Dec. 29, 1936. O. V. PAYNE 2,065,730

ELECTROMECHANICAL LOOM STOPPING MECHANISM

Filed Jan. 8, 1935

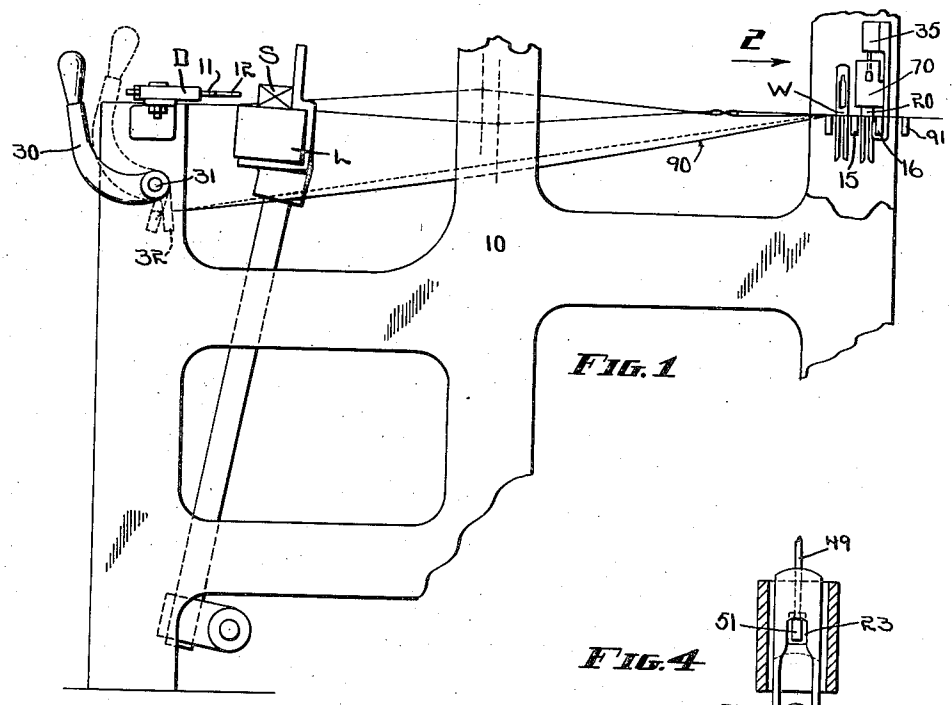



FIG. 1

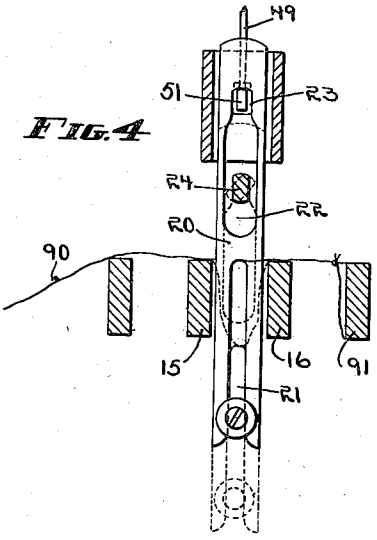



FIG. 4

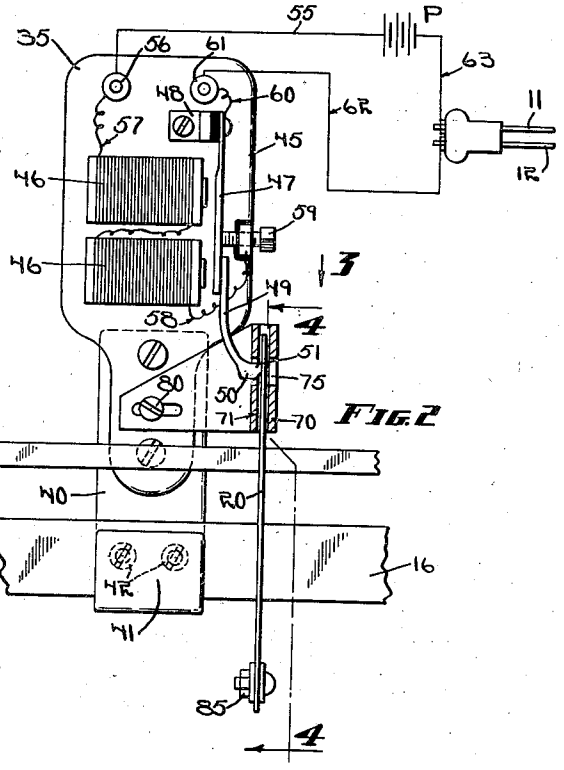



FIG. 2

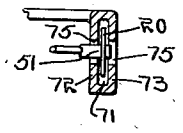



FIG. 3

Inventor
Oscar V. Payne
Attorneys

Patented Dec. 29, 1936 2,065,730

# UNITED STATES PATENT OFFICE

2,065,730

## ELECTROMECHANICAL LOOM STOPPING MECHANISM

Oscar V. Payne, Leicester, Mass., assignor to Crompton & Knowles Loom Works, Worcester, Mass., a corporation of Massachusetts

Application January 8, 1935, Serial No. 884

12 Claims. (Cl. 139—370)

This invention relates to improvements in stopping means for looms and it is the general object of the invention to permit the use of an electric weft detector in connection with a mechanically operating warp stop motion to effect loom stoppage upon substantial exhaustion of weft in the running shuttle.

Where a full automatic installation with respect to weft replenishment is not desired it is customary to employ a weft detector which operates prior to complete exhaustion of weft in the running shuttle to stop the loom so that the weaver may replenish the weft by hand. The stopping instrumentalities as heretofore employed have generally been electromagnetic, and operate either through special stopping mechanism or through an electrical warp stop motion. There are, however, a great many looms equipped with mechanically actuated warp stop motions and it is an important object of my present invention to introduce an electromagnetic control between the weft detector and the mechanical warp stop motion operative upon exhaustion of weft to effect movement of a warp drop wire to stopping position. When used in box looms the warp stop motion may be given an operative stroke every second beat of the loom so timed as to bring the loom to rest with the defective shuttle in either the plain end or box end, as preferred.

It is a further object of my present invention to employ a simple and commercial form of electro-magnetic actuated device, such for instance as a common doorbell, to release a normally raised drop wire by an impulse received from the electric weft detector when the filling for the running shuttle is exhausted. The drop wire may move in a small guide and be normally held in elevated position by a detent. Upon actuation the armature moves the detent out of supporting relation with respect to the drop wire and the same will move downwardly to have stopping relation with a normally moving actuator.

It is a further object of my invention to provide a cord or the like connected to the shipper mechanism so arranged that upon stoppage of the loom the cord will be straightened sufficiently to raise the drop wire to normal position, where it will be automatically caught by the detent and held in readiness for another stopping operation.

