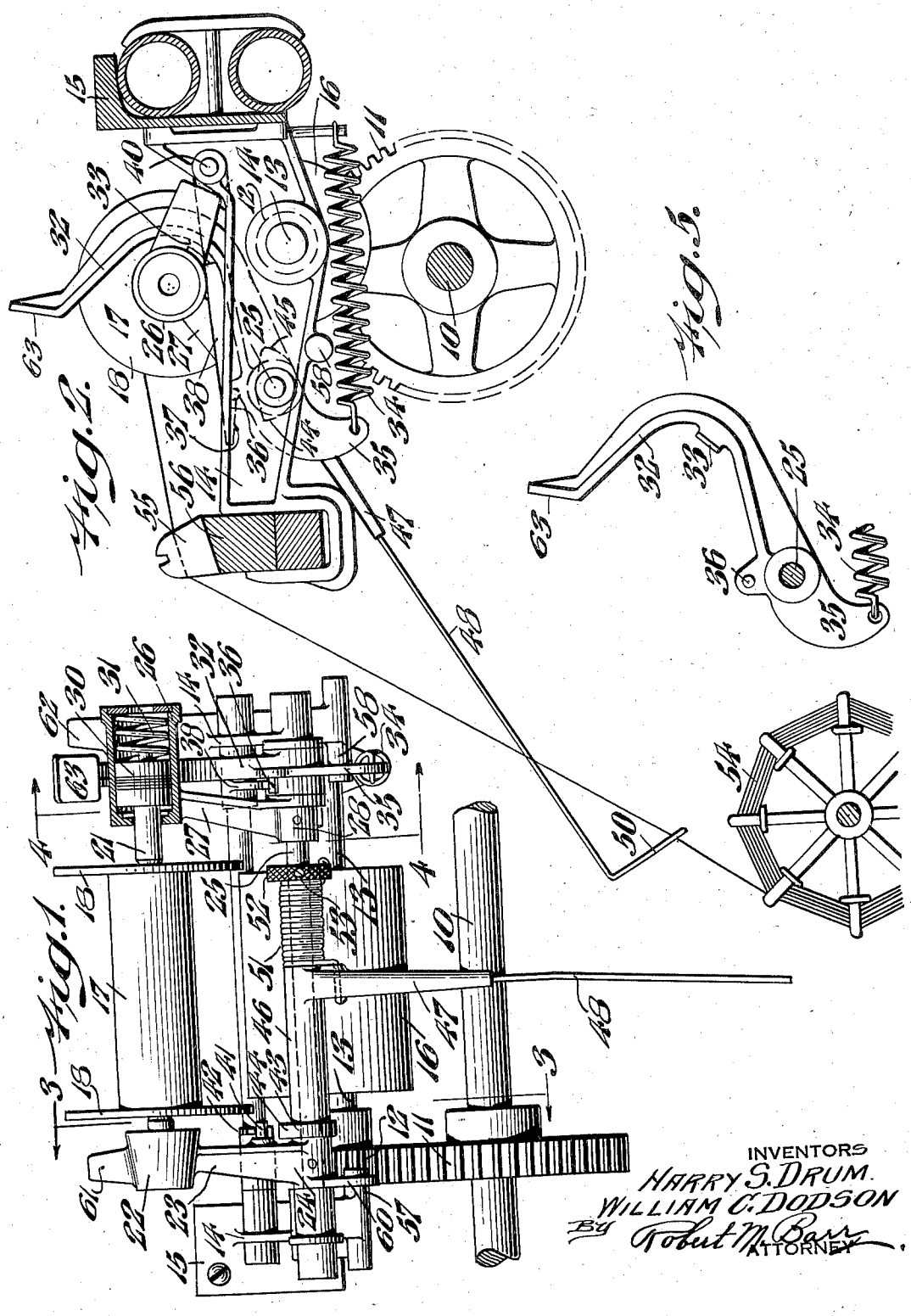
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THREAD WINDING MECHANISM

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INVENTORS
HARRY S. DRUM.
WILLIAM C. DODSON
By Robert M. Barr
ATTORNEY.

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Fig. 3.

