Aug. 23, 1932. O. V. PAYNE 1,873,465

KNOCK-OFF FOR ELECTRICAL WARP STOP MOTIONS

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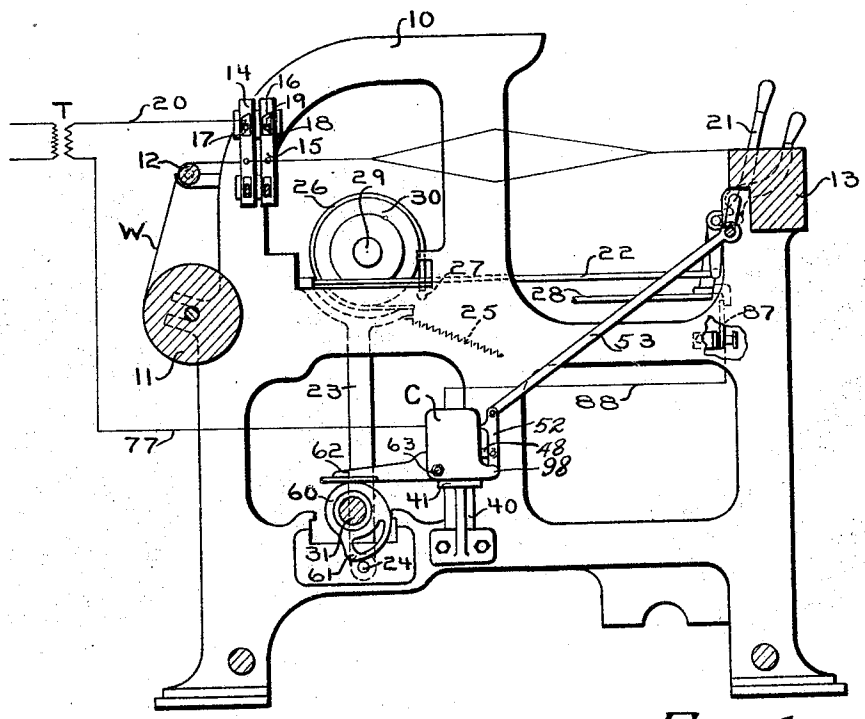


Fig. 1

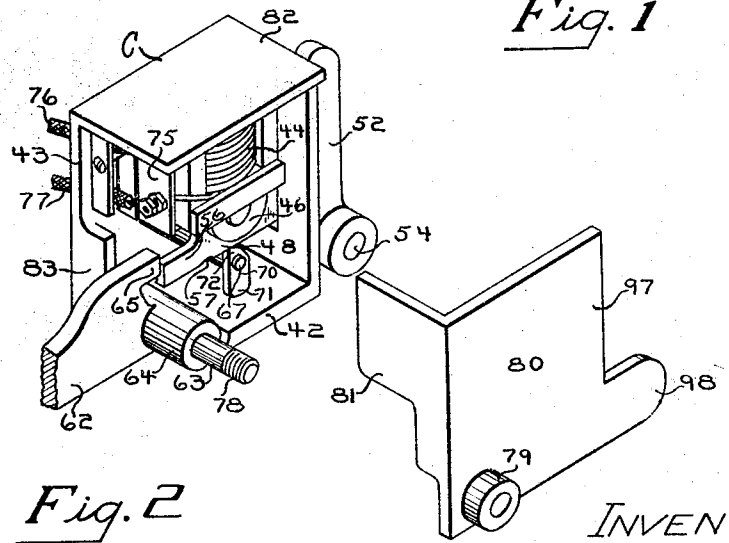


Fig. 2

INVENTOR
OSCAR V. PAYNE

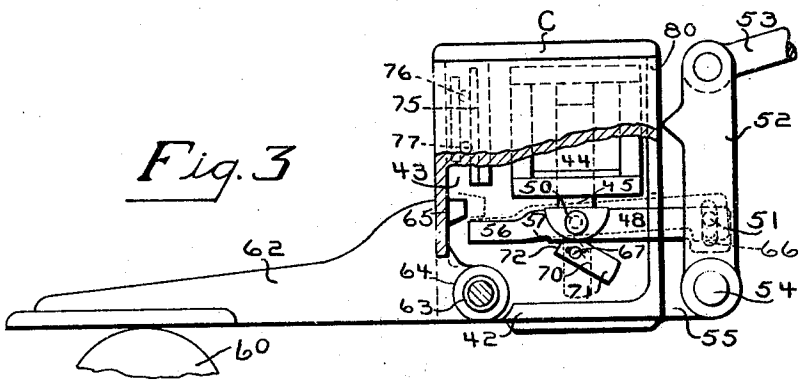
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Fig. 3