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 drawing, wherein a convenient embodiment of my invention is set forth,

Fig. 1 is a side elevation of a loom having my invention applied thereto, certain parts being shown in diagrammatic relation,

Fig. 2 is a rear elevation taken in the direction of arrow 2, Fig. 1 showing the release device for the drop wire on an enlarged scale,

Fig. 3 is a detailed plan view in the direction of arrow 3, Fig. 2, and

Fig. 4 is a transverse section on line 4—4 of Fig. 2.

Referring to the drawing, I have shown a loom frame 10 having a lay L carrying a shuttle S. A weft detector D of the electric type is mounted on the loom frame and is placed so that the prongs 11 and 12 thereof enter the shuttle to engage the weft upon every alternate forward beat of the loom. While I have shown a form of weft detector which closes a circuit by contact with a metallic ferrule on the bobbin, yet I do not wish to be limited to this form of detector since the invention can be used with any form of weft detector which operates to close a circuit upon weft exhaustion. The particular form of detector shown herein may be as set forth more particularly in my prior Patent No. 1,924,197 to which reference may be had for the structure of the detector. It is sufficient for present purposes to state that when prongs 11 and 12 are electrically connected they indicate exhaustion of weft and the desirability of stopping the loom.

At the rear of the loom there is provided a warp stop motion W which may comprise separator bars 15 and 16, respectively, to define between them a space for drop wires to cooperate with the warp of the loom. An additional drop wire 20 similar to those for the warp has the lower end slotted as at 21 in usual manner. The upper part of the drop wire is provided with a closed slot 22 the upper end of which is restricted as at 23. Passing through the slot 22 is an oscillating detector rod 24 which is slightly smaller in width than the width of the restricted upper end 23 of the slot. Under normal conditions the detector rod 24 is caused to oscillate by a yielding connection from some driving part of the loom not shown and as long as this oscillation is unrestricted due to the fact that the drop wire is raised and the detector is in the lower large part of the slot 22, the loom

continues to run. Upon falling of the drop wire, however, the narrow part 23 of the slot will fit around the detector and prevent oscillation of the latter, whereupon loom stopping mechanism not shown operates to pull off the shipper handle and stop the loom.

