June 4, 1935. A. GRUNA ET AL 2,003,774

STOP MOTION FOR KNITTING MACHINES

Filed Dec. 13, 1934 2 Sheets-Sheet 1

Fig. 1.

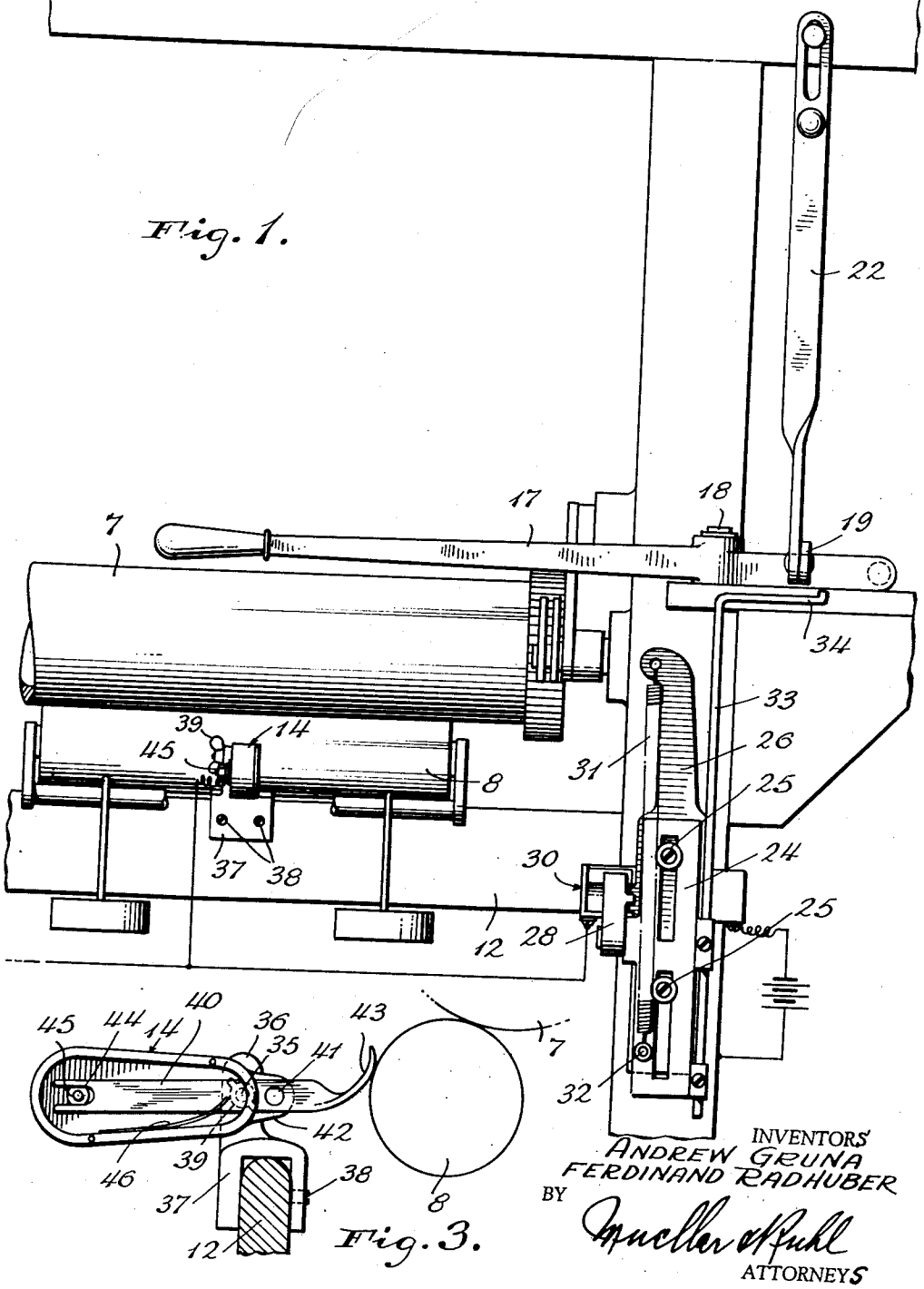


Fig. 3.