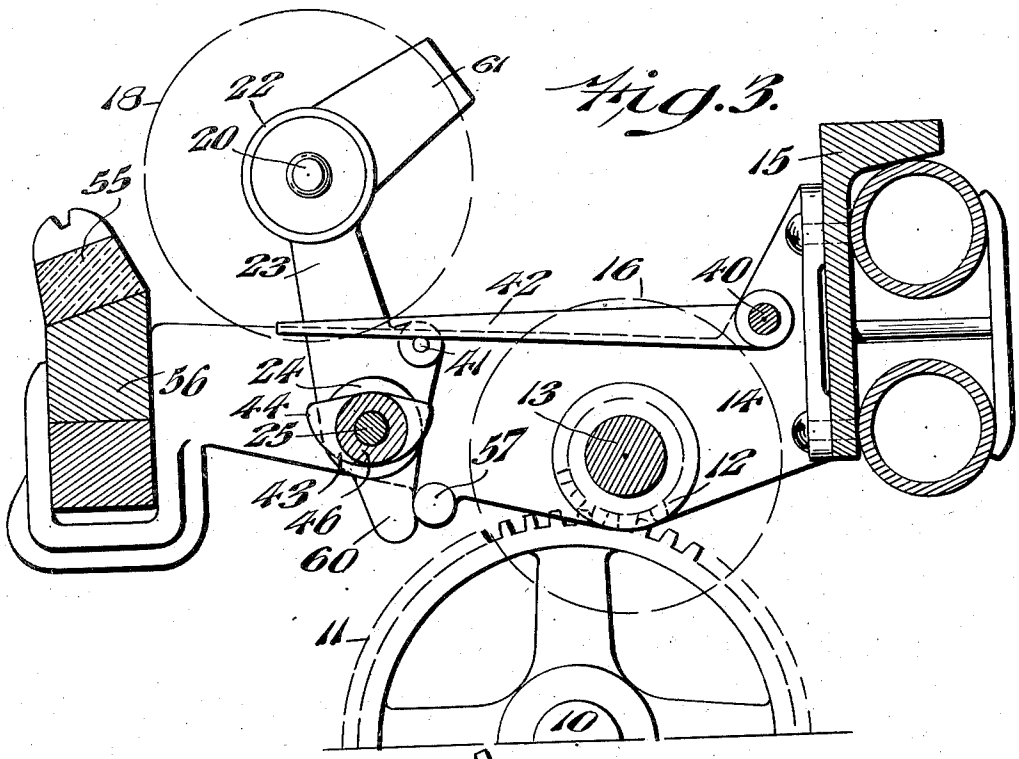
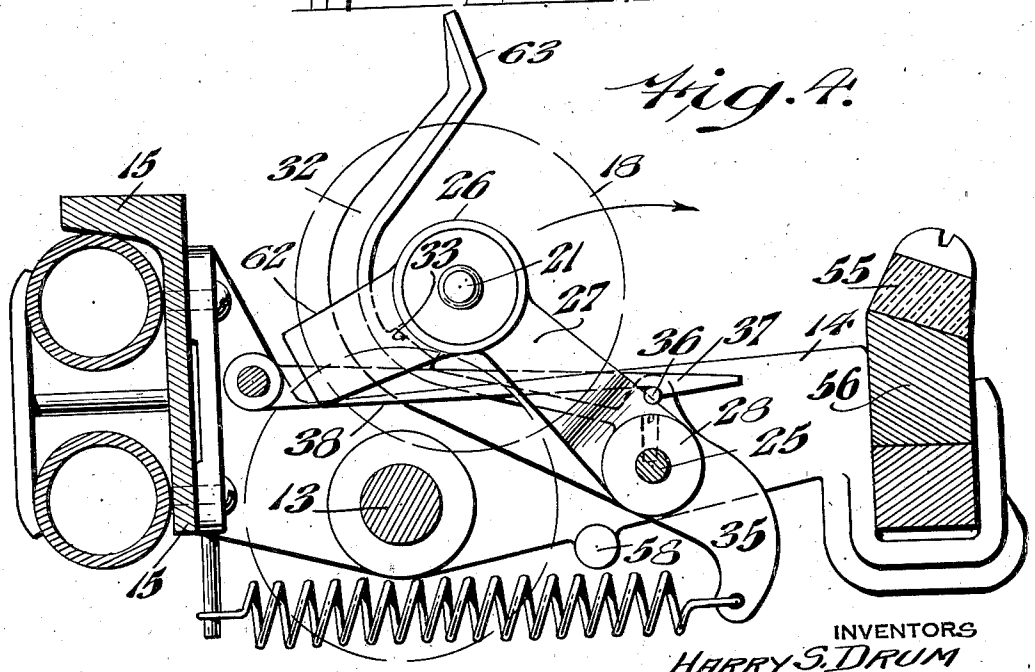


