Aug. 1, 1944. J. H. BRADNACK ET AL 2,354,792

SKEIN WINDING MACHINE

Filed May 21, 1943 2 Sheets-Sheet 1

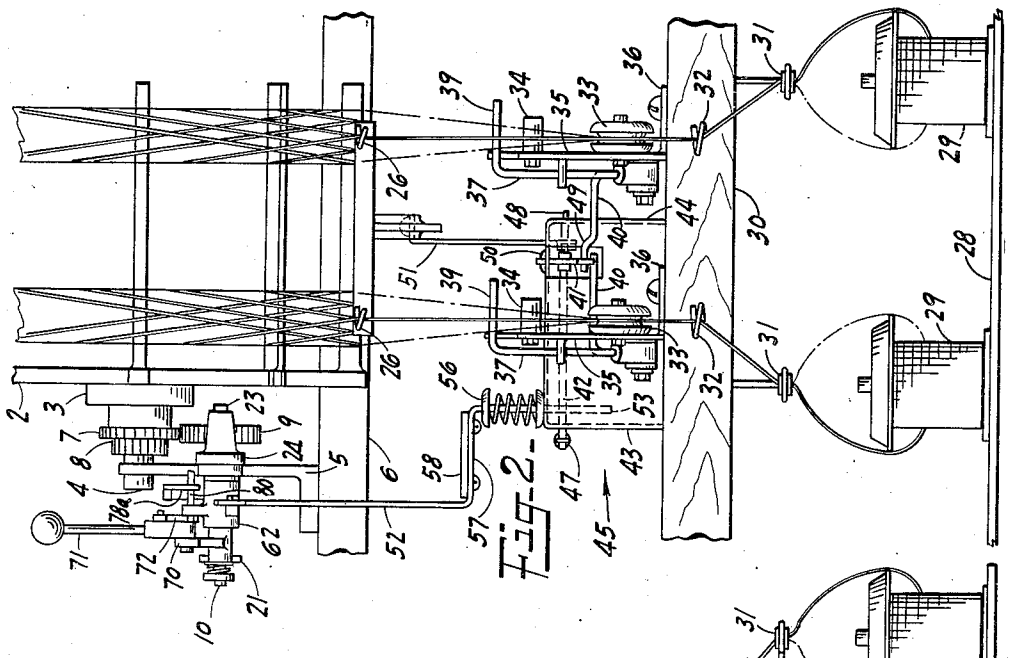

