March 11, 1952 M. ANTONEVICH 2,588,689

STOP MOTION

Filed April 13, 1950 2 SHEETS—SHEET 1

FIG. 2.

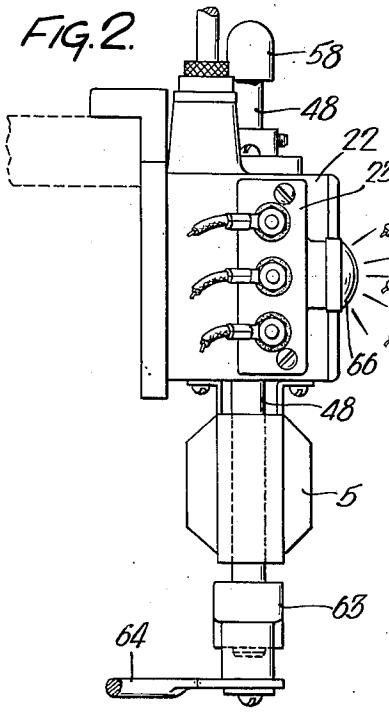


FIG. 1.

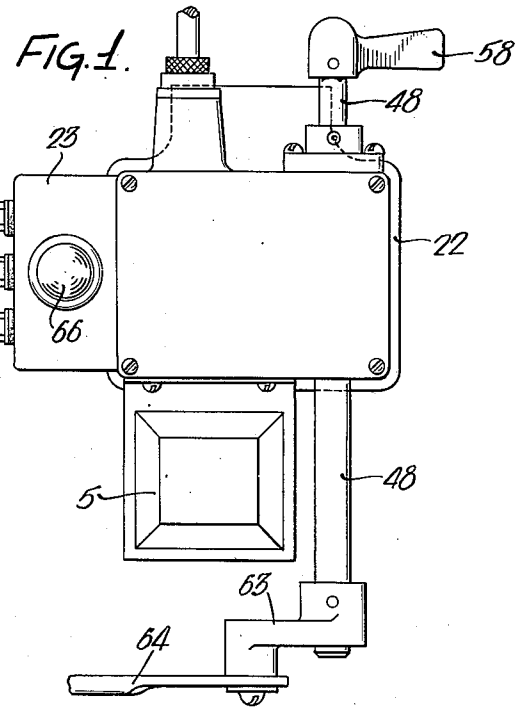
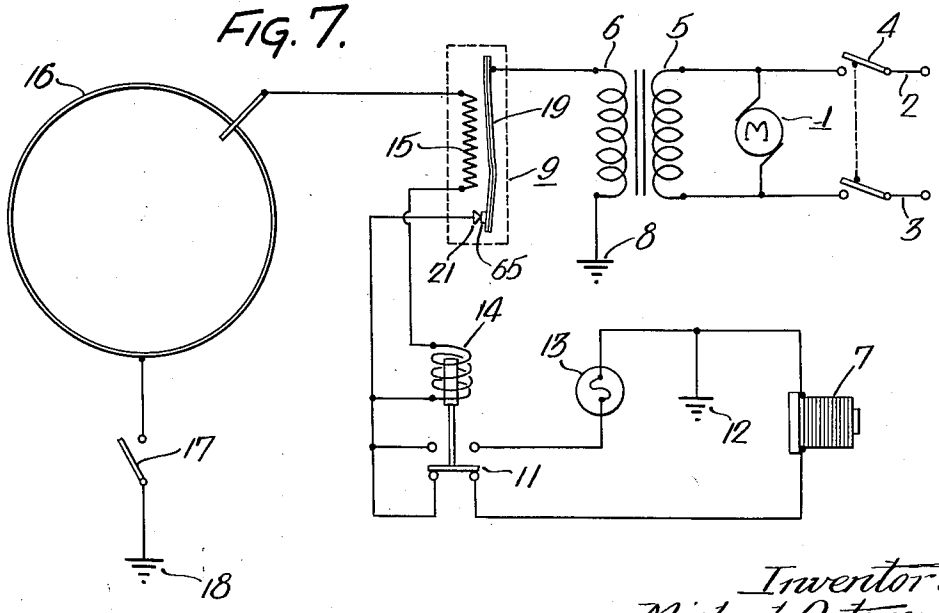


FIG. 7.



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STOP MOTION

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FIG. 3.