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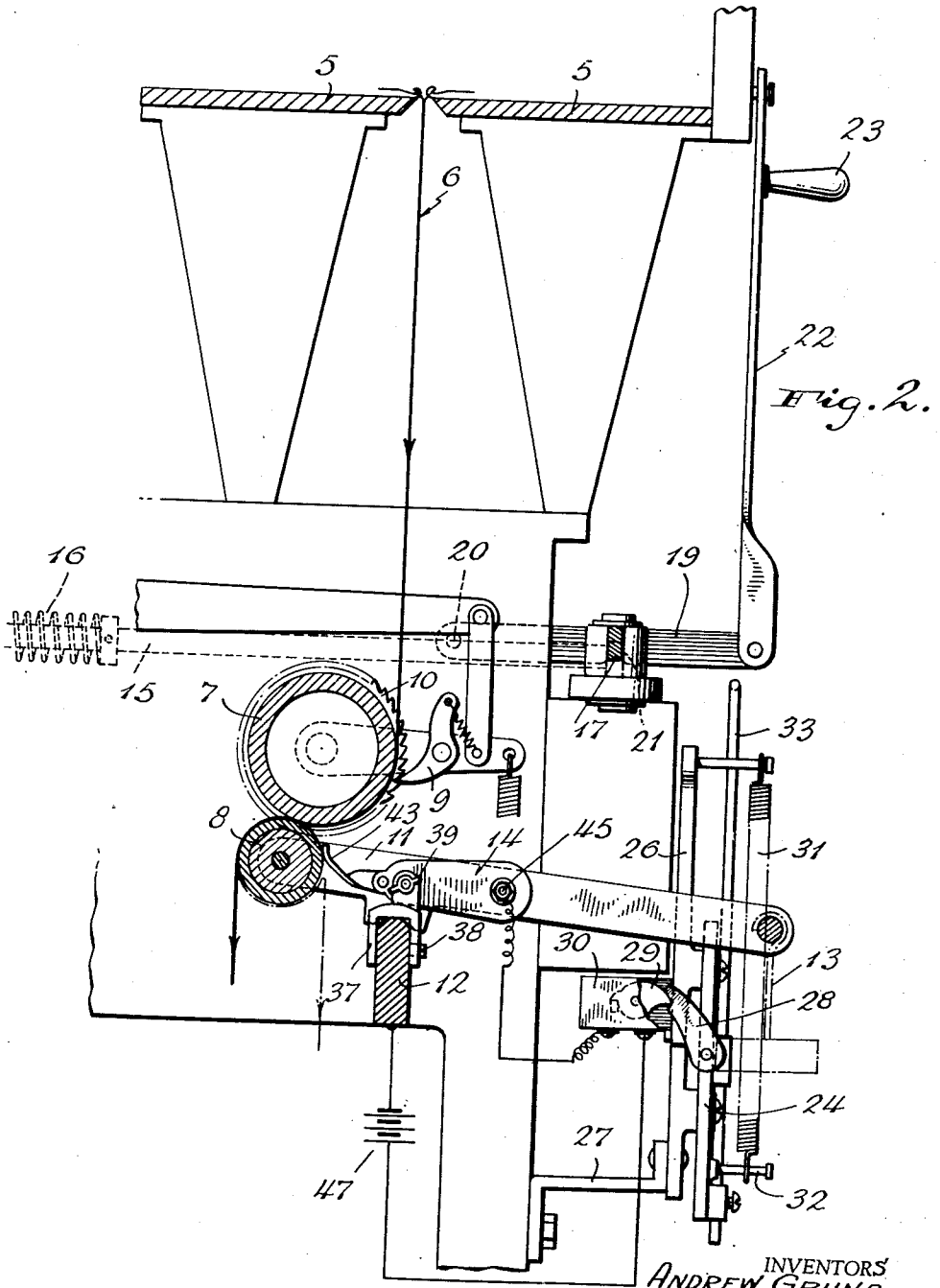


Fig. 2.