Fig-2-

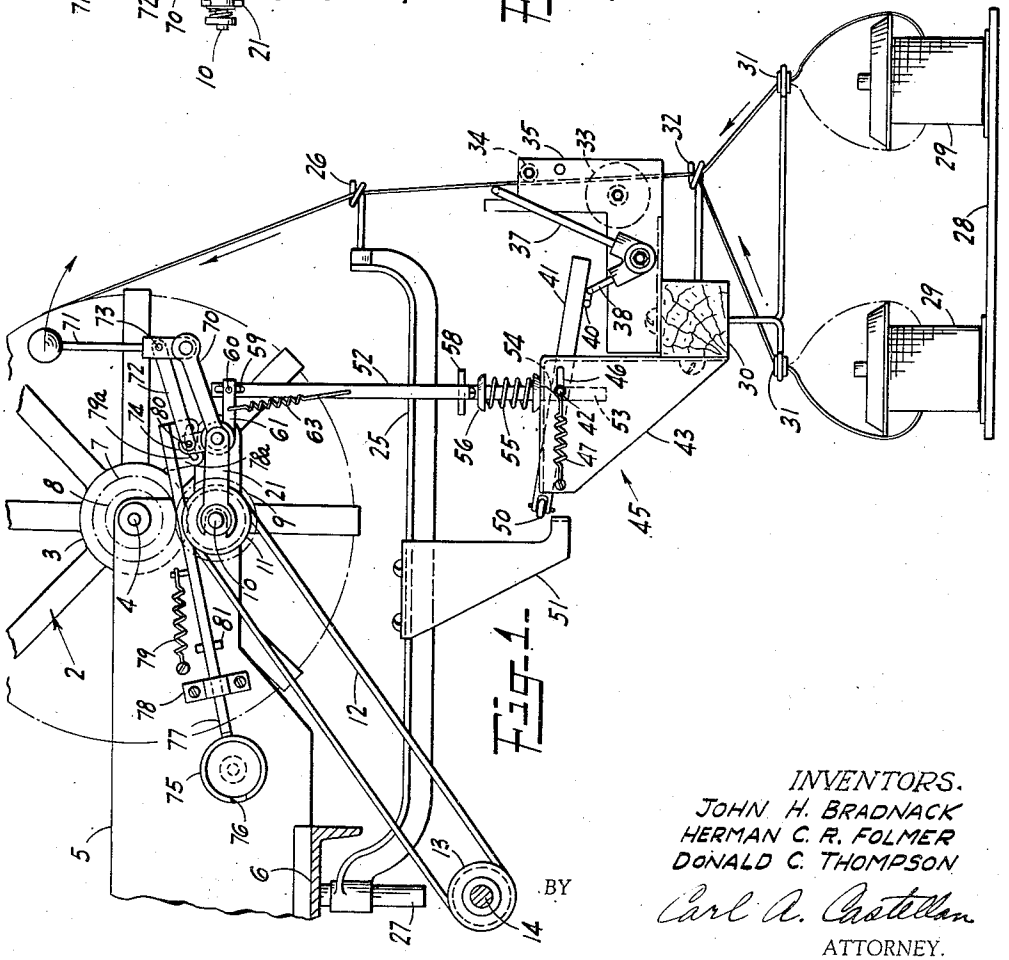

Fig-1-

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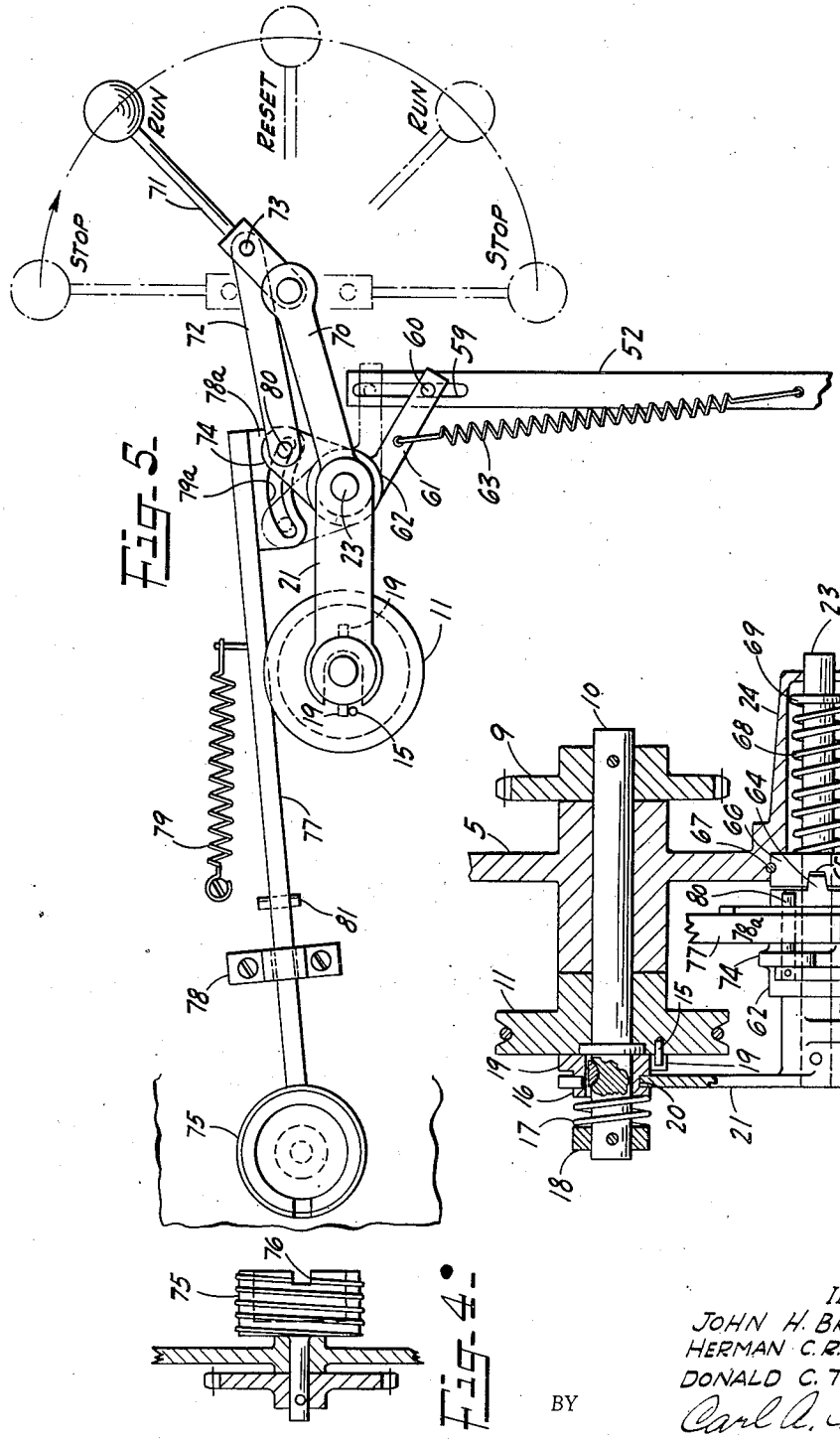