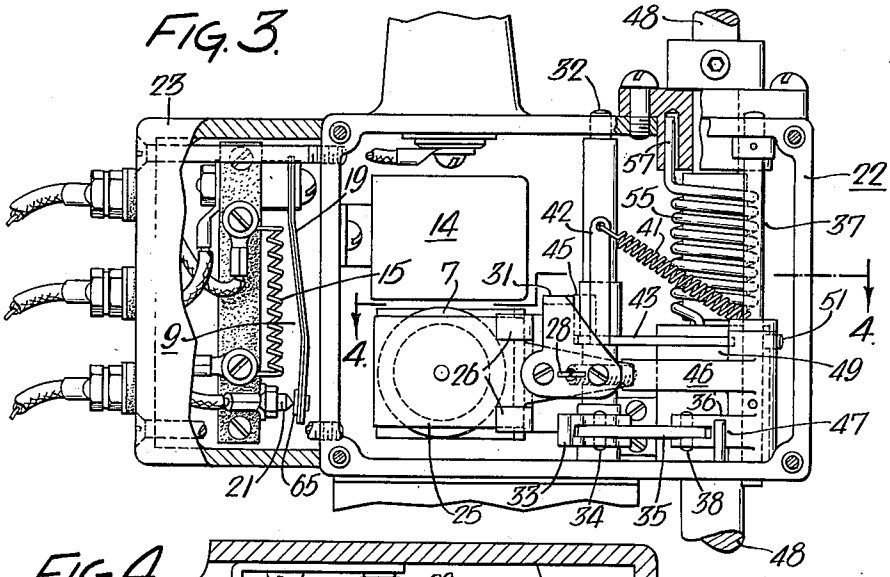


FIG. 4.

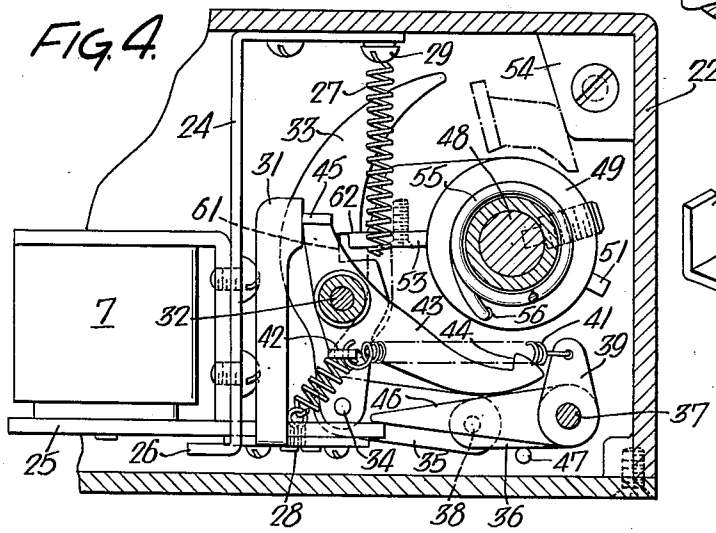


FIG. 6.

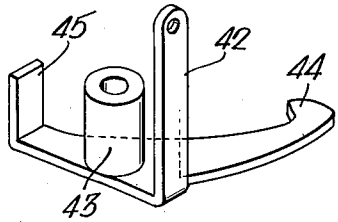
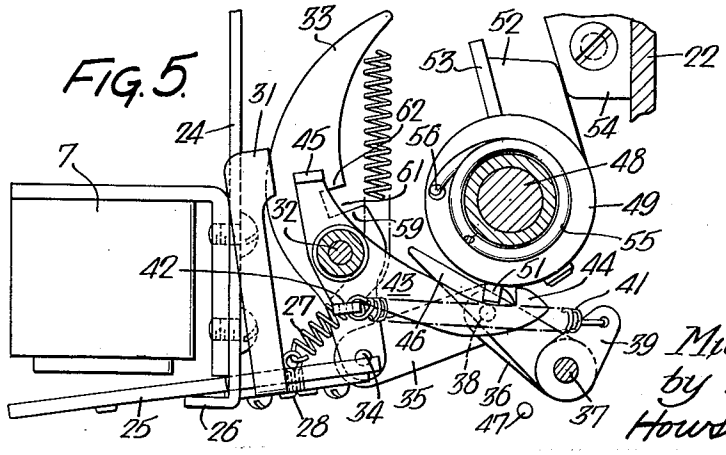


FIG. 5.



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UNITED STATES PATENT OFFICE

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STOP MOTION

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Application April 13, 1950, Serial No. 155,768

10 Claims. (Cl. 66—157)

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This invention relates to stop motions of the general type disclosed in my prior United States Letters Patent No. 2,488,614, and a principal object of the present invention is to provide a device of the specified class having certain additional safety factors hereinafter described.

