Jan. 5, 1954 F. F. STANGE 2,665,077

STOP MOTION FOR YARN WINDING MACHINES

Filed Aug. 4, 1951

5 Sheets-Sheet 1

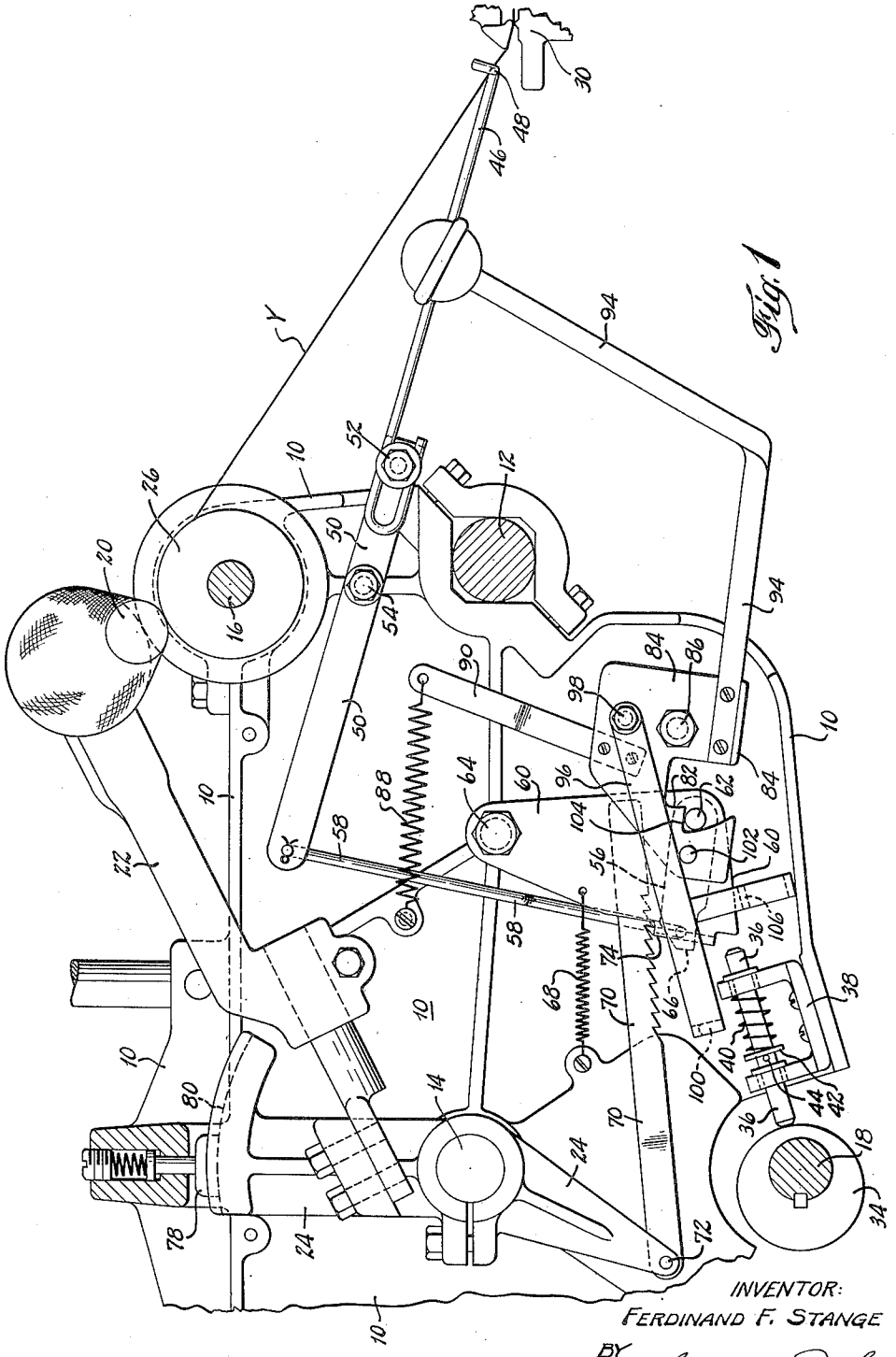