FIG. 5.

FIG. 3.

FIG. 4.

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SKEIN WINDING MACHINE

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7 Claims. (Cl. 242—53)

This invention relates to skein winding machines and is an improvement over the types of machines disclosed in Crewdson Patent 1,824,658 and in Breakell et al. Patent 1,952,969.

It is an object of this invention to provide skein winding machines with a yarn breakage detector and stop mechanism which is capable of operating independently of the yardage stop mechanism. It is a further object to so arrange or interlock the yardage and the breakage stop mechanism that in case the operator fails to take account of the particular cause of stoppage when he subsequently attempts to start the machine his efforts will be unsuccessful. In this manner, it is certain that he will tie in the yarn if it is broken or that he will doff the machine if a full skein is wound as indicated by operation of the yardage stop mechanism. A further object is to provide an improved reset linkage for the yardage mechanism of the type disclosed in Breakell et al. Patent 1,952,969 so that the operator can be certain of resetting the yardage mechanism to the proper starting position. Other objects and advantages will be apparent from the drawings and the description thereof hereinafter.

In the drawings, illustrative of the invention,

Figure 1 is a side or end elevation of a machine in accordance with this invention,

Figure 2 is a front elevation of the machine in Figure 1,

Figure 3 is an enlarged elevation, with parts in cross-section, showing certain details of the operating linkage,

Figure 4 is another detail view, and

Figure 5 is a side or end elevation view illustrating the various positions of the manual operating lever.

The reel 2 which may be of any suitable construction has a hub 3 which is rotatably mounted on a shaft 4 supported within a transverse plate 5 carried by a beam 6 of channel section extending the length of the machine which may comprise a number of such units in two rows, one in front and the other in back of the channel beam 6. Two gears 7 and 8 are secured to the reel hub 3 for rotation therewith. The reel is driven by the gear 7 which meshes with the gear 9 on a second shaft 10 supported within suitable bearings within the plate 5. This second shaft 10 carries a loose pulley 11 which is driven by a belt 12 which receives power from the pulley 13 mounted upon the drive shaft 14 which extends the length of the machine. The loose pulley 11 (see Figure 5) is provided with a pin 15 which projects from that face of the pulley which is adjacent a collar 16 which is keyed to the shaft 10 for axial motion therealong. This collar or slipper member 16 is normally pressed against the face of the pulley by means of a spring 17 which backs up against a fixed collar 18 upon the shaft 10. The slidable collar 16 is provided with one or more radially outwardly extending lugs 19 (two being shown) which as shown in Figures 3 and 5, are engaged by the pin 15 of the pulley 11 when the spring 17 is allowed to press the collar 16 into contact with the pulley 11. Thus, in the position shown in Figure 3, the pin 15 on the loose pulley 11 and one of the lugs 19 upon the collar 16 constitutes a clutch to transmit motion from the loose pulley 11 through the collar 16 to the shaft 10 and thereby drive the gear 9 which in turn drives the gear 7 (Figures 1 and 2) and the reel. The slidable collar 16 is provided with an annular groove 20 which is adapted to receive a forked member 21 which extends from a sleeve 22 secured to a pin shaft 23 which is axially slidable within a bearing formed in a boss 24 which forms a part of the supporting plate 5. The forked member 21 serves to disengage the clutch or to permit its reengagement in a manner and by means of connections which will be described hereinafter.

