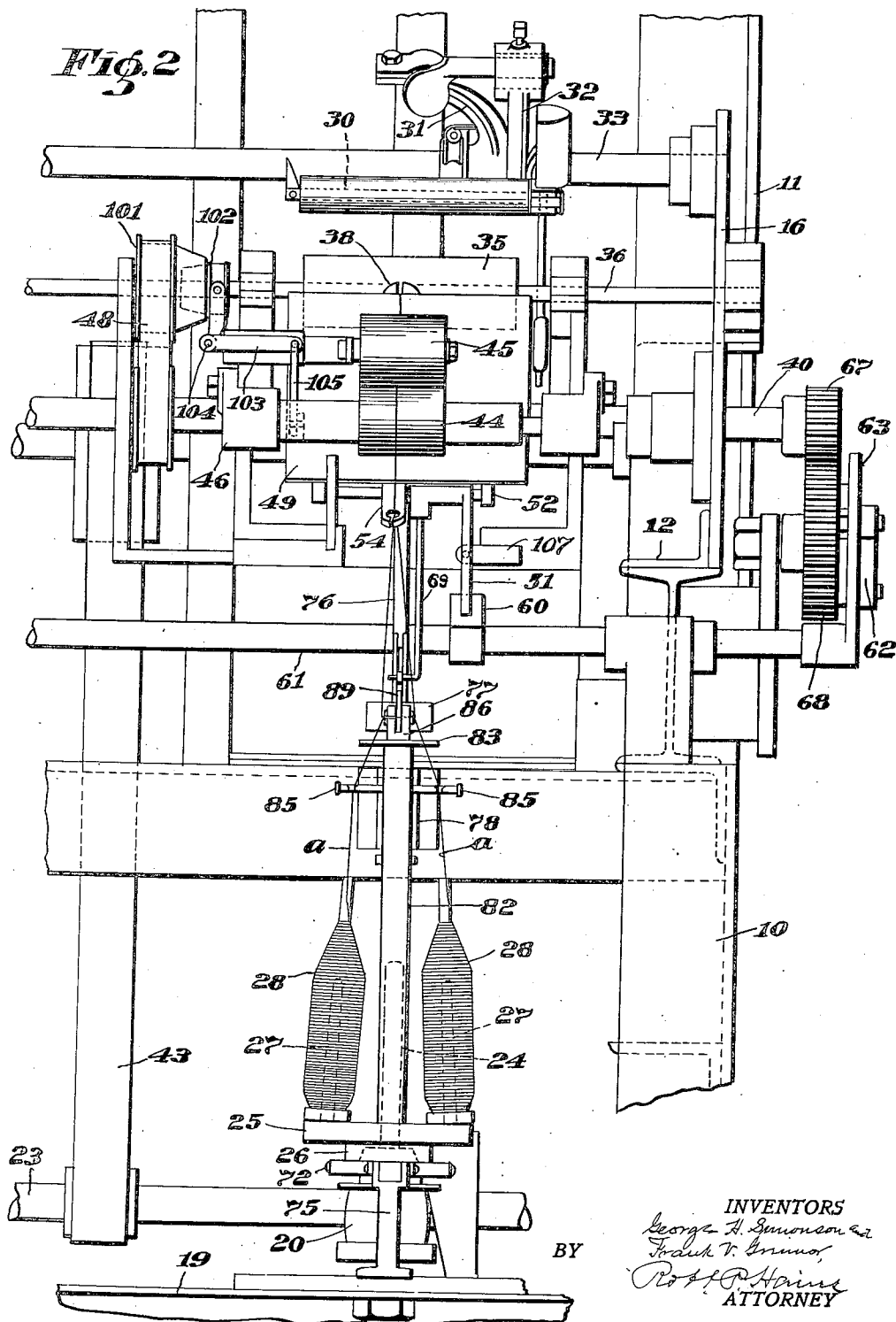
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STOP MECHANISM FOR YARN TWISTING AND WINDING MACHINES