Fig. 1

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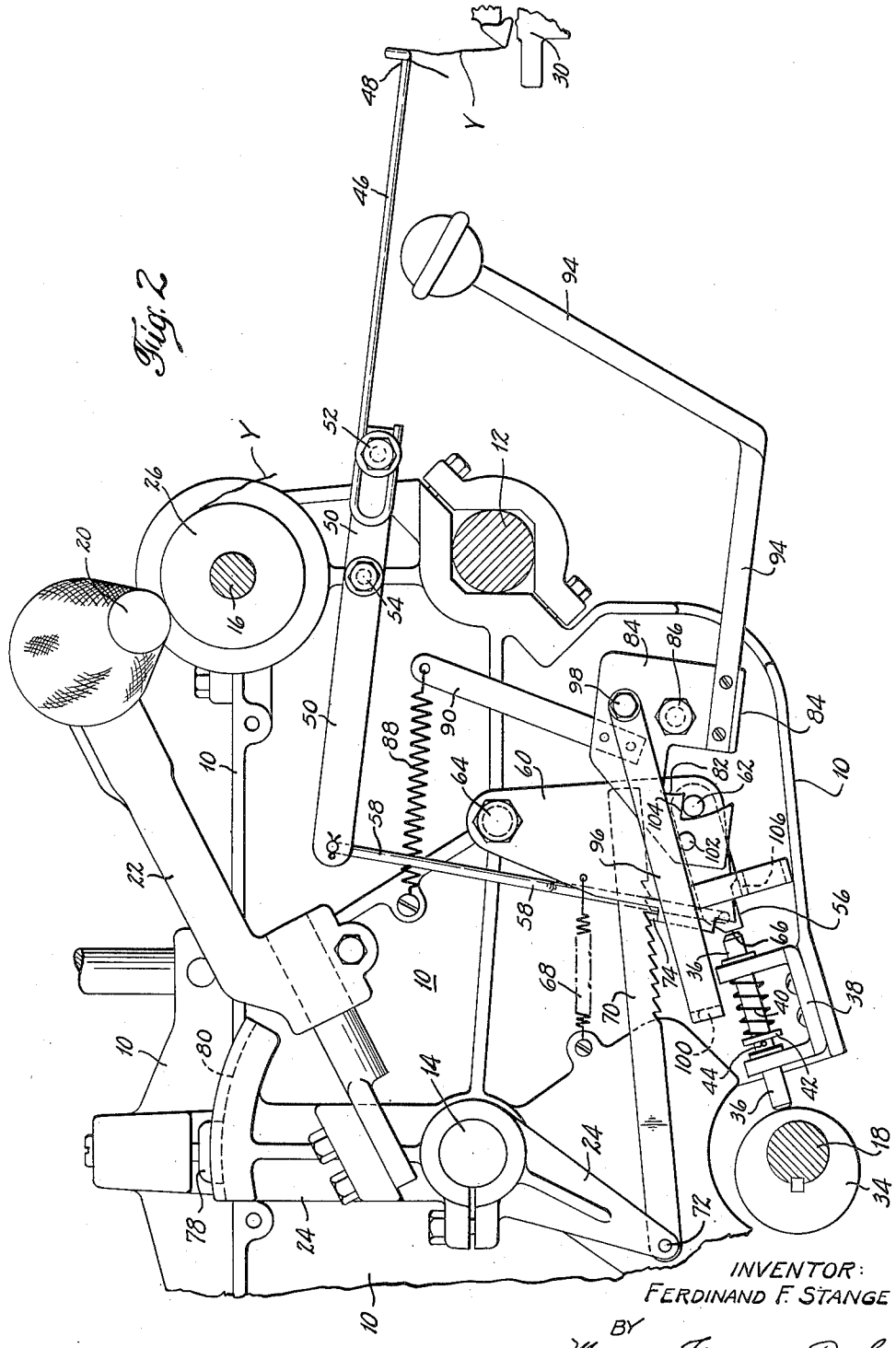
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Fig. 2