A traverse arm 25 (Figures 1 and 2) carrying the traverse guide 26 is fixedly secured to a vertical shaft 27 which is supported for oscillation within the channel beam 6. The vertical shaft 27 may be oscillated by suitable connections to the drive mechanism of the reel, such as to gear 8 on the reel hub as shown in Patent 1,824,658.

A platform 28 extends the length of the machine and supports the wound packages 29 of filamentary material which are to be converted into skeins. A beam 30 extends the length of the machine just above the platform 28 and is adapted to support the guide eyes 31 to control ballooning and related guides 32 for conducting the yarn to a suitable tension device 33 and an auxiliary guide 34 on its way to the traverse guides 26. The tension device may be of the ordinary disk type or any other suitable form and with the auxiliary guide 34 may be supported upon an angle plate 35 whose foot 36 is secured to the guide supporting beam 30.

A thread breakage detector in the form of a bell crank lever having two legs 37 and 38 is associated with each of the unwinding filamentary strands. The bell crank lever may be pivotally supported upon a substantially horizontal axis extending through the plate 35. The legs of the bell crank lever have arms 39 and 40 respectively

extending at right angles thereto. A bar 41 is secured to a slender rod 42 which extends through it approximately at right angles. The slender rod 42 extends through the opposite end walls 43 and 44 of a bracket 45 supported upon the beam 30. One end extends through a slot 46 in the vertical wall 43 of the bracket 45 and is drawn to one end of the slot by means of a spring 47. The other end 48 of the rod 42 is provided with a shoulder which is adapted to bear against the inside of the other vertical wall 44. This latter end is of smaller diameter and extends through a small hole of substantially circular outline which is sufficiently large to permit a limited amount of swinging motion of the rod 42 therein. Where two skeins are wound upon a single reel as shown, the bar 41 rests upon horizontally extending arms 40 of both detectors. To prevent these two arms 40 from interfering with each other, one of them is offset at 49 with respect to the other so that the breakage of either filamentary strand will be transmitted independently to the bar. The bar 41 is designed so that it has a tendency to rest in the position shown in Figure 1 upon the supporting arms 40 of the two detector members. Each of the bell-crank lever detectors is so designed that it normally tends to lean against the yarn as shown in Figure 1 and upon breakage of the yarn exerts sufficient clockwise moment to fall in that direction and lift the bar 41 so that it in turn swings in a counterclockwise direction about its rod 42 as an axis. The rear end of the bar 41 is provided with a roller 50 which, upon counterclockwise rotation of the bar 41, falls in the way of the foot of a depending arm 51 attached to the traverse arm 25. A link 52 has a portion 53 extending vertically down through the top of the bracket 45 and has a notch 54 adapted to catch upon the rod 42 to latch the link 52 in the position shown in Figure 1. A spring 55 surrounds the portion 53 of the link and bears against a collar 56 secured to it, tending to force the link upwardly. The link 52 may be provided with an offset portion 57 adapted to receive a pad 58 to accommodate the hand for manual depression of the link to latch it. The uppermost end of the link 52 (see Figures 1, 2, 3 and 5) is provided with a longitudinal slot 59 into which a pin 60 extends from a projecting ear 61 secured to a sleeve 62 which is rotatably mounted upon the pin shaft 23 carrying the fork lever 21. A spring 63 is provided and tends to pull the ear 61 downwardly with respect to the link 52 to which the spring is anchored, but spring 63 is of less strength than spring 79 for reasons explained hereinafter.

The sleeve 62 is provided with one or more bosses 64 (Figure 3) adapted to cooperate with corresponding recesses 65 within a stationary sleeve 66 secured within the supporting plate 5 by means of pins 67. A helical spring 68 surrounds the pin shaft 23 within a housing therefor provided by the boss 24 on the plate 5 and presses against the back face of the stationary sleeve 66 and against the integral collar 69 of the pin shaft 23, urging the pin shaft 23 with the forked lever 21 into the position shown in Figure 3. It will be readily appreciated that upon rotation of the sleeve 62 about the pin shaft 23 the forked lever 21 is urged outwardly against the action of the spring 68 as a result of the cam bosses 64 riding out of their recesses 65 onto the face of the stationary sleeve 66. This means for disconnection of the loose pulley 11 from the slidable collar 16 on the shaft 10 is shown in Patent 1,824,658 where, however, it is shown only in combination with a mechanism for stopping the machine when a predetermined number of yards has been wound.