Fig. 4.



INVENTORS
HARRY S. DRUM
WILLIAM G. DODSON
By Robt M Barr
ATTORNEY

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THREAD WINDING MECHANISM

Harry S. Drum, Abington, and William C. Dodson, Jenkintown, Pa., assignors to Smith, Drum and Company, Philadelphia, Pa., a corporation of Pennsylvania

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4 Claims. (Cl. 242—36)

The present invention relates to thread winders such as mechanism for drawing thread from a swift or reel and winding it upon a spool and relates more particularly to a control mechanism, responsive to any one of a number of different conditions, for stopping the winding operation.

Some of the objects of the present invention are to provide an improved control for thread winding machines or mechanisms; to provide a control wherein the delicate threads of rayon and the like can be successfully wound upon a spool with a minimum of breakage; to provide a thread winding control wherein provision is made for automatically doffing a partially wound spool in case of a tangle in the thread which causes it to cease feeding; to provide a thread winding control wherein provision is made for automatically doffing a partially wound spool in case of a break in the thread while feeding; to provide a thread winding control wherein provision is made for automatically doffing a spool when the thread mass reaches a predetermined diameter; to provide a doffing mechanism for thread winders wherein braking action on the thread is avoided during a doffing operation; to provide a thread winding control which can be adjusted for sensitiveness in accordance with varying thread weights; and to provide other improvements as will hereinafter appear.

In the accompanying drawings Fig. 1 represents a front elevation (partly broken away) of a thread winding mechanism embodying one form of the present invention and with the parts in doffed position; Fig. 2 represents an end elevation of the same but with the parts in winding position; Fig. 3 represents an enlarged section on line 3—3 of Fig. 1; Fig. 4 represents an enlarged section on line 4—4 of Fig. 1 but with the parts in thread winding position; and Fig. 5 represents a detail of the doffing arm and associated parts.

Referring to the drawings one form of the present invention is shown as assembled with a winding mechanism which may be a single unit for winding one spool or one unit of a multiple spool machine. Where but a single unit is employed there will naturally be but a single control mechanism and where there are a plurality of units each will be independently controlled by a separate control mechanism. In other words the present showing includes a complete unitary control and it is to be understood that this is reproduced in each unit of a multiple machine. As here shown a shaft 10 driven from a suitable source of power has a drive gear 11 keyed thereon and meshing with a driven pinion 12 which is fast to counter shaft 13. Suitable brackets 14 project from the main frame 15 of the machine to provide bearings for the aforesaid shaft 13. A driven drum 16 is keyed to the counter shaft 13 for rotating the spool 17 by frictional contact with the thread mass being wound thereon. The length of the drum 16 is conveniently less than the distance between the heads 18 of a spool in order that the spool body can contact the periphery of the drum.

For supporting a spool 17 two coaxially mounted center pins 20 and 21 are provided to respectively enter the axis holes of the spool heads 18. The pin 20 is journalled in the head 22 of an arm 23 having an integral hub 24 pinned to a control rock spindle 25. The pin 21 is journalled in a head 26 of an arm 27 having an integral hub 28 pinned to the aforesaid rock spindle 25. The head 26, in the present instance, is in the form of a sleeve which receives a follower 30 and coacting coil spring 31, the arrangement being such that the pin 21 is held outwardly pressed and thus clamps a spool in winding position. With the spool mounted upon the centers 20 and 21 it can be swung about the spindle 25 as an axis to take a winding position (as indicated in Fig. 2) or a doffing position (as indicated in Fig. 1). As the thread mass increases in diameter, while winding, the spool arms 23 and 27 are gradually rocked forward towards doffing position as will be apparent.