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STOP MOTION FOR KNITTING MACHINES

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4 Claims. (Cl. 66—166)

This invention relates to improvements in stop motion devices especially adapted for use on knitting machines and has particular reference to a device which will operate in conjunction with the take-down rollers of such machines.

In some types of knitting machines, the knitted fabric is drawn downwardly from the needle plates by the cooperation of two rollers between which the fabric passes, one of said rollers having an intermittent rotative movement to feed the fabric down as it is being knitted, while the other roller is rockingly supported on a part of the machine frame and counter-balanced thereon so as to exert pressure against the first-named roller and the fabric which passes between said rollers. In the normal operation of these rollers, the fabric is drawn downwardly between the same and depends from the lower roller beneath which it is gathered as the knitting operations proceed. However, it more or less frequently occurs that as the fabric passes between the rollers it will adhere, due to magnetism in the yarn, to one or the other of them and, as a consequence, the fabric will travel around the roller instead of passing downwardly therefrom. Should the fabric adhere to either of the rollers it will be carried there-around and form one or more complete convolutions unless the operator of the machine observes this condition and stops the machine before the fabric is damaged, by an undue downward pull upon the same, which would otherwise occur if the faulty condition were allowed to continue. It sometimes happens also that defective portions of the fabric, such as loose stitches or broken ends, will wind themselves around one or the other of the rollers and cause the fabric to do likewise, with resulting damage to the fabric. In the operation of knitting machines of known construction, it has been the customary practice to rely upon the operator to observe, from time to time, the condition of the fabric passing between the take-down rollers and to stop the machine by a manual operation in the event that said fabric should start to wind upon one of said rollers. It will be readily apparent that such precedure is unreliable since the operator cannot devote his entire attention to this phase of the operation of the machine and, as a result, the fabric may take several turns about one of the rollers and thereby become damaged before the defective operation is seen.

The present invention is designed to overcome the above difficulty by providing a device of simple and practical construction which, through engagement of an element thereof with the surface of one of said rollers, will effect the automatic operation of the stopping means of the machine should the knitted fabric inadvertently start to wind itself about either roller.

The inventive idea involved is capable of receiving a variety of mechanical expressions, one of which, for purposes of illustration is shown in the accompanying drawings wherein:

Figure 1 is a fragmentary front elevation of a knitting machine of the link-and-link type, showing only so much of the machine as is necesary to an understanding of the invention.

Figure 2 is a fragmentary transverse section through the machine, and

Figure 3 is an enlarged side elevation of the stop motion device of the present invention illustrating its position in respect to the taken-down rollers.

The knitting machine employed to illustrate a preferred adaptation of the present invention is shown as comprising the cooperating needle plates 5 between which the fabric 6 is knitted in a known manner and then fed downwardly from said plates by the cooperation of the upper and lower take-down rollers 7 and 8 between which said fabric is drawn and from whence it passes downwardly from the lower roller 8 and then is gathered beneath the machine. The upper roller 8 is positively driven through an intermittent or step-by-step rotative movement by means of the usual instrumentalities including the pawl 9 supported adjacent said roller and the ratchet 10 on the latter. The roller 8 shown in the drawings, and of which there may be several extending through the entire length of the machine as is customary, is mounted in one end of a frame 11 which is rockingly supported upon the rail or bar 12 forming a part of the frame of the machine. The other end of said frame 11 has suspended therefrom a suitable number of counter-balancing weights 13 which tend to raise the roller 8 so that it will exert upward pressure against the roller 7 and the fabric passing between said rollers. The stop motion of the present invention, generally indicated by the numeral 14 and later to be described in detail, is mounted upon the rail 12 and associated with the roller 8, there being as many of the devices 14 arranged at intervals along the rail as is deemed expedient for the detection of faulty operation of the take-down rollers.

