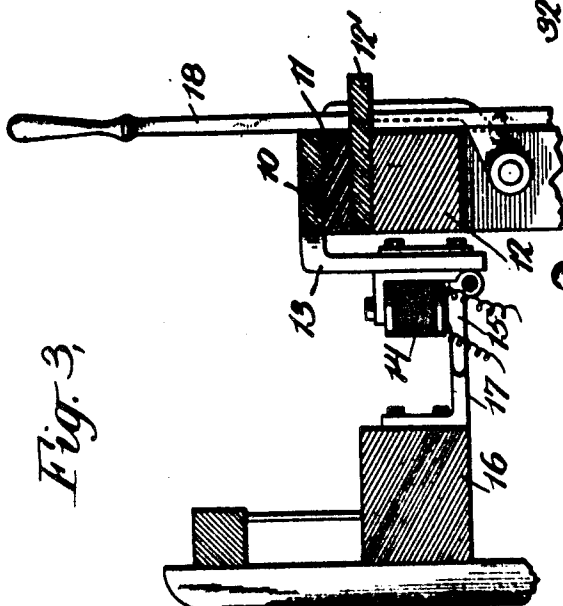
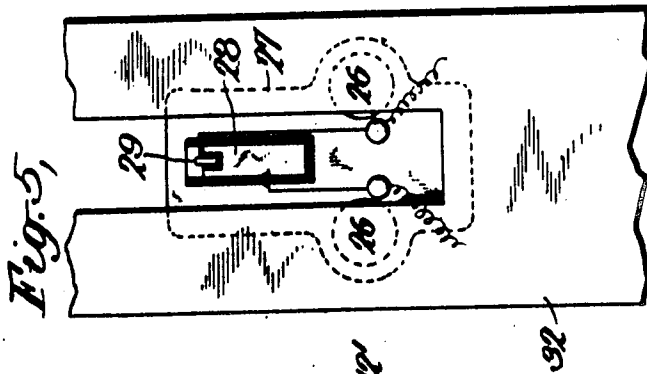
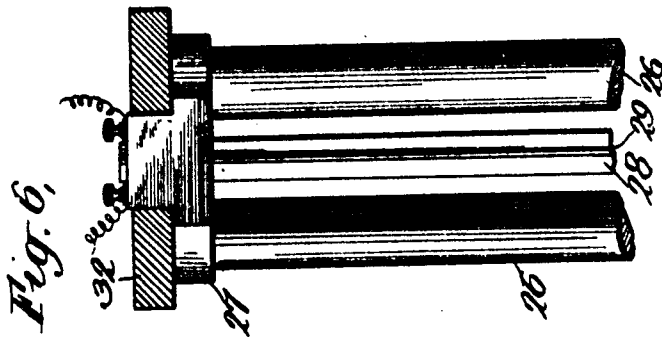


No. 879,873.

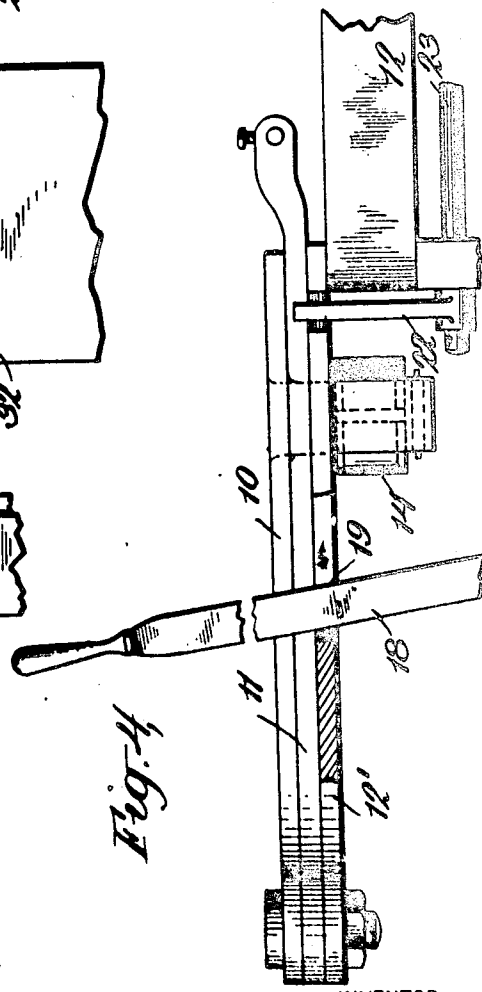
PATENTED FEB. 25, 1908.