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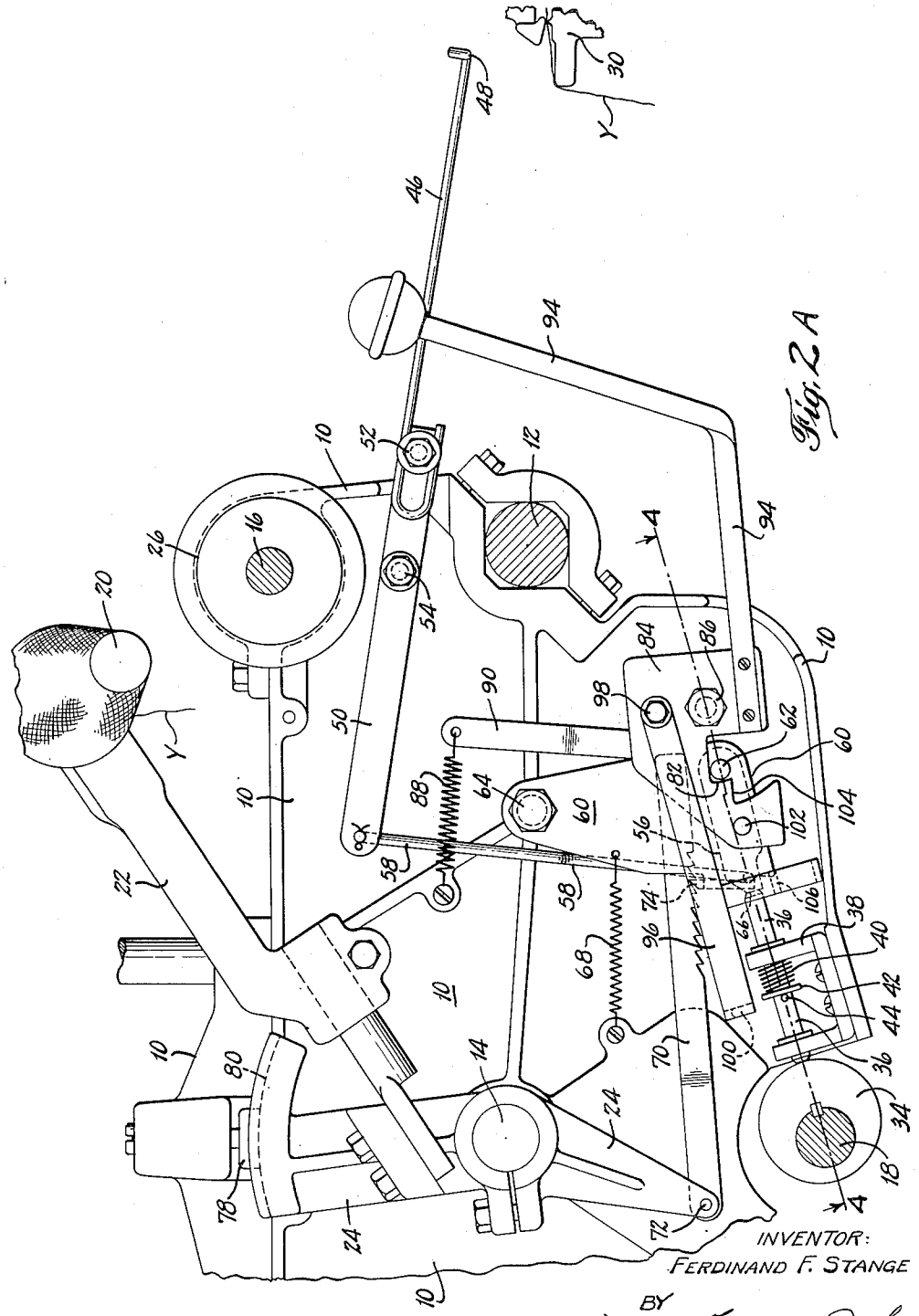


Fig. 2A

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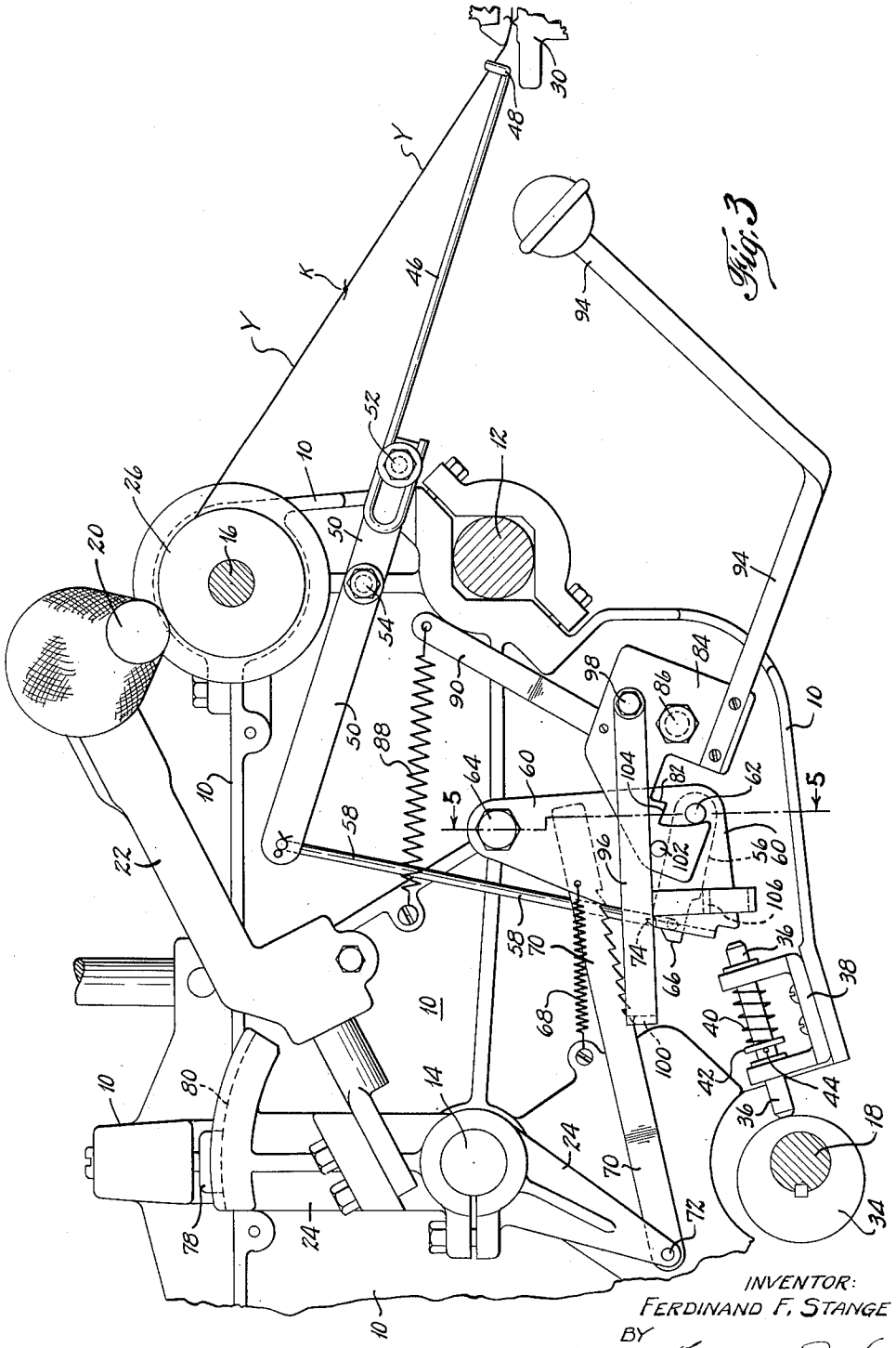