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3 Sheets-Sheet 2



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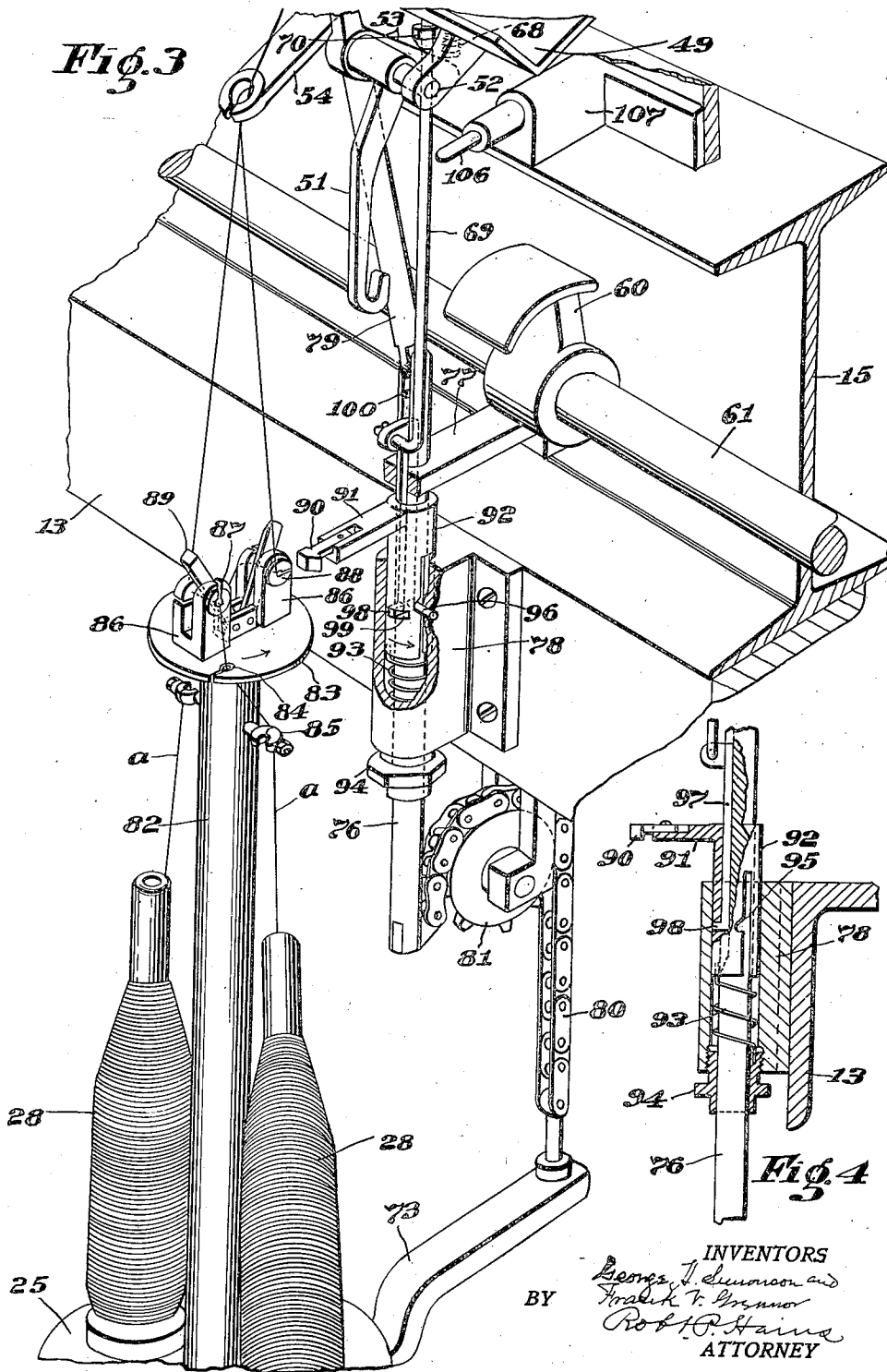
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STOP MECHANISM FOR YARN TWISTING AND WINDING MACHINES

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3 Sheets-Sheet 3



UNITED STATES PATENT OFFICE

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STOP MECHANISM FOR YARN TWISTING AND WINDING MACHINES

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This invention relates to yarn winding machines for doubling and twisting yarns, and more particularly to stop mechanism for stopping the winding operation when one of the two or more yarns being twisted breaks.