More specifically, an object of the invention is to provide a stop motion of the stated type wherein automatic means is provided for preventing possible damage to the transformer which constitutes an element of the electrical system.

To the aforesaid end, the invention contemplates also the provision of a knock-off device for stop motions of the stated class, said device having means for automatically interrupting the circuit of the secondary coil of the transformer after actuation of the stop motion so as to preclude damage to the coil due to overheating.

Still another object is to provide a knock-off device of the character set forth including electrically actuated thermosensitive means for intermittently interrupting the said secondary coil circuit to the end that damage to the coil is prevented.

The invention extends also to certain novel mechanical details hereinafter described and illustrated in the attached drawings wherein:

Fig. 1 is a front elevational view of a knock-off unit made in accordance with the invention;

Fig. 2 is an end elevational view of the unit shown in Fig. 1;

Fig. 3 is an enlarged fragmentary front elevational view with a part of the casing cut away and with the cover plate removed so as to disclose the elements of mechanism;

Fig. 4 is a sectional view on the line 4—4, Fig. 3;

Fig. 5 is a fragmentary assembly illustrating the elements of the knock-off device in the released position;

Fig. 6 is a view in perspective of one of the elements of the knock-off mechanism detached from the assembly; and

Fig. 7 is a diagrammatic view illustrating the electrical system.

With reference first to Fig. 7, numeral 1 designates an electric motor which constitutes the prime mover of a knitting machine (not shown). This motor is connected across the main power line represented by the conductors 2 and 3, and flow of current to the motor is controlled in the present instance by a manually actuated double throw switch 4. Paralleling the motor 1 is the primary coil 5 of a transformer, the secondary coil 6 of which is connected in a circuit which

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contains an electro-magnet 7. In the present instance one side of the coil 6 is grounded at 8, the other end of the coil being connected through a thermostatic switch 9 and a relay-actuated switch 11 to the magnet 7, the circuit being completed by way of a ground 12 connected to the other side of the magnet. The switch 11 also controls a shunt circuit containing a signal lamp 13, this circuit being open when the electro-magnet 7 is energized and being closed when the electro-magnet 7 is deenergized.

The system comprises a third circuit which parallels the circuit's first named end which contains the relay 14 which actuates the switch 11. This circuit also contains a heating element 15, which is operatively associated with the thermostatic switch 9; a collector ring 16 forming an element of the knitting machine and, in operation, rotating with the cam ring of said machine; and a plurality of normally open detector switches of which one is shown at 17. This circuit is grounded at 18.

As hereinafter more specifically described the electro-magnet 7 functions to maintain the knock-out mechanism of the stop motion in the set condition, so that the operation of the knitting machine depends in part upon maintenance of the electro-magnet 7 in the energized state. Deenergization of the electro-magnet results in tripping of the knock-off mechanism and consequent interruption of the operation of the knitting machine.

With further reference to Fig. 7, the knitting machine is set in operation by closing the switch 4. This energizes the electro-magnet 7 and permits setting of the knock-off device as hereinafter described. Since the detector switches 17 are open, the relay 14 will be deenergized and the switch 11 will occupy the position in which it is shown in Fig. 7. If a detector switch 17 is closed, as a result of some malfunction in the knitting operation, the relay 14 will be energized thereby actuating the switch 11 to deenergize the electro-magnet 7 and to energize the signal lamp 13. At the same time the heating element 15 is energized, thereby heating the bimetallic arm 19 of the thermostatic switch 9 and causing it to move away from the contact 21 which it normally engages so as to interrupt the circuit of the secondary transformer coil 6. Opening of the thermostatic switch also deenergizes the relay 14 and the heating element 15, and as the temperature of the bimetallic arm decreases the arm will again move to the switch-closing position thereby reenergizing the relay 14

and the heating element 15. This cyclic action, effecting intermittent interruption of the transformer secondary circuit, precludes overheating of the transformer coil and possible damage from that cause. The accompanying intermittent de-energization of the relay 14 has the effect of alternately making and breaking the circuit containing the lamp 13 and thereby affords an intermittent visible signal indicating that the particular machine is inoperative.