Fig. 3

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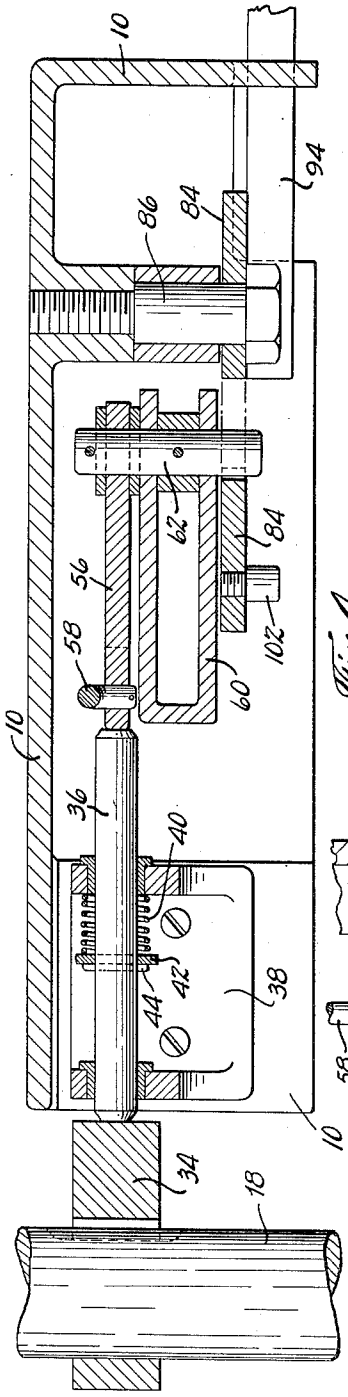


Fig. 4

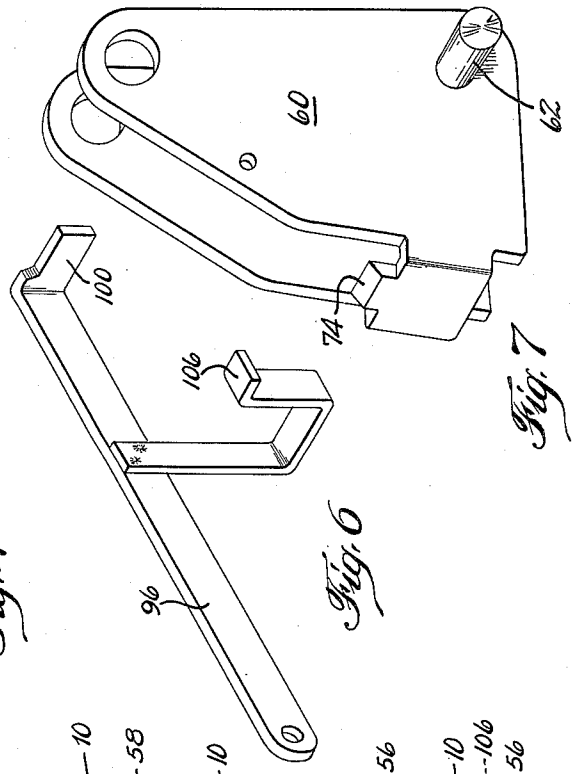


Fig. 7

Fig. 6

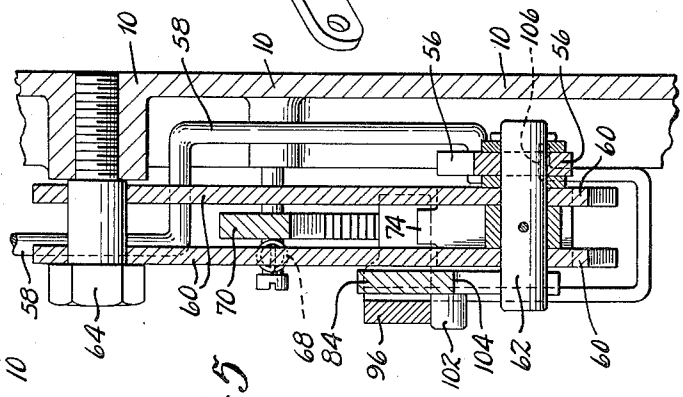


Fig. 5

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Patented Jan. 5, 1954

2,665,077

UNITED STATES PATENT OFFICE

2,665,077

STOP MOTION FOR YARN WINDING MACHINES

Ferdinand F. Stange, Westfield, Mass., assignor to Foster Machine Company, Westfield, Mass., a corporation of Massachusetts