For the purpose of removing a spool from contact with the driving drum 16 so that automatic doffing takes place, a doffing arm 32 is pivotally mounted upon the spindle 25 so that it has a radial swing to cause its head 33 to engage the sleeve head 26. Movement is transmitted to the arm 32 by a coil spring 34 which is stretched between the end 35 of the arm 32 and a fixed part, such as the frame 15. The action of the spring 34 is to throw the doffing arm 32 to a position where the spool is entirely removed from contact with the driving drum 16.

In order to render the doffing arm 32 ineffective during normal spool winding operation, a pin 36 is provided which projects laterally from one side of the arm 32 and at such a location that when the arm 32 is swung back out of sleeve engaging position this pin 36 will be held by a hook latch 37. This hook 37 is formed on the free end of an elongated finger 38 fixed to a horizontally disposed rock rod 40 which extends parallel to the axis of the spool and is journalled in the brackets 14. Thus by rocking the rod 40 in the right direction the finger 38 will be lifted to remove the hook latch 37 from the pin 36 so

that the spring 34 can cause the doffing arm 32 to function.

For causing the rod 40 to rock when the spool has been wound or the thread mass has reached a predetermined diameter, the spool supporting arm 23 is provided with a pin 41 which projects laterally therefrom to travel in an arcuate path which intercepts a finger 42 carried by the rod 40. Thus when the thread mass reaches the desired size the travel of the pin 41 brings it under the finger 42 to thereby rock the rod 40 and release the latch 37 whereby the spool is automatically doffed and winding ceases.

For causing the rod 40 to rock when the thread ceases to feed or the thread breaks, a cam 43 having two lifting toes 44 and 45 is attached to or formed integral with a control sleeve 46 which is mounted upon and freely rotatable on the rock spindle 25. An extension 47 projects radially from the sleeve 46 and forms a socket to receive and support a wire or other elongated member 48 which terminates in a thread guide 50. The cam toe 44 operates to lift the finger 42 when the thread breaks, and to cause this operation a spring 51 is coiled about the spindle 25 and has one end located below and against the extension 47 and its other end secured to a knurled collar 52, also upon the spindle 25. By turning the collar 52 the desired tension can be placed upon the spring 51 after which the collar 52 is fixed in position by a set screw 53 engaging the spindle 25. Thus the spring tension tends to elevate the thread guide but normally the latter is held down by the taut thread travelling through the guide 50. It will be understood that the thread leaves the swift or reel 54 passes through the guide 50 to the guide 55 of the traverse bar 56 and thence to the spool 17. The traverse bar 56 is reciprocated by any well known mechanism which it is here deemed unnecessary to describe or illustrate because the laying on of the thread forms no part of the present invention. The cam toe 45 operates to lift the finger 42 when a tangle occurs such as to seriously retard or stop the thread feed, and it is the function of the toe 45 to bring about the removal of the spool from its driving means before such a strain is placed upon the thread as will cause breakage.

From the foregoing it will be observed that a complete unitary winding mechanism has been devised which can be automatically stopped through the action of a novel control responsive to certain conditions. This control primarily is vested in the latch 37 which when released renders an automatic doffing device effective to cause the winding operation to cease immediately.

In the case of the thread mass reaching a predetermined diameter the swinging movement of the spool arms caused by the thread build-up will bring the travelling pin 41 against the finger 42 so that its continued travel will rock the rod 40 to thereby lift the latch 37 from the doffer arm pin 36. As soon as the pin 36 is free the pull of the spring 34 turns the arm 32 in a direction to engage an associated part of the spool support to thereby move the spool out of contact with the drum 16. Winding then ceases.

In the case of the thread breaking its tension on the guide member 48 is relieved so that the sleeve 46 is rotated by the torque transmitted by spring 51 and causes the cam toe 44 to swing the finger 42 so that the rod 40 is rocked in the direction necessary to release the latch 37. With this latch released the automatic doffing takes place as heretofore explained.