Winding machines have been provided heretofore for winding yarn from a bobbin to a power driven package, and these prior machines have been provided with stop mechanism controlled by the running yarn and adapted to stop the rotation of the package when the yarn being wound thereon breaks.

While the stop mechanism of these prior devices work satisfactorily when a single yarn is being wound upon a package, they are not adapted for use where two or more yarns are being twisted together as they are supplied to the package, since these prior devices will stop the winding operation only in case all the yarns break and not when a single yarn breaks. This is objectionable for if the winding operation continues after one yarn breaks, a single yarn, or yarns of less than the desired number of ends will be wound on the package.

An important feature of the present invention resides in mechanism controlled by each of the yarns being twisted together as they are delivered from bobbins to a winding package and operable to stop the winding operation upon the breakage of a single yarn. The construction is such that when one yarn breaks the winding operation will stop while the other yarn or yarns supplied to the package remain intact. This is highly desirable since in piecing up it is necessary to tie together only the ends of the one broken yarn, and the knot thus produced is so small that it will not be noticeable in the multiply twisted yarn, whereas if all the strands of the multiply yarn are broken, an objectionable large knot is produced in tying these several ends together.

Another important feature of the invention resides in latch means for controlling the winding operation, and in latch actuators carried by the spindle that rotate the yarn supply bobbins and which are adapted to be held inactive by the running yarns, but are

constructed and arranged to stop the winding operation when any one of the yarns break.

A further feature of the invention resides in mechanism for automatically resetting the latch means after it has been actuated to stop the winding operation, and still a further feature of the invention resides in power actuated means controlled by each yarn for stopping the rotation of the bobbins and the rotation of the yarn receiving package when a yarn breaks, or supply package runs out.

Other features of the invention and novel combination of parts in addition to the above will be hereinafter described in connection with the accompanying drawings, which illustrate one good practical form of the invention.

In the drawings:—

Fig. 1 is an end view of a yarn winding machine constructed in accordance with the present invention.

Fig. 2 on a larger scale is a front view of an end portion of the machine of Fig. 1 showing one group of yarn doubling and twisting units.

Fig. 3, on a still larger scale is a perspective view of stopping mechanism for controlling one twisting and winding unit, and

Fig. 4 is a vertical sectional view through latch means and cooperating parts to be described.

The operating parts of a winding machine provided with the novel features of the present invention are supported at the desired height from the floor by any suitable frame, and such frame is shown as having the uprights 10 and 11 connected by the transversely extending beams 12 and to these uprights are secured the longitudinally extending rails 13, 14 and 15. To the upper portion of each end frame is secured an end plate 16 adapted to support the yarn receiving package and other mechanism to be described.

The frame of the present winding machine may be made long enough to support any desired number of yarn twisting and doubling units such as shown in Figs. 2 and 3 of the drawings. Each of these units comprises a rotating spindle 17 mounted in a

bearing 18, clamped or otherwise secured to a spindle supporting rail 19. Upon each spindle 17, in the construction shown, is rigidly secured a pulley or whirl 20, adapted to be driven by a belt 21 which in turn is driven from a pulley 22 secured to the main or power shaft 23. Each spindle 17 has a portion 24 which extends upwardly therefrom some distance above the pulley 20 and upon this upper portion 24 of the spindle is journaled and slidably mounted the bobbin supporting disc 25. This disc has the reduced downwardly extending portion 26 forming a clutch member adapted to engage a cooperating clutch member secured to the spindle 17 or its pulley 20. This clutch mechanism may be of well known construction and the arrangement is such that the weight of the bobbin supporting disc 25 and parts carried thereby are relied upon to hold the clutch member 26 in frictional engagement with the clutch member of the spindle 17 when it is desired to drive the disc 25 from the spindle 17. The disc 25 may be provided with any desired number of bobbin carriers 27, two being shown in the drawings, and upon each of these carriers is mounted a bobbin 28.