The shipper handle may if desired be of the forward pull type and comprises a body 30 on the shipper shaft 31 and having a lower finger 32 which is moved forwardly as viewed in Fig. 1 when the shipper handle moves in a clockwise direction on loom stoppage. It is understood that there are other connections for the shipper handle than those set forth herein and I have illustrated the finger 32 merely to show a portion of the shipping mechanism which has a forward motion upon loom stoppage.

The parts thus far described may be of a well-known construction, the detector being as shown in my previously identified patent and the warp stop motion being more particularly as set forth in patents to Regan No. 1,265,112 and Holmes No. 1,360,638, many of which are now in use.

In carrying my invention into effect, I provide a bracket 40 having the lower end bent under and extending upwardly along one side of the separator bars, as at 41. Holding screws 42 secure the bracket to the separator bar and hold the bracket permanently in vertical position.

The electro-magnetic part of the equipment is an ordinary house bell 35 modified slightly to adapt it for use with drop wire 20. The bell comprises electro-magnet 46 which may be electrically connected in series and are positioned to actuate a spring armature 47 mounted on the fixed insulated support 48. The armature has attached thereto a clapper wire 49 the head of which is flattened as at 50 to provide a detent 51 normally lying in notch or slot 23.

The bell is of usual construction and may be wired as set forth in Fig. 2, where it will be seen that the battery P is connected by wire 55 to an insulated binding post 56 of the bell and wire 57 connects the post and one of the magnets. The other magnet is connected by wire 58 to a contact screw 59 insulated from base 45 and normally contacting with the armature. Wire 60 connects the armature with the other binding post 61. A wire 62 runs from the post 61 to prong 12, while the other prong for the detector is connected by wire 63 to the battery. The wired return 62 may be replaced by a ground if desired.

Whenever weft exhaustion occurs in the shuttle being detected the electrodes or prongs 11 and 12 will be connected electrically, whereupon current will flow through the circuit previously described and energize the magnets so that the clapper wire 49 will be moved to the left as in Fig. 2. Such movement will be accompanied by a breaking of the circuit by the screw 59, but this has been found not to be objectionable.

Secured to the bracket 40 is a guide 70 having a vertical elongated tubular chamber 71 formed by opposite parallel walls 72 and 73, respectively. The chamber 71 is sufficiently large to accommodate the upper end of the drop wire 20 and the walls 72 and 73 have aligned slots 75 in their upper portions to receive the detent 51. The detent 51 normally extends into the chamber 71 far enough to extend under the top part of the drop wire which defines the upper end of the restricted slot or notch 23.

The guide 70 is held in horizontally adjusted position by screw 80 and is capable of adjustment with respect to the detent 51. The drop wire if desired may be weighted by some such device as indicated at 85 in Fig. 2.

A cord 90 is attached to finger 32 of the shipper handle and extends rearwardly under the drop wire 20, passing through slot 21 thereof, and is tied to the separator bar 91 similar to bars 15 and 16. When the loom is running the cord is slack, permitting the wire 20 to fall.

In operation, under normal conditions the detent 51 lies under and has supporting relation with respect to the drop wire, and cord 90 is slack. On non-indicating detecting beats of the loom when the electrodes 11 and 12 are not connected to each other the magnets 46 will not be energized and the drop wire will remain in raised position, permitting the non-circular rod 24 to oscillate without resistance. When a substantially exhausted bobbin is presented to the detector, however, the prongs 11 and 12 will be electrically connected, whereupon the magnets will attract armature 47 as described and move the detent 51 laterally out of supporting relation with respect to the drop wire. Any tendency of the drop wire to follow the detent will be resisted by one of the walls of the guide chamber. The drop wire will thereupon fall and notch 23 will fit around the detector or actuator rod 24. When the next effort of the rod 24 to rock is resisted, the loom will be stopped as set forth in the patents to Regan or Holmes already mentioned. When the shipper handle moves to stopping position the cord 90 is tightened and raises the drop wire to normal position, where it is held by the detent 51. The latter may have its under side inclined to facilitate this operation.