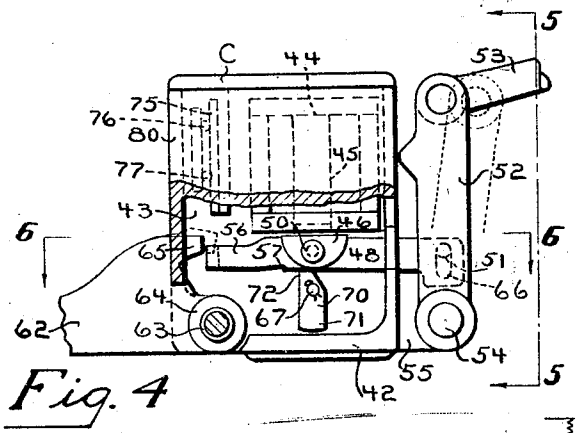


Fig. 4

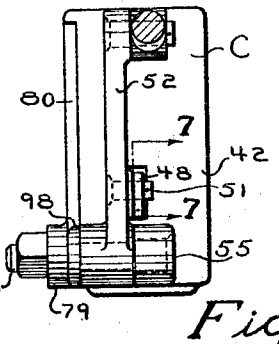


Fig. 5

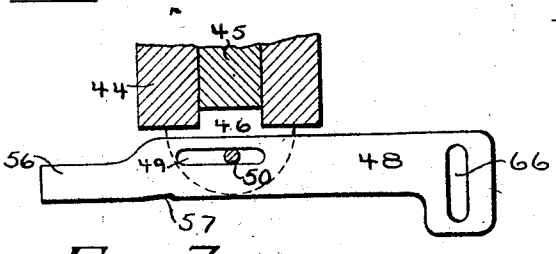


Fig. 7

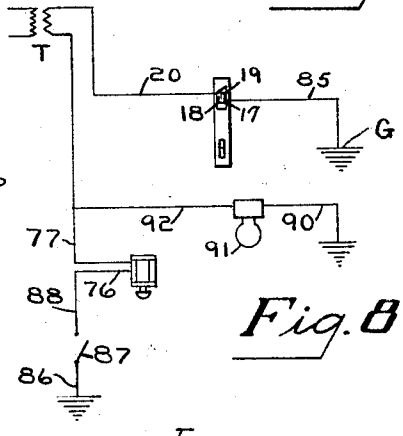


Fig. 8

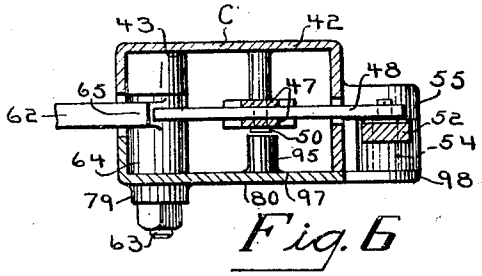


Fig. 6

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Patented Aug. 23, 1932 1,873,465

UNITED STATES PATENT OFFICE

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KNOCK-OFF FOR ELECTRICAL WARP STOP MOTIONS

Application filed July 1, 1929. Serial No. 375,118.

This invention relates to improvements in electrical stopping devices for loom, particularly warp stop motions and it is the general object of the invention to provide a simplified and reliable form of electro-magnetic knock-off mechanism.

In the usual form of electrical warp stop motion there is a contact bar having two electrodes insulated from each other but adapted to be connected together electrically by a drop wire at the time of warp fault. Electromagnetic devices are then actuated to stop the machine to which the motion is applied. A warp fault is likely to occur at any point in the cycle of the pick of the loom and it is desirable for this reason to provide means for storing the indication from the warp stop motion and rendering it effective to stop the loom at a predetermined point in the pick. It is a further object of my present invention to accomplish this result preferably by means of a weighted lock.