Application August 4, 1951, Serial No. 240,423

8 Claims. (Cl. 242—37)

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The present invention relates to a novel and improved stop motion for yarn winding machines.

Objects and advantages of the invention will be set forth in part hereinafter and in part will be obvious herefrom, or may be learned by practice with the invention, the same being realized and attained by means of the instrumentalities and combinations pointed out in the appended claims.

The invention consists in the novel parts, constructions, arrangements, combinations and improvements herein shown and described.

The accompanying drawings, referred to herein and constituting a part hereof, illustrate one embodiment of the invention and together with the description, serve to explain the principles of the invention.

Of the drawings:

Figure 1 is a fragmentary vertical sectional view showing a typical and illustrative embodiment of the present invention as applied to a surface driven winding machine for winding yarn to form conical packages and showing the various parts of the illustrative embodiment in running position;

Figure 2 is a similar view but showing the parts in the position assumed just after a yarn failure but just prior to the start of the "knock-off" action;

Figure 2A is a view similar to Figure 2 but showing the parts in "knocked off" position with the winding operation interrupted in response to a failure of the yarn supply;

Figure 3 is a view similar to Figures 1, 2 and 2A but showing the parts after the yarn supply has been reestablished and with the parts moved to positions which will restart and permit continuation of the winding operation;

Figure 4 is a sectional view taken on the line 4—4 of Figure 2A;

Figure 5 is a detailed sectional view taken on the line 5—5 of Figure 3;

Figure 6 is a detailed perspective view of a lever part; and

Figure 7 is a detailed perspective view of a pivoted bracket forming part of the stop mechanism.

The present invention has for its object the provision of a novel and improved stop motion for yarn winding machines which is of simplified construction and may be more conveniently and rapidly rethreaded and placed back into operation than is possible with conventional stop motions. A further object of the invention is the provision of a stop motion mechanism for winding machines in which the core being wound is positively moved away from its driving member upon actuation of the stop motion by failure of the yarn supply. Still another object of the invention is the provision of a stop motion for yarn winding machines in which oscillatory or secondary movement of the drop wire or detector element is avoided while the winding operation is stopped as well as during the rethreading and restarting operation.

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In accordance with the present invention, a detector element or drop wire is provided which is normally held in one position by the running yarn as it is fed from a supply to the package being wound, and moves away from this position upon failure of the yarn, either by exhaustion or by breakage, or in case the tension on the yarn becomes abnormally reduced so that improper winding would result.

A constantly reciprocating member is provided which operates at all times that the winding machine is running whether or not yarn is being wound, and this reciprocating member is adapted to engage and move another member which is brought into engaging position with the reciprocating member only by movement of the drop wire away from its normal or running position. When so moved, this other member is actuated by the reciprocating member, and thereby positively moves the yarn package being wound out of driving engagement with its driving member so that winding of the yarn on the package is discontinued, while at the same time the reciprocating member causes a starting handle to be moved away from the normal running position and to an idle or knocked-off position, at the same time disengaging the reciprocating member from contact with the member which was just operated by it and into idle position.

The starting lever is so constructed and arranged that after the yarn has been reunited with its supply, the operator's action in depressing the starting lever resets the drop wire mechanism and simultaneously lowers the package being wound into engagement with its driving surface, at the same time restoring the drop wire or detecting mechanism to its normal position so that winding of the yarn on the package is resumed and continues until another failure occurs in the yarn supply.

It will be understood that the foregoing general description and the following detailed description as well are exemplary and explanatory of the invention but are not restrictive thereof.

Referring now in detail to the present preferred

and illustrative embodiment of the invention as shown in the accompanying drawings, Figure 1, 2 and 3 are vertical sectional views showing one of several identical winding units and positions of the frame members therefor, several such units ordinarily being supported by a single main frame as is customary in this type of winding machine.

The present embodiment of the invention is similar in certain respects to the winding machine shown in the prior patent to McKean 2,087,439 granted July 30, 1937, but differs therefrom in many particulars which will be described in detail and especially in those particulars which relate directly to the stop motion mechanism.

As embodied there is provided the winding machine frame 10, which is shown with parts broken away, the remaining parts being of the conventional construction well understood in the art. Extending along the plurality of winding units, and bracing the frame, are the bracing rods 12 and 14, and the driven shafts 16 and 18 which are constantly driven during the running of the machine.