The yarns *a* supplied by the bobbins 28 are drawn upwardly through suitable guides to be described and are wound upon the yarn receiving package 29, which package is mounted upon and is rotatably supported by the holder 30. One end of this holder is pivotally secured to the L-shaped arm 31 which is clamped in the desired position of adjustment to the bracket 32, that is rockingly supported by the longitudinally extending shaft 33 and the bracket 32 is provided with the downwardly extending arm 34. The construction is such that the yarn receiving package 29 rests under the influence of its own weight upon the driving roll 35 and the package and its supporting shaft 30 moves upwardly as the size of the package 29 increases.

The roll 35 in the construction shown is secured to the operating shaft 36 which is driven from the main power shaft 23 by the chain or belt 37. The desired traversing movement is imparted to the doubled and twisted yarns *a* as they are delivered to the package 29 by the traversing guide 38 which may be operated in a well known manner from the traversing cam or slotted drum 39, which is rigidly secured to and rotated by the shaft 40. The shaft 40 in the construction shown is driven by the belt 41 that is operated by the rear shaft 42 and this rear shaft is driven from the lower or power shaft 23 by the belt 43. The roll 35 and drum 39 obviously, however, may be driven by other means.

It will be apparent from the construction so far described that when the spindle 17 is

operated to rotate the bobbin supporting disc 25 and the bobbins carried thereby, the yarns *a* will be twisted together as they pass upwardly from the supply bobbins 28 to the yarn receiving package 29.

In some cases it is desirable to provide means for firmly engaging the twisted yarns *a* at a point between the supply bobbins 28 and the yarn receiving package 29 to determine more accurately the number of twists imparted to the yarn per unit length by the rotation of the spindle 17. To this end in the construction shown the doubled and twisted yarns *a* are fed between the nip of the cooperating rolls 44 and 45. The lower roll 44 in the construction shown is rotatably supported by the fixed brackets 46 and the upper roll 45 is supported by the arms 47 for movement towards and from the lower roll 44. The lower roll 44 may be driven from the shaft 36 by the belt 48 and the upper roll 45 is driven by its friction engagement with the roll 44 or the yarn passing between these rolls.

As above stated an important feature of the present invention resides in stop mechanism for stopping the winding operation when any one of the yarns *a* break and one novel form of mechanism to this end will now be described.

In the embodiment of the invention illustrated a hook supporting lever 49, which is pivotally secured at 50 to the machine frame is positioned below the roll 44 for swinging movement and to the outer end of the lever 49 is pivotally secured the drop-hook 51. This hook is pivoted to the lever 49 at 52 and is provided with the inwardly extending arm 53. The lever 49 is shown as also provided with the yarn guide 54 extending from its outer end and adapted to guide the yarns to the nip of the rolls 44 and 45.

The hook supporting lever 49 is normally held in the raised or yarn winding position in which it is shown in Fig. 1 by a spring 55, the arrangement being such that when this lever 49 is rocked downwardly, either by hand or by actuating means to be described, it will be retained in its lowered position by an offset portion of the spring 55. The lever 49 is provided with the upwardly extending arm 56 adapted to support the package elevating rod 57. The rear end of this rod is pivotally connected at 58 to the downwardly extending arm 34 and is provided at its forward end with the handle 59 adapted to be grasped when it is desired to raise or lower the package 29 manually by rocking its supporting bracket 32. The lower face of the rod 57 is provided with a series of notches as shown in Fig. 1 and adapted to engage the upper end of the supporting lever 56. The arrangement is such that when the hook supporting lever 49 is moved downwardly from the position in which it is shown in Fig. 1 the rod

57 will be pulled frontwardly by the rocking movement of the arm 56 to lift the package 29 out of engagement with its driving roller 35 to stop the rotation of this package.