The electro-magnet vibrates in a manner common in doorbells to cause the detent 51 to strike the drop wire repeated blows and jar the same loose should it tend to remain in raised position in the guide due to friction or the like.

While I have shown a particular form of actuator for mechanical warp stop motion, yet I do not wish to be limited to such an actuator, and it is sufficient for the purposes of my invention if the falling of the drop wire causes an abnormal operation by the actuator.

From the foregoing it will be seen that I have provided a very simple form of electric equipment which acts to release a drop wire of a mechanically operating warp stop motion whenover exhaustion of weft occurs in a shuttle being detected. It will be noted that the drop wire 20 falls immediately upon indication of weft exhaustion but the actual time of stopping the loom is dependent upon a subsequent tendency on the part of rod 24 to oscillate and this tendency can be delayed as suggested in the Holmes patent mentioned. It will further be seen that the electromagnetic part of the device is mounted so that it can slide along one of the separator bars to any desired position. Furthermore, the stopping of the loom resets the drop wire in normal position. The actual stopping of the loom will ordinarily come with the depleted bobbin out of contact with the detector prongs, so that the magnets 46 will be deenergized and the detent 51 will be held yieldingly in position where it can ordinarily lock the drop wire 20 when the latter is raised by tightening of cord 90.

Having thus described my invention it will be seen that changes and modifications may be made therein by those skilled in the art without de-

parting 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 loom, a normally oscillating member arrestable to effect loom stoppage, a drop wire effective when down to arrest oscillation of the member, an electric weft detector, the normal condition of which is non-indicating, a circuit to be closed when the detector assumes an abnormal condition and indicates substantial exhaustion of weft, an electro-magnet in said circuit, and a support for the drop wire normally effective whenever the detector is in normal condition to hold the drop wire raised and movable by the electro-magnet out of supporting relation with respect to the drop wire when the circuit is closed by the detector, whereupon the wire falls to down position to effect loom stoppage.

2. In a loom, a normally oscillating member arrestable to effect loom stoppage, a drop wire effective when down to arrest oscillation of the member, an electric weft detector, a circuit to be closed when the detector indicates substantial exhaustion of weft, an electro-magnet in said circuit, a support for the drop wire normally positioned to hold the drop wire in raised position and movable by the electro-magnet out of supporting position with respect to the drop wire, and a fixed guide for the drop wire to prevent the latter from moving with the support when the latter moves away from the drop wire.

3. In a loom, a normally oscillating member arrestable to effect loom stoppage, a drop wire effective when down to arrest oscillation of the member, an electric weft detector, a circuit to be closed when the detector indicates substantial exhaustion of weft, an electro-magnet in said circuit, and a support normally positioned to hold the drop wire elevated and arranged to be moved by the electro-magnet out of supporting relation with respect to the drop wire and to be vibrated by the electro-magnet to thereby vibrate the drop wire and insure falling of the latter should said drop wire tend to remain in elevated position.

4. In a loom, a normally oscillating member arrestable to effect loom stoppage, a drop wire effective when down to arrest oscillation of the member, an electric weft detector, a circuit to be closed when the detector indicates substantial exhaustion of weft, an electro-magnet in said circuit, a support for the drop wire normally positioned to hold the latter in raised position and movable by the electro-magnet out of supporting relation with respect to the drop wire, and a guide for the drop wire to prevent the latter from moving laterally when the support moves out of supporting relation with respect thereto, the electro-magnet effective to vibrate the support for the purpose of jarring the drop wire to cause the latter to overcome any tendency to remain in raised position when the support is out of supporting position.

5. In a loom, a normally oscillating member arrestable to effect loom stoppage, a drop wire effective when down to arrest oscillation of the member, an electric weft detector the normal condition of which is non-indicating, a circuit to be closed when the detector assumes an abnormal condition and indicates substantial exhaustion of weft, an electro-magnet in said circuit, and a support for the drop wire normally effective whenever the detector is in normal condition to hold the drop wire raised and movable by the electro-magnet out of supporting relation with respect to the drop wire when the circuit is closed by the detector, whereupon the wire falls to down position to effect loom stoppage, and means to restore the drop wire to raised position where it can have supporting relation with respect to the support when the loom stops.