The package to be wound is formed on a conical core 20 which is supported on a rotatable spindle projecting laterally from an arm 22 which extends forwardly from a pivoted yoke member 24 mounted for rocking or pivotal motion about the bracing rod 14, the package 20 being supported by its spindle so that the surface of the package is parallel to shaft 18, and adapted to make a line contact with the surface of cam roll 26 mounted on and driven by the shaft 16.

The yarn to be wound on the package is supplied from a source, not shown, through conventional yarn tension mechanism and guide 30, and is led to the package 20 over the surface of cam roll 26, the surface of the cam roll 26 preferably being provided with helical grooves in accordance with the disclosure of the patent to McKean 1,918,210 granted July 11, 1933, so that as the cam roll 26 is rotated by its driving shaft 16, with the surface of the package 20 in contact with the surface of the cam roll 26, the yarn is automatically traversed as it is laid on the package by the surface grooves formed in the cam roll 26, thereby eliminating the need for any separate yarn traversing mechanism, although such mechanism may be used if desired.

In the normal operation of the winding of yarn on the package 20, the package 20 is rotated and gradually increases in size, thereby gradually moving arm 22 upwardly as it pivots about the rod 14, the weight of the package normally holding the package in contact with the surface of the cam roll 26 so that the driving of the package continues until the desired size of the package has been produced.

During the running of the winding machine, and whether or not yarn is being wound on any particular package 20, shaft 18 is continually rotated and drives eccentric 34, this eccentric in turn reciprocating a short plunger 36 which is slidably mounted in guide apertures in bracket 38 supported on a portion of the frame 10, the plunger 36 being urged towards the periphery of the eccentric 34 by means of compression spring 40 which is compressed between the bracket and washer 42 on the plunger 36, the movement of washer 42 being limited by pin 44 which passes through an intermediate portion of the plunger 36. Thereby the plunger is at all times held against the eccentric, and is constantly reciprocated once each revolution of the eccentric 34 so long as the winding machine as a whole is in operation.

During the normal winding operation the plunger 36 reciprocates idly, but is always ready to be brought into operation as the source of power for lifting the winding package 20 from its driving surface in case there is any failure in the feeding of the yarn to the package.

During the normal winding operation the yarn Y between the guide 30 and the cam roll 26 rests against and holds the drop-wire 46 which may be in a depressed or running position. Drop-wire 46 is formed at its outer end with a horizontal portion or hook 48 adapted to receive the running yarn Y. The drop-wire 46 is removably mounted on the end of a pivoted arm 50 by means of nut 52, while the arm 50 is pivotally mounted on the frame 10 by means of stud 54, the weight of the arm 50 and the drop-wire 46 being such that the drop-wire tends to move away from its running position by gravity, but is retained in its running position by pressure exerted on it by the running tension of the yarn Y. Arm 50 is connected to a link 56 by connecting rod 58, while link 56 is pivotally mounted on a bracket member 60 by means of pivot pin 62, the bracket member 60 being pivotally mounted on the frame 10 by stud 64.

In the position shown in Figure 1, the end 66 of link 56 is held above plunger 36, but is adapted to be lowered by gravity in the position to be engaged by the reciprocating plunger 36 whenever failure of the yarn Y frees the end 48 of the drop-wire 46, so that the bracket 60 is oscillated about its pivot 64 and against the tension of spring 68 by rotation of the eccentric 34.

For raising the package 20 and its supporting arm 22 about the pivot 14 to cause stoppage of the winding operation on failure of the yarn Y, a ratchet rack 70 is pivotally connected at 72 to the lower end of the yoke member 24, rack 70 being normally supported by means of pawl 74 which is formed as an integral connecting portion of the bracket 60 as shown in Figure 7. As the winding of yarn proceeds and the diameter of the package 20 increases, arm 22 is gradually lifted causing the rack 70 to slide over pawl tooth 74, but always positioning the rack 70 on the pawl 74 so that the pawl 74 may lift the package 20 (i. e. move in a package lifting direction) by counter-clockwise motion of the bracket 60.

On failure of the yarn, the parts first assume the position shown in Figure 2 wherein the link 56 has dropped so that its wide mid-portion rests on a ledge 100 formed as part of a lever 98. The nose 66 of link 56 is thus brought into the path of movement of the reciprocating plunger 36 if the latter is in its rearmost position. If the link 56 dropped during such times as the plunger 36 was in any position other than the back position the link 56 first hits and rests on the plunger. When the plunger finally reaches its rear position the link 56 then drops off and in front of the plunger and onto ledge 100. Any subsequent reciprocation of the plunger 36 causes the bracket 60 to oscillate thereby moving the pawl 74 in a package lifting direction a distance in excess of the distance between adjacent teeth of the rack 70 so that the yoke member 24 is moved counter-clockwise to lift the package 20 from its driving cam roll 26. Pawl 74 is moved by the rotation of eccentric 34, and free movement of the package 20 and its supporting arm 22 and yoke 24 is restrained by means of the spring-pressed friction member 76 which presses against the arcuate

braking surface 30 formed integrally with the yoke 24.

