

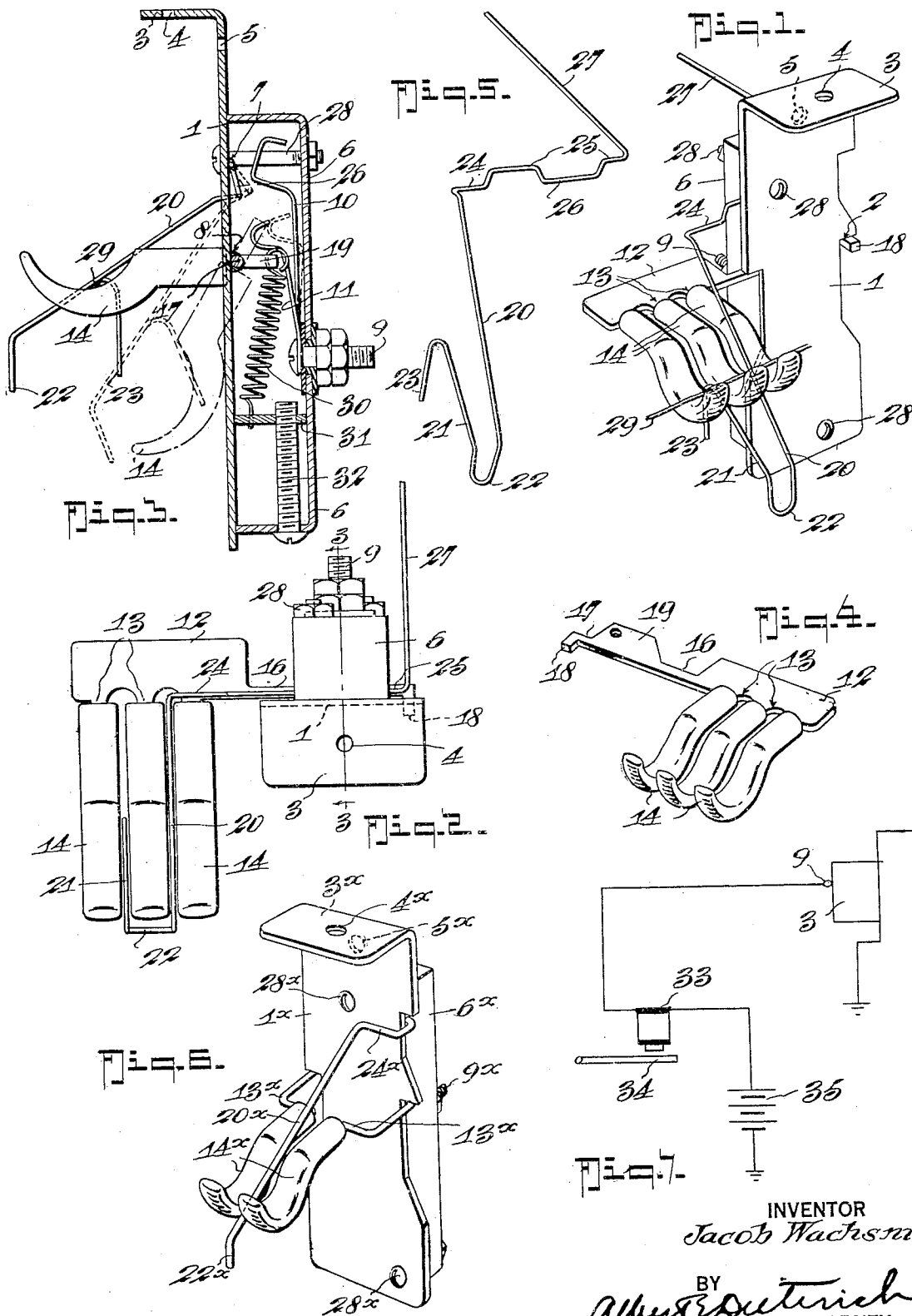
Oct. 14, 1930.

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1,778,097

CIRCUIT CLOSER FOR STOP MECHANISM OF KNITTING MACHINES AND THE LIKE

Filed Dec. 5, 1929



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## CIRCUIT CLOSER FOR STOP-MECHANISM OF KNITTING MACHINES AND THE LIKE

Application filed December 5, 1929. Serial No. 411,876.