It is a further object of my present invention to provide a suitable housing for certain of the movable parts of the mechanism, said housing being provided with a cover so formed as to simplify the type of bearing which may be used for the pivoted parts of the device.

It is another object of my present invention to provide a circuit having a visual signal, such for instance as an incandescent lamp, so arranged that upon warp fault the visual signalling device will be illuminated and will remain so until the warp fault is remedied, even though stopping of the loom acts to break the main circuit including the electromagnetic stopping devices.

With these and other objects in view which will appear as the description proceeds, my invention resides in the combination and arrangement of parts hereinafter described and set forth in the claims.

In the accompanying drawings wherein a convenient embodiment of my invention is set forth,

Fig. 1 is a vertical section through a loom having my invention applied thereto looking from the center of the loom toward the right end thereof,

Fig. 2 is a perspective view of the portion of my device which is inclosed in the aforesaid casing, the cover being removed to show more clearly the relation of the interior parts,

Fig. 3 is an enlarged elevation of the knock-off device looking in the direction in which Fig. 1 is taken, part of the cover being broken away and the parts being shown in normal position when the warp is intact,

Fig. 4 is a view similar to Fig. 3, but with the solenoid energized and the armature in elevated position,

Fig. 5 is a vertical section on line 5—5 of Fig. 4,

Fig. 6 is a horizontal section on line 6—6 of Fig. 4,

Fig. 7 is an enlarged detailed vertical section on line 7—7 of Fig. 5, and

Fig. 8 is a diagrammatic view showing the circuits which I employ.

Referring to Fig. 1 I have shown a loom frame 10 having a warp beam 11 and whip roll 12. The warp W extends from the beam around the whip roll and forwardly toward the breast beam 13. Indicated generally at 14 is an electrical warp stop motion, the particular type of which forms no part of my present invention. The stop motion may include drop wires 15 having slots 16 through which extend contact bars 17. These bars may include an outer U-shaped member 18 which supports but is insulated from an inner electrode 19. The U-shaped bars are preferably grounded to the loom, while the bars 19 are connected by means of wire 20 to one side of a transformer T. The drop wires 15 are threaded on the warp threads W and when the latter are sufficiently taut for proper weaving the drop wires will be held in raised position as shown in Fig. 1 where they will be out of contact with the electrode 19. Should a warp fault occur, however, the drop wire corresponding to the faulty thread will fall and establish contact between the U-shaped bar 18 and the electrode 19. It is upon an occurrence of this condition that the loom must be stopped.

A shipper handle 21 of the forward pull type may be employed and has operatively

connected thereto a rearwardly extending brake rod 22 attached to the upper end of a brake lever 23 pivoted as at 24 on the loom frame. This lever tends to move normally toward the front of the loom under action of a tension spring 25 and there is connected to said lever one end of a flexible band 26 the other end of which is fixed to an anchor 27 fast with respect to the loom frame. A shipper rod 28 is also operatively connected to the shipper handle and extends to mechanism not shown but effective to connect and disconnect the driving element, such as an electric motor, from the top shaft 29 on which is mounted the brake wheel 30. The loom is provided with the usual bottom shaft 31 which preferably is given a complete revolution every other pick of the loom.

The matter thus far described is of common construction, the shipper handle and associated parts being well known and the electrical motion being of the type which has gone into use in connection with certain classes of looms.

My invention relates more particularly to the mechanism which is actuated upon the falling of a drop wire and operative to effect a shifting of the position of the shipper handle 21, and in carrying my invention into effect I provide a stand 40 bolted to the loom-side and having a horizontal foot 41 on which rests a casing designated generally at C. The casing has a vertical wall 43 to which is secured a solenoid 44 having a movable core 45. The core is provided with a head 46 which is forked as at 47 in Fig. 6 to receive a transmitting link 48. The latter is provided with a slot 49 as shown in Fig. 7 through which extends a pin 50 which is supported by the forked head 46. As shown in Fig. 3 the right hand end of the transmitting link receives a pin 51 secured to a knock-off lever 52, the latter being connected by means of a rod 53 to the shipper handle 21 as shown in Fig. 1. The knock-off lever is pivoted as at 54 to a stud secured in an extension 55 projecting from the casing C. The transmitting link is provided with an abutting end 56 and a detent 57, see Fig. 4.