With reference to Figs. 1, 2, and 3 to 6, inclusive, the mechanism of the knock-off device, including the electromagnet 7 and the relay 14, is contained within a casing 22. The transformer 5 is secured to the underside of the casing 22; and the elements of the thermostatic switch 9, including the heating element 15, and the signal lamp 13, are mounted in a sub-casing 23 attached to one end of the casing 22. As shown in Fig. 4 the electro-magnet 7 is mounted on a bracket 24 secured to a wall of the casing 22, and an armature 25 is pivotally mounted in two ear-like extensions 26 of the bracket 24 in operative pcsition with respect to the magnet. A coiled spring 27 has one end hooked to the rear end of the armature 25 as indicated at 28. The other end of this spring being anchored by the bracket retaining screw 29, see Fig. 4. This spring exerts a continuous pull on the rear end of the armature tending to hold the forward end thereof away from the magnet 7 in a retracted position shown in Fig. 5. The armature 25 carries a projecting arm 31, the function of which will be hereinafter described.

Pivotally supported upon a pin 32 in the casing 22 is a lever 33. One bifurcated end of this lever is pivotally connected by a pin 34 to one arm 35 of a toggle link, the other arm 36 of this link being pivotally supported on a pin 37 in the casing. The arms 35 and 36 are pivotally united through the medium of a pin 38. The arm 36 of the toggle constitutes one arm of a bell crank lever, and another arm 39 of this lever has attached thereto a spring 41. The other end of the spring is attached to the upper end of an upright arm 42 on a lever 43 which lever is pivotally supported on the pin 32. The lever 43 includes, in addition to the upright arm 42 a hooked terminal end 44, and at the opposite side of the pin 32, a second arm 45. The spring 41 exerts a pull on the lever 43 tending to move it in a counterclockwise direction as viewed in Fig. 4 for a purpose hereinafter described. It will be noted also by reference to Figs. 4 and 5 that the arm 45 of lever 43 extends into the path of the outer end of the arm 31 of the armature lever 25. The bell crank lever 36—39 includes a third arm 46 which extends in substantial parallel relation to and above the toggle arm 36 of this lever, the outer end of the arm 46 extending into position for operative engagement with the rear end of the armature lever 25 for a purpose hereinafter set forth. The toggle 35—36 is limited in its movement in one direction by a pin 47 which extends upwardly from the bottom wall of the casing 22.

A shaft 48 extends downwardly through the casing 22 and has a collar 49 attached thereto within the casing. The collar 49 has a lug 51 projecting radially therefrom which lies in the plane of the lever 43. The collar 49 also has a projecting arm 52 which lies in the plane of the lever 33, and to one side of the arm 52 is attached a flange 53. The arm 52 is arranged for abutment with a boss 54 on the casing 22, said boss constituting a stop limiting rotation of the shaft 48

in a clockwise direction, as viewed in Fig. 5. A coil spring 55 embraces the shaft 48, one end of this spring being attached at 56 to the collar 49 and the other end to the casing 22, as indicated at 57 in Fig. 3. This spring exerts a torque upon the shaft 48 tending to rotate the shaft in clockwise direction, as viewed in Figs. 4 and 5. At the upper end of the shaft 48 is a lever 58 by means of which the shaft may be manually rotated against the bias of the spring 55 so as to bring the outer end of flange 53 of the arm 52 into engagement with one side, 59, of a recess 61 in the lever 33 thereby exerting pressure tending to rotate this lever in a clockwise direction as viewed in Fig. 5 and to thereby extend the toggle 35—36. The toggle when fully extended, as viewed in Fig. 4, acts to maintain the lever 33 in the adjusted position shown in Fig. 4 and thereby to also retain the shaft 48, by interlocking engagement of the outer end of the lever 52 with the wall 62 of the recess 61, in the adjusted position against the pressure of the spring 55.

Let it be assumed that the elements of the above described mechanism are in the positions shown in Fig. 5, the magnet 7 being deenergized. Under these circumstances the hook 44 of lever 43 will lie in the path of the lug 51 and will prevent rotation of the shaft 48. Energization of the magnet will result in a movement of the armature arm 25 in a clockwise direction as viewed in Fig. 5 until the arm lies against the face of the magnet 7 where it will be held by magnetic attraction. This movement of the arm 25 carries the outer end of the arm 31 into engagement with the arm 45 of the lever 43 and moves that lever in clockwise direction to a position wherein the hooked end 44 of the lever is removed from the circular path of the lug 51. The mechanism may now be set by turning the shaft 48 counterclockwise which carries the arm 52 into engagement with the shoulder 59 of the lever 33, adjusting that lever in a clockwise direction about the pin 32 and straightening the toggle 35—36, the toggle being moved slightly beyond dead center to a position wherein the lever 36 engages the stop pin 47. When the shaft 48 is released the arm 52 will engage the shoulder 62 of the lever 33 and since this lever is now locked in position by the toggle the shaft 48 will be retained in the adjusted position against the pressure of the spring 55.