5 It is important to provide means for automatically lowering the hook supporting lever 49 when a yarn breaks, to stop the winding operation. This is accomplished in the embodiment of the invention shown by positioning the drop-hook 51 so that it is normally held out of the path of a vibrator or oscillating sector 60, rigidly secured to its operating shaft 61 and rocking movement is imparted to the shaft 61 in the construction shown by a link 62, one end of which is pivotally secured to an arm 63 operatively connected to the shaft 61 and the opposite end of the link 62 is pivotally secured to a disc 64. This disc is secured to the shaft 65 which is driven from the shaft 40 by the cooperating gears 66 and 67.

The drop-hook 51 in the construction shown, is continuously urged into position to be engaged by the vibrator 60 by a light spring 68, and the hook 51 is held in the position in which it is shown in Fig. 1 during the normal operation of the machine by the rod 69 which is provided at its upper end with an adjustable nut 70, adapted to cooperate with the arm 53. The arrangement is such that when one of the yarns *a* break the hook controlling rod 69 is raised by mechanism to be described, whereupon the hook 51 is permitted to swing inwardly into position to be engaged and pulled downwardly by the vibrator 60 to cause this vibrator to pull the lever 49 downwardly and stop the rotation of the package 29, as above pointed out.

When the winding operation of the package 29 is stopped the rotation of the bobbins 24, by the spindle 17, should also be arrested and this is accomplished by providing means for disengaging the clutch elements, above described, as provided between the bobbin supporting disc 25 and whirl 20. This friction clutch is controlled in the construction shown by providing a ring 71 that loosely surrounds the upper portion of the whirl 20, and this ring is pivotally secured at 72 to the bifurcated arms of the operating lever 73. The bifurcated ends of the lever 73 are pivotally secured at 74 to a bracket 75 supported by the rail 19. The arrangement is such that when the lever 73 is rocked upwardly it will raise the ring 71 to cause this ring to elevate the disc 25 out of engagement with the clutch element of the whirl 20 and at the same time the frictional engagement of the ring 71 with the portion 26 of the disc 25 will quickly check the rotation of this disc.

Movement of the clutch operating lever 73 is controlled from the hook supporting lever 49 by providing the sliding rod 76 which is supported for vertical sliding movement by the fixed brackets 77 and 78. The upper end

of the rod 76 is connected to the outer end of the lever 49 by the link 79 and the lower end of the rod 76 is connected to the lever 73 by the sprocket chain 80, an intermediate portion of which passes about the sprocket 81, best shown in Fig. 3. The arrangement is such that when the lever 49 is rocked downwardly to lift the package 29 out of engagement with its driving roller 35 the clutch operating lever 73 is elevated to stop the rotation of the bobbins 28.

An extremely important feature of the present invention resides in means for stopping the winding operation when any one of the yarns *a* breaks and while the other yarns *a* remain intact. This is accomplished in accordance with the present invention by rigidly securing to the bobbin supporting disc 25 an upwardly extending post 82, the lower portion of which post is made hollow to receive the spindle 24. This post is provided at its upper end with a platen 83 and in this platen are preferably provided the yarn guiding slots 84. The desired tension may be placed upon the yarns *a* as they unwind from the bobbins 28 by looping such yarns about the eyelets 85 carried by the post 82 and formed of porcelain or other suitable material. Upon the upper face of the platen 83 in the construction shown, are provided the bifurcated blocks 86, one for each yarn *a*, and the arms of each block are provided with the yarn guides 87, 88, one of these guides being provided with a vertically disposed slot, and the other with a horizontal slot, as shown, so that the yarn may be readily introduced in these guides and will be prevented from escaping therefrom by the angle at which these slots are disposed to each other. Cooperating with each bifurcated block 86 is a pivoted latch actuator 89, the arrangement being such that each latch is held in the elevated position in which it is shown in Fig. 3 by the tension of the running yarn *a*. When a yarn breaks the latch controlled thereby will move downwardly under the influence of gravity and centrifugal force into the path of a projection 90 adjustably secured to an arm 91 extending laterally from a sleeve 92 that slidably receives the rod 76, the arrangement being such that the arm 91 and sleeve 92 constitute a latch that is supported for turning and sliding movement. The outer end of the projection 90 is preferably beveled as shown.