In the case of a thread tangle the increased tension caused thereby upon the thread will swing the guide member 48 against the tension of the spring 51 to thus bring the cam toe 45 into position to swing the finger 42 whereby the rod 40 is rocked to release the latch 37. Again automatic doffing takes place as heretofore explained.

For limiting the outward swing of the spool 17 under a doffing action the brackets 14 are respectively provided with stops 57 and 58, arranged in coaxial relation, the former (57) being in the path of a lug 60 projecting from the hub 24, and the latter (58) being in the path of the end 35 of the doffing arm 32. Therefore a doffing action brings the spool to rest in doffing position as determined by the position of the stops 57 and 58.

In order to maintain a spool 17 firmly against the driving drum 16, the heads 22 and 26 are preferably respectively formed with weights 61 and 62 since these act to steady the spool while being wound and assist in a uniform wind at constant speed.

The doffing arm 32 is preferably of a length sufficient to bring its free end to a convenient accessible position where it terminates in a thumb-plate 63 which permits finger pressure to easily reset the arm 32 after a doffing action.

It will now be apparent that a complete unitary doffing mechanism has been devised which acts under a control subject to thread breakage, abnormal thread tension, and a full wound spool. Also it should be noted that doffing action takes place following any one of the aforesaid three conditions and such action is accomplished without subjecting the delicate thread to the action of a brake or like device contacting therewith. In other words the objectionable brake action herefore present in some prior structures is entirely eliminated by the novel structure of the present invention.

While only a single form is shown in which this invention may be embodied, it is to be understood that the invention is not limited to any specific construction, but might be applied to various forms without departing from the spirit of the invention or the scope of the appended claims.

Having thus described our invention, we claim:—

1. In a thread winding mechanism a pair of arms for rotatably mounting a spool, a device for transmitting motion to said spool, means for pivoting said arms to position said spool in operative association with said device, a pivotally mounted doffing arm for removing said spool from association with said device, means including a spring for throwing said doffing arm to doffing position, latch means for rendering said spring means ineffective, a rock rod arranged to control said latch means, and a control means for releasing said latch means, said control means including a cam operating in one direction to rock said rod in response to failure of said thread to feed and in another direction in response to the breaking of a thread whereby said doffing arm is actuated in response to both abnormal thread conditions.

2. In a thread winding mechanism a pair of arms for rotatably mounting a spool, a device for transmitting motion to said spool, means for pivoting said arms to position said spool in operative association with said device, a pivotally

mounted doffing arm for removing said spool from association with said device, means including a spring for throwing said doffing arm to doffing position, latch means for rendering said spring means ineffective, a rock rod arranged to control said latch means, a control means for releasing said latch means, said control means including a cam operating in one direction to rock said rod in response to failure of said thread to feed and in another direction in response to the breaking of a thread whereby said doffing arm is actuated in response to both abnormal thread conditions, and means controlled by the movement of said spool arms for rocking said rod whereby said latch is released to cause a doffing operation when the size of the thread mass reaches a predetermined diameter.

3. In a thread winding mechanism, the combination of a sleeve, means for mounting said sleeve for turning movement, a thread guide attached to said sleeve, a pair of arms for rotatably mounting a spool, a device for transmitting motion to said spool, a spring actuated doffing arm for removing said spool from operative association with said device, a latch means for rendering said doffing arm ineffective, means including a rock rod for releasing said latch means, and means actuated by the turning movement of said sleeve a predetermined distance in either direction for operating said rod to release said latch means.

4. In a thread winding mechanism, the combination of a sleeve, means for mounting said sleeve for turning movement, a thread guide attached to said sleeve, a pair of arms for rotatably mounting a spool, a device for transmitting motion to said spool, a spring actuated doffing arm for removing said spool from operative association with said device, a latch means for rendering said doffing arm ineffective, means including a rock rod for releasing said latch means, means actuated by the turning movement of said sleeve a predetermined distance in either direction for operating said rod to release said latch means, and a torsion spring for turning said sleeve when said thread guide is released from the thread.

HARRY S. DRUM.
WILLIAM C. DODSON.