H. HORSFAL.
WARP STOP MOTION FOR LOOMS.
APPLICATION FILED AUG. 10, 1906.

3 SHEETS—SHEET 2.



WITNESSES:
W. D. Ashley
George Gilmore



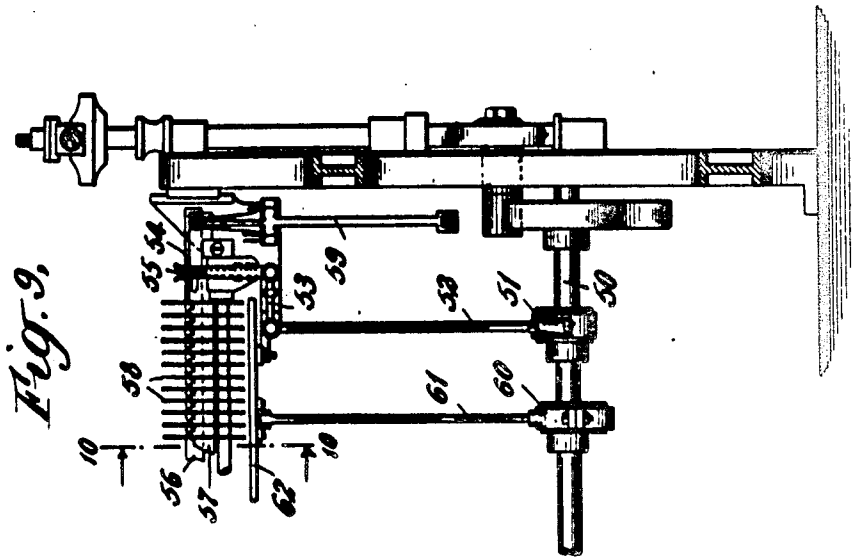
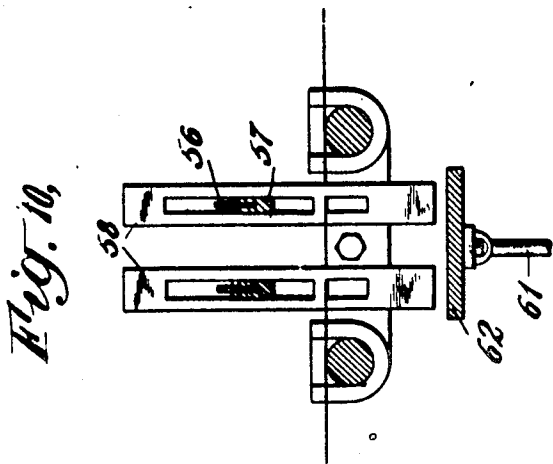
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No. 879,873.

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3 SHEETS—SHEET 3.



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UNITED STATES PATENT OFFICE.

HERBERT HORSFAL, OF BRIDGEPORT, CONNECTICUT, ASSIGNOR TO THE SALTS TEXTILE MANUFACTURING COMPANY, OF BRIDGEPORT, CONNECTICUT, A CORPORATION OF CONNECTICUT.

WARP STOP-MOTION FOR LOOMS.

No. 879,873.

Specification of Letters Patent.

Patented Feb. 25, 1908.

Application filed August 10, 1906. Serial No. 330,007.

To all whom it may concern:

Be it known that I, HERBERT HORSFAL, a citizen of the United States, residing at Bridgeport, in the county of Fairfield and State of Connecticut, have invented certain new and useful Improvements in Warp Stop-Motions for Looms, of which the following is a specification.

The present invention relates to warp stop motions for looms in which the warp threads support a series of metallic drop devices during the normal running of the loom, said drop being adapted, when a warp thread breaks or becomes unduly slack, to either close a controlling circuit or to set mechanical means for putting in operation the knock-off mechanism.

The object of the invention is to provide means in that type of stop motion to intermittently raise the drops from the warp threads to permit the latter to momentarily pass free of the drops for the purpose fully set forth in the following specification.

The invention is adapted to pile fabric looms as well as to ordinary looms and in the drawings I have illustrated it as applied to both an electrical and a mechanical warp stop motion.

In the accompanying drawings Figure 1 is a side view partly diagrammatic of a pile fabric loom embodying the invention; Fig. 2 a plan view of the loom stopping mechanism shown at the right in Fig. 1; Figs. 3 and 4 are enlarged detail views of the loom stopping mechanism; Fig. 5 a side view and Fig. 6 a plan view of the easing bars or rods for the pile warps; Fig. 7 a detail view of an easing bar or rod for the pile warps with a drop device in normal position; Fig. 8 a modified means for intermittently raising the pile warp drops; Fig. 9 a view partly in elevation and partly in section to illustrate the application of the invention to a mechanical warp stop motion; and Fig. 10 a vertical section on the plane of the line 10--10 of Fig. 9.

Similar reference numerals indicate similar parts in the several views.

I will first describe the general parts of the loom and the knock-off or stopping mechanism which may be of any well known construction.