The sleeve 92 is slidably mounted in the bracket 78 and is continuously urged upwardly by a coiled spring 93 confined in the lower portion of the hollow bracket 78 and the tension of this spring may be adjusted by rotating the adjustable nut 94. The sleeve 92 is normally held in its lowered position in which it is shown in each view by the engagement of a notch 95 formed in this sleeve with a pin 96 which is rigidly secured to and

projects inwardly from a side wall of the hollow bracket 78. The spring 93 not only continuously urges the sleeve 92 upwardly but also tends to rotate this sleeve in a direction to engage its notch 95 with the pin 96. However, it may be desirable in some cases to employ one spring to urge the sleeve 92 upwardly and a second spring to rotate the sleeve.

The construction just described is such that during the normal winding operation of the present machine the platen 83 will be rotated with the bobbin supporting disc 25 in the direction indicated by the arrow in Fig. 3, and when one of the yarns *a* break the latch actuator 89 controlled thereby will move downwardly into position to strike the portion 90 of the spring actuator latch to release this latch and cause it to move upwardly under the action of the compressed spring 93. The upward movement of the sleeve 92 relative to the rod 76 is imparted to the hook controlling rod 69 by the key link 97 mounted in a slot in the rod 76 and the upper end of which link is secured to the lower end of the rod 69, as shown. The lower end of this link is provided with the lateral projection 98 that lies within an arcuate slot 99 formed in a wall of the sleeve 92. The upward movement of the sleeve 92 acts through the key link 97 to elevate the rod 69 sufficiently to permit the drop-hook 51 to move under the action of its spring into the path of the vibrator 60, whereupon the hook supporting lever 49 is pulled downwardly and a similar downward movement is imparted to the sliding rod 76 through the connecting link 79 to cause the rod 76 to actuate the lever 73 to stop the rotation of the bobbins 24. The downward movement of the rod 76 serves also to reset the spring actuating latch 91, 92. This is accomplished by providing the rod 76 with a pin or stop 100 to limit the sliding movement of the key 97 in the keyway formed in the rod 76 so that the downward movement of the rod 76 will engage the pin 100 with the upper end of the key link 97. This serves to force the sleeve 92 downwardly sufficiently to bring its notch 95 opposite the pin 96, whereupon the notch will be engaged with this pin due to the rotation of the sleeve 92 under the turning action of the spring 93.

It will be seen from the foregoing that the spring actuated latch 91, 92 controls the rotation of the package 29 and also the rotation of the bobbins 24 to impart the desired twists to the yarns *a* at a point between the platen 83 and the nip of the rolls 44 and 45. Since the lower roll 44 is power driven it is desirable to stop the rotation of the same when a yarn breaks and the spring actuated latch it tripped. This is accomplished in the construction shown by providing the pulley 101 mounted upon the shaft 36 to drive the belt 48, with the friction driving clutch or cone

102 adapted to be actuated by the bell crank lever 103 which is pivoted at 104 and one arm of the lever 103 is connected by a link 105 to the hook supporting lever 49. The arrangement is such that when the lever 49 is lowered in the manner above described the cone clutch 102 will be actuated by the connections just described to stop the rotation of the pulley 101.

In some cases it may be desirable to provide means for holding the drop-hook 51 out of the path of the vibrator 60 after the hook has been once engaged and lowered by this vibrator to stop the winding operation, the purpose being to eliminate excess wear of the hook and vibrator. This is accomplished in the construction shown by providing the spring actuated plunger 106 which is slidably mounted in the supporting bracket 107 carried by the beam 15. The arrangement is such that when the lever 49 is in its upper position the plunger 106 will not prevent the drop-hook 51 from moving into the path of the vibrator 60, but when this lever 49 is rocked downwardly to stop the winding operation the hook 51 will be moved bodily towards the plunger 106 and this will cause the plunger to move the hook 51 out of the path of the vibrator 60 as soon as the vibrator rocks upwardly.