After completion of the first full motion of link 56 to the right, as shown in Figure 2A, the bracket 60, which was rotated counter-clockwise by the said motion, is latched and releasably held in the position to which link 56 moved it. The link 56, being thus unable to follow the receding plunger 36 and now having its wide mid-portion free from the ledge 106, drops again so that its narrow nose portion rests on ledge 106. The nose 66 is thus dropped below the line of motion of plunger 36 placing link 56 in an idle position so that the continuing reciprocation of the plunger will not adversely vibrate or otherwise affect the link 56 and associated parts.

The latching operation for releasably holding the bracket 60 in its right hand position, as viewed in Figure 2A, is accomplished by engagement of an extension of pivot pin 62 with a notch 82 formed in a plate 84 which is pivotally mounted by stud 86 on the frame 10, and is urged to latching position by means of a tension spring 88 connected between the frame 10 and an arm 90 fast to the plate 84. When the parts are thus held in knocked-off position, and the winding operation has stopped, the parts are in the position shown in Figure 2A of the drawing. In this position the link 56 is no longer reciprocated and the drop-wire 46 remains at rest in spite of the continued rotation of the eccentric 34.

Means are also provided for restarting the winding operation by the operation of a single control lever once the yarn Y has been rejoined and brought into position to engage and hold down the hook 48 at the free end of the drop-wire 46. For this purpose, plate 84 is rigidly connected to a starting handle 94, and is to be moved about the pivot 86 in a clockwise direction to restart the winding operation. Plate 84 is connected to a lever 96 by pivot stud 98. Lever 96 extends towards the ratchet rack 70 and is provided with a bent end 100 which is engageable with an untoothed portion of the rack 70. Lever 96 is freely pivoted on its pivot 98, but is engageable with a pin 102 extending laterally from the plate 84 so that as the handle 94 is moved to its extreme clockwise position (Figure 3) lever 96 is raised and its end 100 engages rack 70 to lift the rack free of the pawl tooth 74 also lifting link 56 by contact with ledge 106 attached to lever 96 thereby placing the drop wire into winding position so that the package 20 descends into driving engagement with the drive roll 26, rapid dropping movement of the package being restrained by the friction members 78 and 80.

As the winding starts the slack in the yarn Y is taken up and drop wire 46 is held in its normal running position (Figures 1 and 3) in which it is held by continued running of the yarn Y under tension. When handle 94 is released, it is moved counter-clockwise by the tension of spring 88 and about its pivot 86 until it reaches the position shown in Figure 1, at which time further counter-clockwise movement of the handle 94 is prevented by pivot pin 62 acting as a stop in cooperation with the ledge 104 of notch 82. The parts are now in the position of Figure 1.

During this restarting operation, the drop-wire 46 is additionally urged to its running position by means of a ledge 106 depending from lever 96 and engageable with the underside of link 56, so that link 56 is raised about its pivot 62, and raises rod 58 to depress the hook-end 48 at least to its normal running position.

Thus, in the threading and restarting operations, and after the yarn Y has been reknotted, as at K, only a single operation requiring only one hand of the operator is needed to restore all of the parts to their normal running position, as distinguished from the conventional stop motion devices which require the operator to depress the starting handle with one hand at the same time that he uses his other hand to hold the drop-wire depressed to its normal running position.

The complete cycle of operations of the embodied form of the invention may be summarized as follows:

With the machine in running position as shown in Figure 1, the winding cone 20 rests on and is driven by the cam roll 26, the drop-wire 46 pivoted at 54 is held down against gravity by the yarn Y which is being drawn by the package under normal light tension. At this time the cam roll 26 is rotating causing the package 20 to rotate, and the eccentric 34 is likewise being rotated to cause constant reciprocation of the plunger 36 against the compression of spring 40. These motions continue indefinitely so long as there is no failure of the tensioned yarn Y being wound.

When a break occurs in the yarn supply, when the yarn has been exhausted, or if for any reason there is an abnormally low tension on the yarn, the counter-balanced drop-wire 46 is moved by gravity about pivot 54 to raise the hook-end 48 of the drop-wire, thereby lowering the link 56 until it comes to rest on ledge 106 of lever 96 to place nose 66 in line with the free end of the reciprocating plunger 36. As plunger 36 moves to the right, it pushes bracket 60 in a counter-clockwise direction against the tension of spring 68, and with the pawl tooth 74 engaging with that tooth of the rack 70 corresponding to the diameter of the package 20 at that time. Link 56 then acts as a positive interponent during this counter-clockwise motion of the bracket 60 and causes pawl 74 to pull on rack 70 to swing the package 20 upwardly and away from driving contact with the roll 26.