The sleeve 22 carrying the forked member 21 also carries an outwardly extending arm 70 on which a manual reset lever 71 is pivoted. This lever is connected by a link 72 pivotally attached thereto at a point 73 offset from the pivotal axis of the lever to another ear 74 upon the sleeve 62 carrying the cam bosses 64 so that the swinging of the lever from an approximately vertical position toward the operator through a short arc serves to start the machine.

The machine may be provided with the yardage stopping mechanism of Patent 1,952,969 which comprises the helically grooved yardage measuring wheel 75 which rotates a certain number of revolutions for a definite number of yards and which is provided with the radial slot 76 at the outer end of the groove. A rod 77 adapted to be longitudinally slidable within a supporting yoke 78 which permits the rod to move axially of the grooved wheel is normally biased by means of a spring 79 so that its end is forced into the groove on the wheel 75. The other end of the rod 77 is provided with a plate 78*a* in which an arcuate slot 79*a* is provided to receive a pin 80 extending from the ear 74 on the cam bossed sleeve 62. The rod 77 may be provided with a transverse pin 81 to limit longitudinal motion of the rod upon falling into the radial slot 76 within the grooved wheel 75.

It will be noted that the breakage link 52 is provided with a slot 59 of sufficient length so that counterclockwise rotation of the cam bossed sleeve 62 as a result of the operation of the yardage stop rod 77 moves the pin 60 freely upward from its normal operating position near the middle or preferably adjacent but not too close to the bottom of slot 59 so that the connection between the sleeve 62 and the breakage link 52 does not interfere with the stopping effected by yardage rod 77. Similarly, the counterclockwise rotation of the same sleeve 62 by the breakage link 52 is not interfered with because of the free motion of pin 80 in the arcuate slot 79*a* within the plate 78*a* on the rod 77. Thus, the linkage is so arranged that independent operation of either the yardage stop mechanism or the breakage stop mechanism is available without interference from each other.

Preferably, as shown particularly in Figure 5, the distance between the pivot of the operating lever 71 and the connection 73 of the operating link 72 thereto is so selected that the link connection 73 has but a slight distance to go from the "running" position of the operating lever 71 to a dead center, the amount of this additional displacement being selected to be equivalent to the amount of additional displacement of the rod 77 to withdraw it to a point outside the periphery of the grooved wheel 75 so that the action of the spring 79 causes this rod 77 to be reset into the proper starting position in the helical groove of wheel 75. By making the reset position correspond to a dead center for the link connection 73 with respect to the main pivot of the operating lever 71 and the pin connection 80 of the link 72 with the sleeve 62, the operator may in resetting the device merely proceed through this dead center into the "run" position just beyond it whether above or below it. When the machine is running with the lever in either the upper or lower "run" position, the lever 71 is swung back to either an upwardly or downwardly extending position respectively with an inclination ap-

proaching the vertical by either of the stoppage mechanisms.

There is no tendency upon the part of the operator to accidentally withdraw the rod 77 from the groove of the yardage wheel 75 in the midst of a skein since the strong spring 79 opposes such action and ordinarily, as stated below, it is sufficient to press on pad 58 to start the machine except when the yardage mechanism needs to be reset. In Patent 1,952,969, there may be a tendency on the part of the operator, when he intends to reset the rod 77, to fail to exert sufficient force against the spring 79 to bring the rod 77 clear back to the proper starting groove. For example, the point of the rod 77 may drag against the grooved wheel 75 and lodge in one of the outer grooves simply because the operator failed to exert sufficient pressure upon the operating lever 71 to prevent such dragging. In the present application, the yardage mechanism comprising rod 77 is reset by swinging the operating lever 71 through a dead center into the run position beyond the dead center, thus assuring that the yardage mechanism is reset to the proper starting position. From a study of the drawings it will be seen that operation of either stoppage mechanism will be just as effective regardless of which "run" position the operating lever 71 is in.