After the ends of the broken yarn *a* have been tied together the winding operation may be resumed by manually swinging the hook supporting lever 49 upwardly to the position in which it is shown in Fig. 1, as this will serve to lower the package 29 into engagement with its drive roller 35 and at the same time will actuate the clutch controlled by the lever 73 to drive the bobbins 28 from the spindle 17.

Through the employment of the present invention two or more yarns *a* may be twisted together as they are delivered directly from the bobbins 28 to a package 29 having a convenient size for use in a creel, and since the stop mechanism of the present invention operates to stop the winding operation when any one of the yarns break, without causing the breakage of the remaining yarns, the ends of the single broken yarn may be easily tied together, and the knot thus formed will not be noticeable in the finished twisted yarns.

What is claimed is:—

1. In a doubling and twisting machine, the combination of a yarn package holder, means for rotating a package supported by the holder to wind yarn thereon, a spindle provided with bobbin carriers, power means for driving the spindle to twist together yarns delivered from the bobbins to the package, a drop-hook, a power actuated vibrator for shifting the hook, means rotatable with said spindle and controlled by the yarn being wound upon said package for effecting engagement of the hook and vibrator to shift

the hook when a yarn breaks, and means operable by the shifting of said hook to stop rotation of the package and bobbins.

2. In a doubling and twisting machine, the
5 combination of a yarn package holder, means for rotating a package supported by the holder to wind yarn thereon, a spindle provided with bobbin carriers, power means for driving the spindle to twist together yarns delivered from the bobbins to the package, and
10 stop mechanism under the control of each yarn supplied by a bobbin and including latch operators rotated by said spindle, and a spring operated latch having a part positioned to be engaged by a latch operator and adapted to be shifted by the spring out of the path of the latch operator as soon as the latch is released by a latch operator.

3. In a doubling and twisting machine, the
20 combination of a yarn package holder, means for rotating a package supported by the holder to wind yarn thereon, a spindle provided with bobbin carriers, power means for driving the spindle to twist together yarns delivered from the bobbins to the package, and
25 stop mechanism under the control of each yarn supplied by a bobbin and including yarn-controlled latch operators rotated by said spindle, a latch positioned to be struck and released by a latch operator when a yarn breaks, and a spring operable to shift the released latch to stop the twisting and winding operation and to hold the released latch out of the path of the latch operator.

30 4. In a doubling and twisting machine, the combination of a yarn package holder, means for rotating a package supported by the holder to wind yarn thereon, a spindle provided with bobbin carriers, power means for driving the spindle to twist the yarns delivered from the bobbins to the package, a spring
40 operated latch operable to stop the rotation of the package and bobbins, means for holding the latch in the spring tensioning position, a latch operator rotated by said spindle and controlled by a yarn to release the latch for movement by its spring to stop the winding operation when a yarn breaks, and power actuated means for resetting the released
45 latch.

50 5. In a doubling and twisting machine, the combination of a yarn package holder, means for winding yarn on a package supported by the holder, a spindle provided with bobbin carriers, power means for driving the spindle to twist the yarns delivered from the bobbins to the package, latch means operable to stop the rotation of the bobbins, latch operators carried by the rotating spindle and adapted to engage and shift the latch means
55 and controlled by the yarns to actuate the latch means when a yarn breaks, and spring means for moving the latch means when once actuated out of the path of the latch operator.

60 6. In a doubling and twisting machine,

the combination of a yarn package holder, means for winding yarn on a package carried by the holder, a spindle provided with bobbin carriers, power means for driving the spindle to twist the yarns delivered from the bobbins to the package, and stop mechanism under the control of each yarn and operable upon the breakage of a yarn to stop the twisting and winding operation while the other yarns remain intact, including a drop-hook, a vibrator for shifting the hook, latch means adapted to be released when a yarn breaks, and means operable by the shifting of said hook to reset said latch means.