The knitting machine illustrated further includes a stopping means and a control mecha-

nism therefor which have heretofore been employed in connection with other stop motions of the machine and which, in accordance with the present invention, are also controlled by the device or devices 14. Such stopping means as referred to usually comprise a clutch (not shown) coupled to the drive of the machine and connected to an arm 15 which is withdrawn toward the rear of the machine when the clutch is operative and which, in such position, compresses a spring 16 coiled about said arm. The forward end of the arm 15 abuts against one end of a control lever 17 pivoted at 18 at the front of the machine and normally held in a position to retain the arm 15 in its rearward position by a latching bar 19 pivoted to the frame of the machine at 20 and having a notch or recess 21 intermediate its ends adapted to receive the lever 17 when said latching bar is in its operative position, as best illustrated in Figure 2. When the bar 19 is lifted either by manual or automatic operation presently to be described, the same is disengaged from the lever 17 and the spring 16 immediately becomes effective to impart a forward longitudinal movement to the arm 15 to thereby release the clutch and stop the machine.

To manually operate the latching bar 19 the same has pivotally connected to its forward end the arm 22 slidably mounted for vertical movement on a part of the machine frame and provided with a handle 23 for manipulating the same. After the arm 22 has been raised to release the lever 17, the bar 19, in its elevated position, will rest upon the lever 17 and remain in this position until said lever is manually swung about its pivot to force the arm 15 rearwardly to again throw in the clutch of the machine. When said lever has been so actuated the same will have again registered with the recess 21 in the bar 19 and the latter will be permitted to again assume its horizontal latching position, at the same time pulling the arm 22 downwardly.

For the automatic control of the latching bar 19, which in turn governs the stopping means of the machine, there is provided a well-known mechanism consisting of a vertically movable slide member 24 guided by the pins 25 which project from a stationary plate 26 mounted upon the bracket 27 carried by the frame of the machine. When the slide is lowered as in the drawings, a dog 28 carried thereby engages with the latch 29 of an electrically controlled latching mechanism conventionally shown at 30 and which is of a well-known construction. When the mechanism 30 is operated to withdraw its latch 29 from engagement with the dog 28, the coil spring 31, one end of which is connected to the upper end of the plate 26 and the other end to a pin 32 at the lower end of the slide 24, becomes effective to impel the slide 24 upwardly. When this occurs a trip rod 33 adjustably secured to said slide and movable therewith, becomes effective, through its lateral extension 34, to raise the latching bar 19 out of engagement with the lever 17 whereupon the latter is swung about its pivot by the action of the spring 16 and arm 15, the clutch of the machine being thereby released. When it is desired to start the machine again, the operator need only force the slide 24 downwardly until the dog 28 is again engaged with the latch 29. The lever 17 may then be swung about its pivot to force the arm 15 rearwardly against the tension of the spring 16 to again connect the clutch.

The mechanism thus far described, with the exception of the device 14, has been used previously on knitting machines of the type disclosed herein and in connection with other automatic stop motions of such machines, and no claim of novelty is made for this mechanism except as it is employed in combination with the stop motion device of the present invention.