My invention relates to devices used for the purpose of actuating or controlling the stop mechanism proper of knitting machines and other similar apparatus upon the breaking or knotting of the thread. It particularly relates to what is technically termed in the trade as the top box, i. e., the control device located at the highest point in the path of travel of the thread through the machine.

Primarily the invention has for an object to provide mechanism which will act quickly and surely so as to stop the machine before damage to the cloth can occur.

Further, the invention has for an object to provide means whereby the electric circuit to the stop actuating magnet of the knitting machine will be closed by clean contacts which will not readily corrode, thereby insuring operation of the device at all times under all conditions.

Further, it is an object to improve generally the construction of the circuit closer and to enclose the working parts in a case which will protect the contacts and tensioning mechanism from dust, dirt, lint, etc. which may tend to accumulate from the thread as it passes from the device.

Again, it is an object of my present invention to provide a circuit closer of extreme sensitivity, the cost of manufacture of which is reduced to the minimum and in which the fewest number of parts possible are employed.

Other objects will in part be obvious and in part be pointed out hereinafter.

To the attainment of the aforesaid objects and ends, my invention consists in the novel features of construction and in the combination, connection and arrangement of parts, hereinafter more fully described, and then pointed out in the appended claims.

In the drawing:

Figure 1 is a perspective view of the preferred embodiment of the invention.

Figure 2 is a plan view of the same.

Figure 3 is a longitudinal section on the line 3—3 of Figure 2.

Figure 4 is a detail perspective view of the forked spring-held lever.

Figure 5 is a detail perspective view of the gravity actuated lever.

Figure 6 is a perspective view of a modification of the invention.

Figure 7 is a diagrammatic view of the electric circuit which the device is intended to control.

In the drawing in which like numerals of reference indicate like parts in all of the figures, 1 represents a cover plate which is provided with a suitable stop or stops 2, the purpose of which will presently appear and which has a right angled forwardly extended bracket part 3, apertured at 4 for the purpose of securing the device to a suitable base or support, a hole 5 for the same purpose being provided at right angles to the hole 4 should it be desired to secure the device by horizontal instead of vertical screws.

6 is a box closed on all sides except the front, the box being provided with upper and lower sets of bearing notches 7 and 8 entering from the edge. These bearing notches are adapted to be closed by the cover plate 1 when it is in place on the box, the cover plate being secured in place on the box by suitable bolts 28 as indicated.

9 is an insulated circuit terminal mounted on the box and to which is secured a U-shaped spring wire having resilient contact arms 10 and 11 respectively, the arm 10 being longer than the arm 11 and being designed to cooperate with the gravity actuated lever while the arm 11 cooperates with the spring actuated lever. The spring actuated lever consists of a body 12 formed with bearing portions 16 and 17 and a heel 19, the heel 19 being adapted to lie within the box 6 and the bearing portions 16 and 17 adapted to lie in the bearing notches 8.

The yieldingly held lever (spring actuated lever) also has a stop portion 18 to cooperate with the stop 2, whereby the lever is held in the position indicated in full lines in Figure 3 by means of the tension of the spring 30 that is connected to it and to a plate 31 of similar cross section to that of the box and mounted on an adjusting screw 32 whose head is located outside of the box

and may be adjusted to increase or diminish the tension of the spring 30.

The spring held lever is also provided with any desired number of furcations 13 sheathed with porcelain or other smooth vitreous material 14 so as to prevent catching or dragging of the lint from the thread and its consequent accumulation at the circuit closer.

In the preferred embodiment of the invention the furcated portion of the spring actuated lever is located to one side of the box, whereas in the embodiment of the invention illustrated in Figure 6 it is located directly in front of the box.

The gravity actuated lever consists of a wire bent to provide a loop 26 at each side of which there are bearing portions 25—25 to lie in the notches 7. Extended from one of the bearing portions 25 is a balancing arm 27 and from the other bearing portion 25, in the preferred embodiment, the wire extends laterally as at 24 and then forwardly as at 20 to a point beyond or in front of the furcations 13 where it is looped as at 22, the loop being bent downwardly and then bent back upon itself at 21 with the end downwardly projecting and forwardly as a hook 23, the portions 20 and 21 being separated sufficiently to pass between adjacent furcations 13 of the forked portion of the spring held lever.