7. In a yarn winding machine, the combination of means for winding yarn on a package, a bobbin supporting spindle, power means for driving the spindle, stop mechanism under the control of the yarn for stopping the winding operation when the yarn breaks, including latch means, a drop-hook controlled thereby, a vibrator for shifting the hook, a latch actuator carried by the rotating spindle and adapted to release the latch means when the yarn breaks, and means operable by the shifting of said hook to reset the latch means.

8. In a yarn winding machine, the combination of means for winding yarn on a package, a bobbin supporting spindle, power means for driving the spindle, stop mechanism under the control of the yarn for stopping the winding operation when the yarn breaks, including a spring actuated latch normally held in its retracted position, a drop-hook controlled by said latch, a vibrator for shifting the hook, a latch actuator carried by the rotating spindle to release the latch when the yarn breaks, and means operable by the shifting of said hook to reset the latch.

9. In a yarn winding machine, the combination of means for winding yarn on a package, a bobbin supporting spindle, power means for driving the spindle, clutch means for driving the bobbins from the spindle, stop mechanism under the control of the yarn for stopping the winding operation when the yarn breaks, including a latch, a drop-hook controlled thereby, a vibrator for shifting the hook, a latch actuator carried by the rotating spindle and adapted to release the latch means when the yarn breaks, and means operable by the shifting of said hook to stop the rotation of said package, disengage said clutch and reset the latch means.

10. In a yarn winding machine, the combination of means for winding yarn on a package, a bobbin supporting spindle, power means for driving the spindle, stop mechanism under the control of the yarn for stopping the winding operation when the yarn breaks, including a latch, a drop-hook controlled thereby, a vibrator for shifting the hook, and a latch actuator carried by the ro-

tating spindle to be moved outwardly under the influence of centrifugal force and adapted to release said latch when the yarn breaks.

11. In a yarn winding machine, the combination of means for winding yarn on a package, a bobbin supporting spindle, power means for driving the spindle, stop mechanism under the control of the yarn for stopping the winding operation when the yarn breaks, including a latch, a drop-hook controlled thereby, a vibrator for shifting the hook, latch actuators carried by the rotating spindle and each adapted to be held by a running yarn out of engagement with said latch and constructed to move into position to actuate the latch when the yarn breaks.

12. In a yarn winding machine, the combination of means for winding yarn on a package, a bobbin supporting spindle, power means for driving the spindle to twist the yarns delivered from the bobbins to the package, stop mechanism under the control of the yarn for stopping the winding operation when a yarn breaks, including a latch, a latch actuator rotated by the spindle and operable to release said latch when a yarn breaks, and power actuated means for automatically resetting the latch after it has been actuated to stop the winding operation.

13. In a yarn winding machine, the combination of means for winding yarn on a package, a bobbin supporting spindle, power means for driving the spindle to twist the yarns delivered from the bobbins to the package, stop mechanism under the control of the yarn for stopping the winding operation when a yarn breaks, including a spring actuated latch supported for turning and sliding movement and provided with means for holding the latch in the spring tensioned position, a latch actuator rotated by the spindle and operable to release said latch when a yarn breaks, and means for automatically resetting the latch after it has been actuated to stop the winding operation.

14. In a doubling and twisting machine, the combination of a yarn package holder, means for winding yarn on a package supported by the holder, a spindle provided with bobbin carriers, power means for driving the spindle to twist the yarns delivered from the bobbins to the package, and yarn controlled mechanism for stopping the winding operation when the yarn breaks, including a drop-hook controlled by the yarn, a vibrator for shifting the hook and means for moving the hook out of the path of the vibrator after one engagement by the vibrator.

In testimony whereof, we have signed our names to this specification.

GEORGE H. SIMONSON.
FRANK V. GRENNOR.