The bottom shaft 31 has secured thereto a cam 60 having a point 61 which cooperates with a lever 62 acting to move said lever from its low to its high position in a right direction as viewed in Fig. 1, every other pick of the loom. The casing has a stud 63 which extends through a hug 64 of lever 62 to afford pivotal support for said lever. The cam lever is provided with a shoulder 65 adapted to engage the abutting end 56 of the transmitting link 48.

During normal loom operation the lever 62 is rocked about the stud 63 to cause the abutment 65 to approach the link. If the latter be down as shown in full lines in Fig. 3 no movement of the link results and the abutment will pass over the end of the link as shown in dotted lines same figure.

The solenoid is likely to be energized at any instant regardless of the position of the lever 62 and shoulder 65 relatively to the link 48 and for this reason it is necessary to provide means to hold the link raised until it can be engaged by the lever 62. Accordingly, I provide a support 70 having a counterweighted end 71 and an upstanding lever engaging finger 72. The support moves pivotally about a pin 67 set loosely in a drilled hole in a portion of the casing C. The finger 72 is adapted for the engagement with the detent 57 but tends normally to move in a clockwise direction as viewed in Fig. 3 under action of the counterweight 71. The right end of link 48 as viewed in Fig. 7 has a vertical slot 66 through which the pin 51 extends, the link normally being partly supported by the pin and the slot extending below said pin. There is located in the casing a plate 75 which is equipped with means for establishing electrical connection between wires 76 and 77 and the solenoid. By this arrangement the two wires 76 and 77 are led into the box and may be connected to the wire with which the solenoid is wound.

As shown in Fig. 2 the outer end of the stud 63 is threaded as at 78 and is adapted to extend through a hub 79 formed on a cover 80 for the box and receive a nut which holds the cover in place. The cover has a wing 81 which extends under the top 82 of the casing and rearwardly to the wall 43, the wing and box being so formed that when the cover is removed the electrical connections between the wires 76 and 77 and the solenoid may be inspected. I prefer this construction rather than to extend the side wall 83 of the box upwardly to the top 82.

A feature in connection with the cover 80 is that I form it so as to prevent improper endwise movement of certain parts of the mechanism mounted in the casing. The cover has a vertical wall 97 provided with a boss 95 which is in alignment with the pin 50 to prevent outward endwise movement of said pin, endwise movement in the other direction being prevented by the head on the pin. In like manner the hub 79 engages the hub 64 of the cam lever to prevent the latter from moving forwardly along the stud 63. In the same way I provide the wall 97 with an extension 98 which is in alignment with the stud 54 on which the knock-off lever 52 is pivotally mounted, said extension 98 preventing the knock-off lever from moving endwise from its pivotal support 54.

In operation the parts will normally be in the position shown in Fig. 3 and will remain in this position so long as the warp is under proper tension or is intact. When a fault occurs in the warp, however, and one of the drop wires 15 falls the bars 18 and 19 will be elec-

trically connected whereupon current will flow in the following circuit, referring to Fig. 8: transformer T, wire 20, electrode 19, the fallen drop wire, U-shaped bar 18, to wire 85 which is grounded to the loom frame as at G. Current will rise from the frame through wire 86 which is grounded to the loom preferably through the shipper rod 28, pass through a switch 87 insulated from the loom shown in Figs. 1 and 8, pass over wire 88 which is connected to wire 76, through the solenoid 44, through the wire 77 back to the other side of the transformer. Current flowing in this circuit will energize the solenoid, causing the latter to raise the transmitting link 48 so that the control part thereof is raised, assuming the position shown in Fig. 4.

The action of link 48 depends upon the position of lever 62. If the latter is down the link will move around pin 51 as a pivot, moving the end 56 opposite shoulder 65. On the other hand, if lever 62 is up with end 56 under the shoulder 65 the latter will become the pivot for the link and said link will assume the position shown in dotted lines in Fig. 3. This latter action is possible because of slot 66.

Irrespective of which end of link 48 is raised, the lock 70 will swing in a clockwise direction around pivot pin 67 until finger 72 moves to the link supporting position shown in Fig. 4. The lock will thereafter hold the link in knock-off position independently of the solenoid. If the right end of the link be raised it will fall during the down motion of lever 62. When the link is in the dotted line position shown in Fig. 3 it may be considered as having assumed an intermediate or indicating position from which it will move to the position shown in Fig. 4 as the loom continues to run.