In the preferred embodiment the parts 20 to 24 inclusive lie to one side of the box. In the normal position of the parts when a thread 29 is in place the parts 20 and 21 of the gravity actuated lever overlie the thread while the furcations underlie the thread, the thread tending to hold the gravity actuated lever against dropping down from the full line position shown in Figure 3 to the dotted line position shown in that figure. When, however, the thread breaks and either the end passes the lever or if the thread is an exceedingly light fine thread, the gravity actuated lever will drop to the dotted line position indicated and in doing so causes its loop or heel portion 26 to engage the contact arm 10 and close the electric circuit to the stop magnet 33 of the stop mechanism of the machine, the stop magnet 33 operating the stop lever 34 and being energized by a suitable source of energy 35.

If a knot should form in the thread it will not pass the levers but will cause the levers to be pulled down as shown in dot and dash lines in Figure 3, which causes the circuit to be instantly closed between the heel 19 and the contact spring arm 11 before the resisting tension on the thread becomes sufficient to break it or cause damage to the cloth. The slightest pull on the thread due to knotting will cause the circuit to be closed between the parts 19 and 11. The time interval for closing the circuit between the parts 26 and 10 is greater since it is not so essential that the circuit be closed instantaneously

when a break or end passes the levers as it is to close the circuit and stop the machine when a knot is encountered.

In the modified form of the invention shown in Figure 6 the parts having corresponding structure have the same reference characters plus the reference letter (<sup>x</sup>) as in Figures 1 to 5 inclusive. In that embodiment only two furcations 13<sup>x</sup> are shown and only a single wire 20<sup>x</sup> with downwardly extending ends 22<sup>x</sup> is employed.

Furthermore the portion 24<sup>x</sup> is extended back parallel to the bearing portion 25 so that the portion 20<sup>x</sup> may lie directly in front of the cover 1<sup>x</sup> and between the furcations 13<sup>x</sup>.

The operation of this embodiment is essentially the same as that of the preceding embodiment and further description is thought to be unnecessary.

It will be seen that with my construction there are very few parts and the device is extremely light and sure in its operation, and all of the parts liable to damage or would be rendered uncertain in operation are enclosed in a practically dust-proof box.

From the foregoing description, taken in connection with the accompanying drawing, it is thought the construction, operation and advantages of my invention will be clear to those skilled in the art to which it relates.

What I claim is:

1. In a stop mechanism of the character described, a circuit closer comprising a box having its front open, an insulated electric circuit terminal mounted on the box, a double arm contact spring secured to said terminal within the box, a yieldingly held lever having bearing portions, the open edge of said box having bearing notches for said bearing portions, said lever having a heel adapted to cooperate with one of said spring contact arms within said box, a gravity actuated lever having bearing portions, said box having notched bearing portions for the bearing portions of said gravity actuated lever, a cover plate secured to said box for closing its front and retaining said levers in said bearing notches, said gravity lever having a portion within the box cooperating with the other contact spring arm, each of said levers having portions located outside of the box cooperating with one another and with a thread for the purposes specified.

2. In a stop mechanism of the character described, a circuit closer comprising a box having its front open, an insulated electric circuit terminal mounted on the box, a double arm contact spring secured to said terminal within the box, a yieldingly held lever having bearing portions, the open edge of said box having bearing notches for said bearing portions, said lever having a heel adapted to cooperate with one of said spring contact arms within said box, a gravity actu-

ated lever having bearing portions, said box having notched bearing portions for the bearing portions of said gravity actuated lever, a cover plate secured to said box for closing its front and retaining said levers in said bearing notches, said gravity lever having a portion within the box cooperating with the other contact spring arm, each of said levers having portions located outside of the box cooperating with one another and with a thread, said cover plate having a stop, and a spring in the box to hold said yieldingly held lever against said stop, and means operative from outside of the box for adjusting the tension of said last named spring.

3. In a stop mechanism of the character described, a circuit closer comprising a box having its front open, an insulated electric circuit terminal mounted on the box, a double arm contact spring secured to said terminal within the box, a yieldingly held lever having bearing portions, the open edge of said box having bearing notches for said bearing portions, said lever having a heel adapted to cooperate with one of said spring contact arms within said box, a gravity actuated lever having bearing portions, said box having notched bearing portions for the bearing portions of said gravity actuated lever, a cover plate secured to said box for closing its front and retaining said levers in said bearing notches, said gravity lever having a portion within the box cooperating with the other contact spring arm, said yieldingly held lever having a fork-like portion located outside of the box between the furcations of which said gravity actuated lever may pass for the purpose described.