The parts now occupy the positions shown in Fig. 4 wherein it will be noted that the outer end of the arm 46 will lie against the rear end of the armature 25. Under these circumstances if the magnet is deenergized the spring 27 will retract the armature from the magnet and in so doing will move the arm 46 in a clockwise direction, see Fig. 4, to an extent breaking the toggle 35—36 thereby releasing the lever 33 and permitting the spring 55 to return the shaft 48 to the original position. The parts now again occupy the positions shown in Fig. 5. The lower end of the shaft 48 is connected through an arm 63, a link 64, and other devices, not shown, with suitable clutch and brake mechanisms which operate to disconnect the knitting machine from the prime mover motor and to bring the machine to an immediate stop.

As previously set forth the elements of the thermostatic switch 9 are housed within a casing 23 and these elements are shown in Fig. 3. They comprise in the present instance the bimetallic arm 19, the free end of which carries a contact element 65 which normally engages the switch

element 21. In proximity to one side of the arm 19 is the electrical heating element 15. The casing 23 also houses the electric bulb 13 which is visible through a lens 66 set in the wall of the casing.

The mode of operation of the device will be readily understood from the foregoing description, it being noted that following the tripping of the mechanism by closure of any of the switches 18 the circuit which contains the secondary coil 6 of the transformer and also the relay 14 will be broken intermittently with the results previously described.

In the appended claims the term "trip member" has been applied to the shaft 48 as defining the primary function of that shaft. The term "latch lever" has been used to identify the primary latch 33, as distinguished from the secondary "latch element" 43.

I claim:

1. In an electric stop motion, a transformer fed detector circuit including a secondary element of said transformer and a normally open detector switch controlling flow of current in the circuit and in said transformer element, said circuit including also a make-and-break device operative automatically when the detector switch is closed to intermittently interrupt the flow of current in the transformer element.

2. In an electric stop motion, a transformer fed detector circuit including a normally open detector switch, said circuit including also a make-and-break device operative automatically when the detector switch is closed to intermittently interrupt the said circuit, the make-and-break device comprising a normally closed thermosensitive switch adapted to open at relatively elevated temperatures to interrupt the circuit, and an electric heating element in the circuit in thermal transfer relation with the said thermosensitive switch.

3. An electric stop motion according to claim 2 wherein the thermosensitive switch and the heating element are arranged in series in the circuit.

4. An electric stop motion according to claim 2 including a knock-off circuit paralleling the detector circuit and energized from the same transformer, said knockoff circuit containing the thermosensitive switch and a normally closed control switch, and the detector circuit including a relay for opening the control switch when the detector circuit is energized.

5. An electric stop motion according to claim 4 wherein the knock-off circuit contains an electro-magnet and wherein further a signal circuit is provided as a shunt for said electromagnet, said signal circuit including a normally open switch actuated by the said relay to close the signal circuit when the electro-magnet is deenergized.

6. An electric stop motion according to claim 5 wherein the signal circuit includes the make-and-break device so as to afford an intermittent deenergization of the signal circuit.

7. In an electric stop motion, a movable trip member, a spring for moving the member in one direction, a retractable latch lever arranged for interlocking engagement with the member to retain the member in predetermined adjusted position against pressure of the spring, a toggle operative in extended position to positively hold the latch lever in the member-retaining position, an electro-magnet including a movable armature, and a spring tending to retract the armature from the magnet, said armature being arranged with respect to the toggle so that retraction of the armature forcibly moves the toggle from the extended position and thereby effects release of the trip member from the latch lever.

8. A stop motion according to claim 7 wherein the toggle includes a trip lever which when the toggle is extended is adjusted into the path traversed by the armature in its retractive movement.

9. In an electric stop motion, a movable trip member, a spring for moving the member in one direction, means for retaining the member in predetermined adjusted position against pressure of the spring, said retaining means including a normally energized electro-magnet, a retractable latch element normally interlocked with the trip member so as to prevent movement thereof to the said adjusted position, and means operative as the magnet is energized to retract the latch element so as to permit adjustment of the trip member.

10. A stop motion according to claim 9 wherein the electro-magnet comprises a movable armature and resilient means operative to retract the armature from the magnet when the latter is deenergized, and wherein further the armature is arranged to engage and to retract the latch element when advanced toward the magnet as a result of energization of the latter.

MICHAEL ANTONEVICH.

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