The next working stroke of shoulder 65 will move the link to the right, which movement will rock the knock-off lever 52 from the full to the dotted line position shown in Fig. 4, thereby causing endwise movement to the right as viewed in Fig. 1 of the rod 53 to cause shifting of the shipper lever 21 to the stopping position.

As link 48 reaches its extreme right hand position the finger will enter detent 57 so that during the return movement of the link to the left the lock will be given a reverse movement around stud 67 and the transmitter will therefore be free to fall back to its position shown in Fig. 3 in full lines.

By reference to Fig. 1 it will be noted that when the shipper handle moves to stopping position or to the left the shipper rod 28 will move to the right, thereby opening the switch 87 to interrupt the circuit previously traced. The solenoid will therefore become deenergized and the previously described falling of the transmitter can take place.

At the same time current is flowing through the previously described circuit current will also rise from the frame and pass over wire 90, through a visual signal such as a small incandescent lamp 91, along wire 92 to the wire 77, transformer T, wire 20, drop wire and contact bar, wire 85 to the ground. Current will flow in this circuit so long as the drop wire establishes contact between the electrodes 18 and 19 irrespective of the position of the switch 87, and this signal will remain in a closed circuit and therefore will continue to give visual indication of warp fault so long as a drop wire is down.

From the foregoing it will be seen that I have provided a knocking-off device to be interposed between a bank of drop wires and the shipper handle of the loom, said device operating at any desired time in the pick of the loom and being provided with a support which holds the transmitter link in engaging position with respect to the cam lever. In this way an indication which is given at any point in the cycle of the loom can be held over until the desired time for stopping the loom has arrived. It will further be seen that the transmitter disconnects itself from the support during the knocking-off stroke. It will further be seen that the cover for the box is provided with a series of devices which hold the several parts of the device in proper position. It will be noted that all of the pivots are parallel and are substantially perpendicular to the front wall 97 of the cover so that when the latter is removed the movable parts within the box can be taken out very readily, this feature also facilitating assembly of the device. It will further be seen that the stud 63 is the means by which the cover 80 may be held in position.

Having thus described my invention it will be seen that changes and modifications may be made therein by those skilled in the art without departing from the spirit and scope of the invention and I do not wish to be limited to the details herein disclosed, but what I claim is:

1. In a knock-off mechanism for a loom stop motion, a regularly moving actuator, an electro-magnetic device to be energized to effect loom stoppage, a knock-off lever to be rocked to stop the loom, a link operatively related to the lever and normally out of the path of the actuator, the latter when at the end of its knocking-off stroke overlying a portion of the link, and a lock normally held in non-locking position by the weight of the link but movable when the link is attracted by the electro-magnetic device to lock said link in the path of the actuator.

2. In a loom stopping mechanism, a regularly moving actuator, a member to be moved by a force derived from the actuator to stop the loom, an electro-magnetic element normally deenergized but energized at the time loom stoppage is desirable, a device

formed of magnetic material to be attracted to the electro-magnetic element, a link pivoted at one side of the center thereof to the electro-magnetic element and having one end capable of engaging the actuator and the other end having an operative connection with the member, said other end capable of movement relatively to the member in a direction transverse of the movement of the actuator but in all positions maintaining operative connection with the member, the link capable of movement by the device irrespective of the position of the actuator.

3. In a loom stopping mechanism, a regularly moving actuator, a member to be moved by a force derived from the actuator to stop the loom, an electro-magnetic element normally deenergized but energized at the time loom stoppage is desirable, a device formed of magnetic material to be attracted to the electro-magnetic element, a link pivoted at one side of the center thereof to the electro-magnetic element and having one end capable of engaging the actuator and the other end having an operative connection with the member, said other end capable of movement relatively to the member in a direction transverse of the movement of the actuator but in all positions maintaining operative connection with the member, the link capable of movement by the device irrespective of the position of the actuator, and means acting upon movement of the link under influence of the device to hold the link in operative position relatively to the actuator independently of the electro-magnetic element.