In operation of the device, should the thread break in the midst of a skein, the detector arm 39 falls and causes the counterclockwise rotation of the bar 41 into the path of the arm 51 fastened to the traverse arm 25. When arm 51 strikes the bar 41, the latter swings its rod 42 through the slot 46 against the action of the spring 47, freeing the rod 42 from the notch 54 within the vertical link 52 which is immediately forced upwardly by the helical spring 55. The upward momentum of link 52 transmits counterclockwise motion to the cam bossed sleeve 62 through the pin 60 in its ear 61 which is normally positioned near the middle or lower end of the slot 59 during running of the machine. The rotation of the sleeve 62 moves the operating lever 71 into the stop position and causes the forked lever 21 to move the slidable collar 16 to disengage its lug 19 from the pin 15 on the loose pulley 11.

In order to start the machine after the yarn has broken, the yarn is tied in and the vertical link 52 is depressed by application of the heel of the hand against the pad 58 until operating lever 71 is thrown into running position by the action of pin 60 and ear 61 on the sleeve 62. This causes rod 42 carried by the bar 41 to be latched within the notch 54 of the link.

Upon completion of a skein, the rod 77 which follows the grooved measuring wheel 75 falls into the radial slot 76 therein as a result of the action of the spring 79 and the motion of the rod 77 causes a counterclockwise rotation of the sleeve 62, thereby disengaging the clutch and throwing the operating lever 71 into the stop position.

To start the machine after the completion of a full skein, the operator doffs the reel and then merely turns the lever 71 through its dead center position to reset the rod 77 in the proper groove of the yardage wheel 75. Should the operator forget to reset the yardage mechanism, it would be impossible to start the reel by pressing down on pad 58, because spring 63 is not strong enough to overcome the tension of spring 79.

Should the skein be completed simultaneously with the breakage of a thread, it will be apparent from the description of the connections hereinabove that the operator will be unable to start the machine without being notified of the fact that a full skein has been wound.

There is thus provided by this invention a simple form of interrelated or interlocked stoppage mechanism which is sure to apprise the operator of what the cause of stoppage is and which must be independently reset before operation of the machine can be resumed.

While preferred embodiments of the invention have been disclosed, it is to be understood that changes and variations may be made without departing from the spirit and scope of the invention as defined by the appended claims.

We claim:

1. A winding machine comprising a winding core on a rotatable shaft, a driving shaft, means comprising a clutch for connecting the two shafts in driving relationship, a member movable to and from alternate positions for alternately engaging and disengaging the clutch, a cam member for controlling the movement of the movable member, an element movable in response to a predetermined length of material to be wound, a second element movable in response to breakage of the material being wound, each of the two elements being independently connected to the cam member for transmitting motion to the cam member in one direction only to effect motion of the movable member into the position to disengage the clutch upon the winding of a predetermined length of material or breakage thereof respectively.

2. A winding machine comprising a winding core on a rotatable shaft, a driving shaft, means comprising a clutch for connecting the two shafts in driving relationship, a member movable to from alternate positions for alternately engaging and disengaging the clutch, a cam member for controlling the movement of the movable member, an element movable in response to a predetermined length of material to be wound, a second element movable in response to breakage of the material being wound, each of the two elements being independently connected to the cam member for transmitting motion to the cam member in one direction only to effect motion of the movable member into the position to disengage the clutch upon the winding of a predetermined length of material or breakage thereof respectively, a pivotally mounted manual reset lever, and a link connecting the lever to the cam member for positive transmission of motion in both directions between the cam member and lever.

3. A winding machine comprising a winding core on a rotatable shaft, a driving shaft, means comprising a clutch for connecting the two shafts in driving relationship, a member movable to and from alternate positions for alternately engaging and disengaging the clutch, a cam member for controlling the movement of the movable member, an element movable in response to a predetermined length of material to be wound, means for resetting the movable element to its initial position, a second element movable in response to breakage of the material being wound, each of the two elements being independently connected to the cam member for transmitting motion to the cam member in one direction only to effect motion of the movable member into the position to disengage the clutch upon the winding of a predetermined length of material or breakage thereof respectively, said resetting means comprising a pivotally mounted manual reset lever,

a link connecting the lever to the cam member for positive transmission of motion in both directions between the cam member and lever, the connection of the first movable element with the cam member being arranged so that motion of the cam member to a position beyond that corresponding to engagement of the clutch retracts the first movable element into the influence of the resetting means, the connection between the link and the reset lever being so arranged that it passes through a dead center as the lever is swung to retract the movable element to resetting position.