The device 14, of which one or more may be employed in the machine and placed at convenient points in cooperative relation with the rollers 8, comprises an elongated casing having a screw-threaded pin 35 extended laterally from one end thereof and projected through the extension 36 of an inverted U-shaped bracket 37 which is adapted to be mounted upon the rail 12, as best shown in Figure 2, and removably secured in position thereon by set screws 38. The pin 35 forms a pivot for the casing 14 so that the latter may be properly adjusted with respect to the bracket 37 when mounting the device in position and said casing is secured in its adjusted position by means of a wing nut 39. The device further comprises a control lever 40 a portion of which is enclosed within the casing 14 with the remainder thereof projecting through an opening in one end of said casing adjacent which said lever is pivoted as at 41 to an extension 42 of said casing. The extremity of the projecting portion of the lever 40 is bent to provide a feeler 43 which is adapted to contact the cylindrical surface of the associated roller 8. The enclosed end of the lever 40 is bifurcated as at 44 and situated between the portions of said bifurcation is an electrical contact 45. A leaf spring 46 has one end thereof secured to the lever 40 intermediate its ends and bears against the bottom of the casing 14 so as to yieldably maintain the feeler 43 in contact with the surface of the roller 8. When initially adjusting the stop motion device on the machine the wing nut 39 is loosened so as to permit of a pivotal movement of the casing about the pin 35, and the cover for one side of the casing is removed or swung to a position where the operator may observe the inner end of the lever 40. When the feeler 43 has been made to contact the surface of the roller 8 the casing 14 is then adjusted slightly about its pivot and relative to the lever 40 until the electrical contact 45, which is carried by said casing, is centrally situated between the portions of the bifurcation 44 and out of contact therewith, whereupon the wing nut 39 may be tightened against the extension 36 to maintain the same in its adjusted position.

With the lever 40 in the position described, normal operation of the machine proceeds with the roller 7 feeding the knitted fabric downwardly between the same and the roller 8. However, should said fabric for any reason adhere and be wound upon the roller 7 and thus double the thickness of the fabric between the rollers 7 and 8, said increase in thickness will cause the latter roller to be lowered slightly away from the roller 7 and the feeler 43. Due to the spring 46, the lever 40 will be rocked about its pivot 41 as the roller 8 is lowered and thereby cause the lower portion of the bifurication 44 to engage the contact 45. Such engagement will thereupon close an obvious circuit from one terminal of the battery 47 through the contact 45, the latching mechanism 30 and

from thence back to the other terminal of the battery. The energization of said latching mechanism permits the spring 31 to raise the slide 24 and its rod 33, whereupon the latching bar 49 will be swung about its pivot with the result previously described. Should, for any reason, the fabric be drawn around the roller 8 as indicated in dotted lines in Figure 2, it will eventually pass between said roller and the feeler 43, thereby lifting the latter and rocking the lever 40 about its pivot so that the upper portion of the bifurcation 44 will engage the contact 45 with the same result as previously described.

When two or more of the stop motion devices 14 are employed, the contacts 45 thereof are connected in series, as shown in Figure 1, to the electrical circuit for energizing the mechanism 30.

What is claimed is:

1. In a stop motion for a knitting machine, the combination with rollers between which a knitted fabric is drawn, means for stopping said machine, and a circuit for said means; of a control device including a pivoted circuit-closing element having direct contact with the surface of one of said rollers, said element being movable about its pivot, in one direction by a movement of one of said rollers away from the other and in a different direction by engagement of said fabric therewith, to close said circuit.

2. In a stop motion for a knitting machine, the combination with rollers between which a knitted fabric is drawn, a frame member adjacent said rollers, and stopping means for said machine; of a device for controlling said stopping means, said device mounted upon said frame member and including a rocker arm having a normal position in which one end rests against the surface of one of said rollers, and means controlled by a movement of said arm during which it is disengaged from said roller or by a movement of the latter away from the other roller for operating said stopping means.

3. In a stop motion device for a knitting machine, the combination with a bracket supported upon the frame of the machine, rollers also carried by said frame and between which a fabric is drawn; of a control element pivotally connected to said bracket and having one end capable of engagement with the surface of one of said rollers, the other end of said element being bifurcated, and a contact member disposed within said bifurcation and normally spaced from the portions of said element forming the same, said contact member being engaged by one or the other of said portions upon a movement of said control element about its pivot in either direction.

4. In a stop motion device for a knitting machine, the combination with take-down rollers for said machine, and a support adjacent the take-down rollers; of a casing adjustable on said support, a control element pivoted to said casing and having one end adapted for engagement with one of said rollers, a contact member within said casing normally spaced from said control element and engaged thereby upon movement of said element about its pivot, and means to secure said casing in an adjusted position with said control element in contact with said roller and spaced from said contact member.

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