4. In loom stopping mechanism, an actuator having working and non-working strokes in a given path of movement, a member normally at rest to be given a movement to stop the loom, an electro-magnetic element to be energized at the time loom stoppage is desired, and a link to transmit force from the actuator to the member, the link being free to move relatively to the member in a direction transverse to the path of movement of the actuator but having operative engagement with the member when moving in the direction of the working stroke of the actuator, the electro-magnetic element being effective to move the link into the path of movement of the actuator.

5. In loom stopping mechanism, an actuator having working and non-working strokes in a given path of movement, a member normally at rest to be given a movement to stop the loom, an electro-magnetic element to be energized at the time loom stoppage is desired, and a link under control of the electro-magnetic element to be moved by the latter from normal inoperative position into the path of movement of the actuator to transmit a force from the actuator to the member to move the latter, the link being pivotally connected with respect to the electro-magnetic element and capable of movement relatively to the member in a direction transverse to the motion of the actuator when the latter is at the end of its working stroke at the time the electro-magnetic element moves the link.

6. In loom stopping mechanism, an actuator having working and non-working strokes in a given path of movement, a member normally at rest to be given a movement to stop the loom, an electro-magnetic element to be energized at the time loom stoppage is desired, and a device pivotally connected with respect to the element, one end of the device being heavier than the other, the lighter end being normally out of the path of the actuator and the other end being movable independently of the member, the element effective to move the device independently of the position of the actuator, the heavier end to be lifted if the actuator is in position to prevent the lighter end from being moved into operative position relatively to the actuator, the heavier end when the actuator is on its non-working stroke acting to move the lighter end into the path of the actuator.

7. In loom stopping mechanism, an actuator having working and non-working strokes in a given path of movement, a member normally at rest to be given a movement to stop the loom, an electro-magnetic element to be energized at the time loom stoppage is desired, and means capable of transmitting a force from the actuator to the member to move the latter, said means including a part normally out of the path of the actuator and another part movable with the first part to transmit the aforesaid force, a connection between the element and the means whereby the element is effective to move the means, the first part to move into the path of the actuator under normal conditions and the second part to move from normal position thereof but remain capable of transmitting force to the member if the actuator is in position to prevent the first part from having its normal position, the actuator on the working stroke next following the movement of the means by the element engaging the first part to move the means and thereby move the member to stopping position.

8. In loom stopping mechanism, an actuator having a regular working stroke and a non-working stroke, an electro-magnetic element to be energized when the loom is to be stopped, a member to be moved by a force derived from the actuator on the working stroke thereof and effective when so moved to stop the loom, a transmitter to move to a position where it can transfer the aforesaid force from the actuator to the member by engagement with the actuator on the working stroke thereof, two pivots effective normally to support the transmitter, one of said pivots constituting a connection with the element and movable with the element, the other

pivot being stationary under normal conditions, the transmitter moving around the said other pivot and into the path of the actuator when the element is energized and the actuator is out of the path of movement of the transmitter, and the transmitter engaging the actuator when the latter is near the end of its working stroke and moving pivotally around the engaged part of the actuator when the element is energized at the time the actuator is in the stated position, and means to move the transmitter into the path of movement of the actuator as the latter moves on its non-working stroke.

9. In an electrically controlled loom stopping mechanism, an actuator having regular working and non-working strokes, an electromagnetic element to be energized when the loom is to be stopped, a loom controlling member to be moved by the actuator to stop the loom, a transmitter operatively connected to the element and tending to move into the path of the actuator when acted upon by said element, said transmitter having a connection with the element at a point intermediate of its ends and the ends being each free to move, a lock to hold the transmitter in the position into which it is moved by the element, said lock acting independently of the position of the actuator and at any time that the element moves the transmitter, one end of the transmitter normally moving into the path of the actuator to be engaged by the latter to cause movement of the transmitter against the member to move the latter, said end when the actuator is in position to prevent normal movement thereof engaging said actuator to cause the other end to move relatively to the member, the transmitter under this latter condition moving around the connection with the element as a pivot when the actuator moves on its non-working stroke to bring the first named end into the path of the actuator.