4. A winding machine comprising a winding core on a rotatable shaft, a driving shaft, means comprising a clutch for connecting the two shafts in driving relationship, a member movable to and from alternate positions for alternately engaging and disengaging the clutch, a cam member for controlling the movement of the movable member, an element movable in response to a predetermined length of material to be wound, a second element movable in response to breakage of the material being wound, each of the two elements being independently connected to the cam member for transmitting motion to the cam member in one direction only to effect motion of the movable member into the position to disengage the clutch upon the winding of a predetermined length of material or breakage thereof respectively, a pivotally mounted manual reset lever, a link connecting the lever to the cam member for positive transmission of motion in both directions between the cam member and lever, spring means attached to the first movable element arranged to reset the element to its initial position upon retraction of the element to a position beyond its normal operating position, the first element being arranged to be retracted to resetting position by swinging of the reset lever beyond its position corresponding to engagement of the clutch, the connection between the link and reset lever being so arranged that it passes through a dead center as the movable element is retracted to resetting position.

5. A winding machine comprising a winding core on a rotatable shaft, a driving shaft, means comprising a clutch for connecting the two shafts in driving relationship, a forked member secured to an axially slidable pin shaft and movable to and from alternate positions for alternately engaging and disengaging the clutch, a sleeve rotatably mounted on the pin shaft and provided with cam bosses arranged to be received by and withdrawn from corresponding recesses in an adjacent stationary member upon rotation of the sleeve with respect thereto for controlling movement of the forked member, an element movable in response to a predetermined length of material to be wound, a second element movable in response to breakage of the material being wound, the two elements being connected to the sleeve by separate pins secured to the sleeve and extending through a corresponding slot in the elements, the pins and slots being so arranged that the pins are disposed adjacent the corresponding ends of the slots in operating position whereby responsive motion of at least one of the movable elements effects rotation of the sleeve to cause disengagement of the clutch.

6. A winding machine comprising a winding core on a rotatable shaft, a driving shaft, means comprising a clutch for connecting the two shafts in driving relationship, a forked member secured to an axially slidable pin shaft, and movable to and from alternate positions for alternately engaging and disengaging the clutch, a sleeve rotatably mounted on the pin shaft and provided with cam bosses arranged to be received by and withdrawn from corresponding recesses in an adjacent stationary member upon rotation of the sleeve with respect thereto for controlling movement of the forked member, an element having a slot and being movable in response to a predetermined length of material to be wound, a second element having a slot and being movable in response to breakage of the material being wound, the two elements being connected to the sleeve by separate pins secured to the sleeve extending through their respective slots, the pins and slots being so arranged that the pins are disposed adjacent the corresponding ends of the slots in operating position whereby responsive motion of at least one of the movable elements effects rotation of the sleeve to cause disengagement of the clutch, a manual reset lever pivotally mounted on an arm supported on the forked member, a link having one end pivotally connected to this lever and its other end pivoted on the pin connecting the sleeve to the first movable element, means for resetting the first movable element to its initial position upon retraction to a position beyond its normal operating position by swinging of the manual lever beyond its position corresponding to engagement of the clutch, the distance between the lever pivot and the pivotal connection of the link to the lever being such that swinging of the lever beyond normal operating position causes the latter connection to pass through a dead center as it retracts the first movable element into a position under the influence of the resetting means.

7. A winding machine comprising a winding core on a rotatable shaft, a driving shaft, means comprising a clutch for connecting the two shafts in driving relationship, a member movable to and from alternate positions for alternately engaging and disengaging the clutch, a second movable member for controlling the movement of the first movable member, an element movable in response to a predetermined length of material to be wound, a second element movable in response to breakage of the material being wound, each of the two elements being independently connected to the second movable member for transmitting motion thereto in one direction only to effect motion of the first movable member into the position to disengage the clutch upon the winding of a predetermined length of material or breakage thereof respectively.

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