This swinging action continues until pivot pin 62 is sufficiently close to pivot stud 86 to allow plate 84 to rotate in a counter-clockwise direction under the influence of spring 88, at which time notch 82 engages with pin 62 to prevent further oscillation of the bracket 60 and to prevent the return movement of the bracket 60 under the influence of spring 68. Plunger 36 thereafter continues to reciprocate idly so long as eccentric 34 continues its rotation, and link 56 is supported in the knocked-off position by means of the ledge 106 on lever 96.

In this position the cam roll 26 and eccentric 34 rotate and plunger 36 reciprocates, but the other parts of the mechanism are at rest.

After the yarn Y has been rejoined with its supply, as by the knot K, and the operator desires to restart the machine, handle 94 is fully depressed by moving it in a clockwise direction about its pivot 86 until the arm 90 engages with a portion of the frame 10. This clockwise movement of the handle 94 rotates plate 84, and pin 102 raises lever 96 to lift rack 70 out of engagement with the pawl tooth 74 at the same time that ledge 106 lifts link 56 to depress the hook-end 48 of the drop-wire 46. This same motion of the handle 94 in rotationg plate 84 moves notch 82 away from the pin 62 so that spring 68 may return the bracket 60 to its normal position. By these motions the package 20 is allowed to move downwardly into contact with the driving

cam roll 26 so that the winding operation is resumed, and the normal tension of the yarn Y maintains the drop-wire depressed in its normal position.

As the handle 94 is then released spring 88 returns the handle to its normal running position (Figure 1) where it is held by engagement of the ledge 104 with the pivot pin 62, and this counterclockwise movement of the plate 84 lowers the lever 96 so that its bent over end 100 no longer holds the rack 70 out of engagement with the pawl tooth 74. The parts are now in their normal running position with the rack 70 resting lightly on the pawl tooth 74 so that the successive teeth of the rack 70 may be engaged as the arm 22 moves upwardly with the building of the package.

The invention in its broader aspects is not limited to the specific mechanisms shown and described but departures may be made therefrom within the scope of the accompanying claims without departing from the principles of the invention and without sacrificing its chief advantages.

What is claimed is:

1. In a yarn winding machine, having means for rotatably supporting a yarn package core, a driving roll into and out of engagement with which the rotatably supported core may be moved, a pawl and rack for lifting the package out of driving engagement with the driving roll, a starting lever for releasing the rack from the pawl to cause the core to move into driving engagement with the driving roll, a constantly reciprocated plunger, a pivoted drop-wire normally held by the running yarn, an interponent moved by the drop-wire into engagement with the plunger on failure of the running yarn, said pawl being actuated by said interponent in engaging position in a package lifting direction to positively drive said rack, whereby the pawl and rack operate to lift the package from the driving roll.

2. In a yarn winding machine as claimed in claim 1, latch means for disengaging the interponent from the plunger to idle position after actuation, said latch means being released by movement of the starting lever when it is moved to release the rack from the pawl.

3. In a yarn winding machine having means for supporting and rotating a core on which yarn is to be wound, a yarn detector biased to move from its normal position and normally held against movement by the running yarn, the combination of a constantly driven plunger, an interponent normally held out of engagement with the plunger and movable into engagement therewith on failure of the running yarn, a pawl moved by the interponent, a rack engageable with the pawl and moved thereby for interrupting the action of the core rotating means, whereby the failure of the running yarn stops rotation of the core.

4. In a yarn winding machine as claimed in claim 3, a latch for holding the interponent in idle position out of engagement with the plunger after it has been operated thereby.

5. In a yarn winding machine as claimed in claim 3, a starting lever connected to release the interponent from the latch, to release the rack from the pawl and to restore the drop-wire to its normal position where it may be held by the running yarn.

6. In a yarn winding machine having a core support on which a package is to be wound as it is rotatably driven, the combination of means for interrupting the drive of the package being wound including a yarn detector moved away from its normal position on failure of the running yarn, a driven reciprocating member, a member moved by the detector into driving engagement with the reciprocating member to stop the drive of the package and a releasable latching means for holding the detector moved member in idle position out of driving engagement with the reciprocating member after the package drive has been stopped.

7. In a yarn winding machine having a core support on which a package is to be wound as it is rotatably driven, the combination of means for interrupting the drive of the package being wound including a yarn detector moved away from its normal position on failure of the running yarn, a driven reciprocating member, a member moved by the detector into driving engagement with the reciprocating member to stop the drive of the package, a starting lever, and means actuated by movement of the starting lever for returning the detector to its normal position and for moving the detector moved member out of engagement with the reciprocating member and other means actuated by movement of the starting lever for restoring the drive of the package.

8. In a yarn winding machine having a core support on which a package is to be wound as it is rotatably driven, the combination of means for interrupting the drive of the package being wound including a yarn detector moved away from its normal running position on failure of the running yarn, a driven reciprocating member, a member moved by the detector into driving engagement with the reciprocating member to stop the drive of the package, a latching means for releasably holding the detector moved member in idle position out of driving engagement with the reciprocating member after the package drive has been stopped and a starting lever for releasing the latching means and restoring the drive of the package.

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