6. In a loom, a normally oscillating member arrestable to effect loom stoppage, a drop wire effective when down to arrest oscillation of the member, an electric weft detector, a circuit to be closed when the detector indicates substantial exhaustion of weft, an electro-magnet in said circuit, a support normally positioned to hold the drop wire in raised position and movable by the electro-magnet out of supporting relation with respect to the drop wire, said support having an inclined surface extending normally under a part of the drop wire, the drop wire falling into position to arrest the member when the support is moved out of drop wire supporting position, and means brought into action by stopping of the loom to raise the drop wire and cause part of the same to slide along the inclined surface to a position above the latter to reestablish holding relation with respect to the support.

7. In a loom, a normally oscillating member arrestable to effect loom stoppage, a drop wire effective when down to arrest oscillation of the member, an electric weft detector, a circuit to be closed when the detector indicates substantial exhaustion of weft, an electro-magnet in said circuit, a support normally positioned to hold the drop wire in raised position, a guide for the drop wire having an opening therein through which a portion of the support extends to a position under part of the drop wire, said support being movable by the electro-magnet out of supporting relation with respect to the drop wire when the aforesaid circuit is closed, and means brought into action by stopping of the loom to raise the drop wire in the guide and reestablish holding relation between the drop wire and the support.

8. In a loom, an arrestable member having regularly recurring oscillations at a given point in the cycle of loom operations, and effective when held against oscillation to effect loom stoppage, a normally raised drop wire positioned to permit oscillation of the member but effective when down to arrest oscillation of said member, an electric weft detector the normal condition of which is non-indicating capable of giving an indication prior to said point in the cycle, electro-magnetic means in circuit with the detector to be energized when the detector assumes an abnormal condition and indicates substantial exhaustion of weft, and means under control of the electro-magnet normally holding the drop wire in raised position whenever the detector is in normal condition and releasing the drop wire upon energization of the electro-magnetic means, whereupon the drop wire falls into holding relation with respect to the member at a time subsequent to the indication of weft exhaustion by the detector.

9. In a loom, an arrestable member having regularly recurring oscillations at a given point in the cycle of loom operations, and effective when held against oscillation to effect loom stoppage, a normally raised drop wire positioned to permit oscillation of the member but effective when down to arrest oscillation of said member, an electric weft detector the normal condition of which is nonindicating, electro-magnetic

means in circuit with the detector to be energized when the detector assumes an abnormal condition and indicates substantial exhaustion of weft, the loom being stopped by the member in such a position as will render the weft detector incapable of indicating weft exhaustion, a support controlled by the electro-magnetic means normally effective whenever the detector is in normal condition to hold the drop wire in raised position and movable upon energization of the electro-magnetic means out of supporting relation with respect to the drop wire, whereupon the drop wire falls to arrest oscillation of the member to cause the latter to stop the loom with the detector incapable of maintaining continued energization of the electro-magnetic means.

10. In a loom, a drop wire, a warp stop motion effective by falling of the drop wire to stop the loom, a support normally holding the drop wire up, an electric weft detector, electro-magnetic means in circuit with the detector and operative upon indication of weft exhaustion by the detector to move the support out of supporting relation with respect to the drop wire, whereupon the latter falls to effect loom stoppage, a flexible element extending under a part of the drop wire and normally slack enough during loom operation to permit the drop wire to fall, and means operative upon stopping the loom to tighten the flexible element to cause the same to raise the fallen drop wire to normal up position to reestablish holding connection with the support.

11. In a loom, a mechanical warp stop motion effective to stop the loom, an electric weft detector, an electro-magnetic controller for the warp stop motion effective when actuated to cause a change in the stop motion and render the latter effective to stop the loom, a circuit including the controller and the detector to be closed by the latter to effect loom stoppage when the weft in the shuttle being detected by the detector is exhausted, warp stop motion resetting means positioned during loom operation out of resetting relation with respect to the warp stop motion to permit the latter to operate at any time in the loom cycle, and an actuator for the resetting means operative by stopping of the loom to cause the resetting means to reset the mechanical warp stop motion to normal non-stopping position.

12. In a loom, a drop wire, a warp stop motion effective to stop the loom when the drop wire falls, weft controlled means effective to cause falling of the drop wire upon weft exhaustion to effect loom stoppage, a drop wire resetting element normally ineffective during loom operation to support the drop wire, and an actuator for the resetting element brought into action by stopping of the loom to move the resetting element and cause the same to restore the fallen drop wire to normal raised position.

OSCAR V. PAYNE.