4. In a stop mechanism of the character described, a circuit closer comprising a box having its front open, an insulated electric circuit terminal mounted on the box, a double arm contact spring secured to said terminal within the box, a yieldingly held lever having bearing portions, the open edge of said box having bearing notches for said bearing portions, said lever having a heel adapted to cooperate with one of said spring contact arms within said box, a gravity actuated lever having bearing portions, said box having notched bearing portions for the bearing portions of said gravity actuated lever, a cover plate secured to said box for closing its front and retaining said levers in said bearing notches, said gravity lever having a portion within the box cooperating with the other contact spring arm, said yieldingly held lever having a fork-like portion located outside of the box between the furcations of which said gravity actuated lever may pass, said gravity actuated lever having its outer extremity downwardly bent and extended beyond the end of said fork-like portion.

5. In a stop mechanism of the character

described, a circuit closer comprising a box having its front open, an insulated electric circuit terminal mounted on the box, a double arm contact spring secured to said terminal within the box, a yieldingly held lever having bearing portions, the open edge of said box having bearing notches for said bearing portions, said lever having a heel adapted to cooperate with one of said spring contact arms within said box, a gravity actuated lever having bearing portions, said box having notched bearing portions for the bearing portions of said gravity actuated lever, a cover plate secured to said box for closing its front and retaining said levers in said bearing notches, said gravity lever having a portion within the box cooperating with the other contact spring arm, said yieldingly held lever having a fork-like portion located outside of the box between the furcations of which said gravity actuated lever may pass, said fork-like portion comprising a plurality of furcations, said gravity actuated lever having its outer portion extended beyond the ends of said fork-like portion and bent back upon itself to provide two parts to pass between the furcations of said fork-like portion.

6. In a stop mechanism of the character described, a circuit closer comprising a box having its front open, an insulated electric circuit terminal mounted on the box, a double arm contact spring secured to said terminal within the box, a yieldingly held lever having bearing portions, the open edge of said box having bearing notches for said bearing portions, said lever having a heel adapted to cooperate with one of said spring contact arms within said box, a gravity actuated lever having bearing portions, said box having notched bearing portions for the bearing portions of said gravity actuated lever, a cover plate secured to said box for closing its front and retaining said levers in said bearing notches, said gravity lever having a portion within the box cooperating with the other contact spring arm, said yieldingly held lever having a fork-like portion located outside of the box between the furcations of which said gravity actuated lever may pass, said fork-like portion comprising a plurality of furcations, said gravity actuated lever having its outer portion extended beyond the ends of said fork-like portion and bent back upon itself to provide two parts to pass between the furcations of said fork-like portion, the forward extremity of said gravity actuated lever being bent downwardly and the rear end of said bent back portion being extended downwardly as a hook for the purpose described.

7. In a stop mechanism of the character described, a circuit closer comprising a box having its front open, an insulated electric circuit terminal mounted on the box, a dou-

ble arm contact spring secured to said terminal within the box, a yieldingly held lever having bearing portions, the open edge of said box having bearing notches for said bearing portions, said lever having a heel adapted to cooperate with one of said spring contact arms within said box, a gravity actuated lever having bearing portions, said box having notched bearing portions for the bearing portions of said gravity actuated lever, a cover plate secured to said box for closing its front and retaining said levers in said bearing notches, said gravity lever having a portion within the box cooperating with the other contact spring arm, said yieldingly held lever having a fork-like portion located outside of the box between the furcations of which said gravity actuated lever may pass, said cover plate having means by which the device may be mounted on a suitable carrier or support.

8. In a stop mechanism of the character described, a circuit closer comprising a box having its front open, an insulated electric circuit terminal mounted on the box, a double arm contact spring secured to said terminal within the box, a yieldingly held lever having bearing portions, the open edge of said box having bearing notches for said bearing portions, said lever having a heel adapted to cooperate with one of said spring contact arms within said box, a gravity actuated lever having bearing portions, said box having notched bearing portions for the bearing portions of said gravity actuated lever, a cover plate secured to said box for closing its front and retaining said levers in said bearing notches, said gravity lever having a portion within the box cooperating with the other contact spring arm, said yieldingly held lever having a fork-like portion located outside of the box between the furcations of which said gravity actuated lever may pass, said furcations being sheathed with smooth vitreous envelopes.

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