10. In an electrical warp stop motion, a contact to be closed by a fallen drop wire, and a pair of devices one to give a continuing signal and the other to effect loom stoppage, parallel circuits one for the signal and the other for the loom stopping device, both of said circuits being in series with the contact, the circuit including the signal remaining closed during the time that the drop wire is fallen, and the circuit including the loom stopping device being broken as soon as the loom is stopped.

11. In a loom stopping mechanism, an actuator moving regularly in a given path and having working and non-working strokes, a knock-off member movable to stop the loom, an electro-magnetic element to be energized at warp fault, a transmitter normally in inoperative position and out of the said path, the transmitter being under control of the element and movable by the latter toward operative position at any time irrespective of the position of the actuator, the latter when near the end of its working stroke preventing the transmitter from moving into said path so that the transmitter assumes an intermediate position, and means independent of the electro-magnetic element to hold the transmitter in intermediate position, the transmitter acting on the non-working stroke of the actuator to move into said path and in position to transmit a stopping force to the knock-off member from the actuator on the following working stroke of the latter.

12. In a loom stopping mechanism, an actuator moving regularly in a given path and having working and non-working strokes, a knock-off member movable to stop the loom, an electro-magnetic element to be energized at warp fault, a transmitter normally in inoperative position and out of the said path, the transmitter being under control of the element and movable by the latter toward operative position at any time irrespective of the position of the actuator, the latter when near the end of its working stroke preventing the transmitter from moving into said path so that the transmitter assumes an intermediate position, and means independent of the electro-magnetic element to hold the transmitter in intermediate position, the transmitter acting on the non-working stroke of the actuator to move into said path and in position to transmit a stopping force to the knock-off member from the actuator on the following working stroke of the latter, said means acting as a pivot around which the transmitter moves on the non-working stroke of the actuator.

13. In a loom stopping mechanism, an actuator moving regularly in a given path and having working and non-working strokes, a knock-off member movable to stop the loom, a transmitter to be interposed between the knock-off member and actuator on a working stroke of the latter, said transmitter normally in inoperative position out of the said path, electro-magnetic means effective upon occurrence of warp fault and at any time with respect to the position of the actuator to move the transmitter, the latter moving to operative position if the actuator be on a non-working stroke and being moved to indicating position by the actuator if the latter is near the end of its working stroke, and a device independent of the electro-magnetic means having a complete movement whenever the electro-magnetic means moves the transmitter to retain the transmitter in either operative or indicating position immediately upon movement of the latter by the electro-magnetic means, the transmitter moving to operative position when the actuator has its next non-working stroke and being positioned to transmit a stopping force to the knock-off member from the actuator when the latter has its next working stroke.

14. In a loom stopping mechanism, a regularly moving actuator, a member to be moved by a force derived from the actuator to stop the loom, an electro-magnetic element normally de-energized but energized at the time loom stoppage is desirable, a device formed of magnetic material to be attracted to the electro-magnetic element, and means controlled by the device and operatively connected to and movable relatively to the member and normally out of operative relation with respect to the actuator, said means maintaining operative relation with the member when moving relatively to the latter and having a complete movement at any time by the device irrespective of the position of the actuator, the next working stroke of the actuator being effective to move the means and member to stop the loom.

15. In a loom stopping mechanism, a regularly moving actuator, a member to be moved by a force derived from the actuator to stop the loom, an electro-magnetic element normally de-energized but energized at the time loom stopping is desirable, a device formed of magnetic material to be attracted to the electro-magnetic element, means controlled by the device and operatively connected to and movable relatively to the member and normally out of operative relation with respect to the actuator, said means maintaining operative relation with the member when moving relatively thereto and movable at any time by the device irrespective of the position of the actuator, the next working stroke of the actuator being effective to move the means and member to stop the loom, and additional means to hold the first named means in the path of the actuator when the device has been attracted by the element regardless of the position of the actuator.

16. In a loom stopping mechanism, a regularly moving actuator, a knock-off member, a device normally in inoperative position to become operatively connected to the actuator and member at warp fault, means including an electro-magnet to move the device toward operative position in any position of the actuator, and a retaining mechanism having a complete movement whenever the electro-magnet moves the device to retain the latter in operative position independent of the electro-magnet, said mechanism capable of holding the device in operative position in all positions of the actuator.

In testimony whereof I have hereunto affixed my signature.

OSCAR V. PAYNE.