Referring to the drawings the numeral 1 designates the main warp beam; 2 the main or back warps; 3 the pile warp beam; 4 the pile warps; 5 the let-off rolls for the pile

warps; and 6 the whip roll. The warps are led through the usual harness mechanism indicated at 7 for the formation of the sheds, the pile warps being carried up through the back warps to easing rods and let off intermittently to float between the two back warps of the fabric in the usual and well known manner. The pile warps carry metallic drops 8 and the back warps similar drops 8', these drops being adapted when a warp breaks, and by this is meant to include not only an actual severance of the warp but any abnormal slackness thereof, to close a controlling circuit 9 for the loom stopping mechanism. This mechanism may be of any known type and for the purpose of illustration I have selected one which comprises an auxiliary knock-off lever 10 which rests upon the main knock-off lever 11, both of said levers being pivoted on a bracket 12' extending from the breast beam 12. Secured to lever 10 is a bracket 13 which carries an electro magnet 14 included in circuit 9. The armature 15 of said magnet projects toward the lay 16 on which is fixed a tappet 17. The magnet 14 is normally deenergized so that its armature is out of the path of tappet 17 on the beat up of the lay, but when a back or pile warp breaks the controlling circuit 9 is closed thereby energizing said magnet and positioning its armature in the path of said tappet on the next beat up of the lay. When tappet 17 impinges against armature 15 auxiliary lever 10 will be shifted and thus act on shipper lever 18 to release it from its retaining shoulder 19 to stop the loom. The main knock-off lever 11 is connected at its free end to the slide 20 which carries the weft fork 21, the latter coöperating with the weft hammer (not shown) in the usual manner to release the shipper lever upon the exhaustion or failure of the filling. A let-off lever 22 fixed on a rock shaft 23 is adapted, when impinged upon by the knock-off lever 11, to lift the back pawl of the take-up ratchet. This construction is well known and requires no further description.

To effect the closing of circuit 9 to energize magnet 14 for the purpose above stated I may employ metallic drop devices 8, 8', of any well known type. The form shown is provided with a closed slot 24 in the upper part thereof, and an open ended slot 25 in the lower part thereof, the latter serving as a thread aperture, as clearly indicated in Fig. 10.

7. Referring more particularly to Figs. 1, 5, 6 and 7, the pile warps 4 pass over and are supported by two parallel easing rods 26 fixed at their ends in plates 27, one only of said plates being shown. Plates 27 have mounted in them a compound terminal comprising a bar 28 and a blade 29 set into the upper edge thereof, said bar and blade being insulated from each other and connected to the respective terminals of circuit 9. The bar 28 is insulated from the supporting plates 27 as indicated in Fig. 5. This form of terminal is well known. As shown in Fig. 1 the drop devices 8 are supported on the short lengths of the pile warps 4 which latter extend across and bridge the space between the easing rods 26. In the present embodiment of the invention the compound terminals extend through the closed slots 24 of the drops 8 above the point of suspension of said drops on the pile warps. Plates 27 which support the easing rods are connected by wires 30, in which are springs 31 to serve as a cushion or easement, to the usual mechanism adapted to take up the slack warp. The end plates are guided in their up and down movements in slots in brackets 32 fixed to the loom frame.

The drop devices 8' on the back warps 2 are similar to those above described. These warps pass over and are supported on a fixed plate 32 (Fig. 1) which is slotted to serve as a guide for the drops. The compound terminal is also similar to that above described except that it is secured to a fixed plate in the usual manner and not to a movable plate as with the terminals which cooperate with the pile warp drops.

The operation of the mechanism so far described will be readily understood. During the normal running of the loom the drop devices will be supported on the warps out of contact with the blade 29 of the compound terminal. When, however, either a back or a pile warp breaks the corresponding drop will be released and falling upon the blade 29 of said terminal will close circuit 9, it being understood that the drop devices are always in contact with bar 28 of said terminal. The magnet 14 being thus energized the knock-off mechanism will be set in operation to stop the loom.

The application of circuit closing drop devices to a pile fabric loom has been successfully made in substantially the manner above described. It has been found in practice, however, that when using a pile warp of soft, fluffy material an appreciable quantity of lint is thrown off which collects in balls in front of the drops and is ultimately carried into the fabric. The cleaning of the drops at stated intervals to prevent this is apt to be neglected by operatives, and furthermore the close assemblage of the drops renders such clearing unhandy and troublesome to

accomplish, besides resulting in loss of time due to the necessary stopping of the loom. In order to prevent the accumulation of an undesirable quantity of lint and thus obviate the presence of bunches in the fabric, and to do away with the necessity of cleaning the drops, I have provided means for automatically raising the drops from the warps at frequent intervals during the normal running of the loom. With regard to the pile warps this may be accomplished by placing a stationary plate below and across the path of the rising and falling drops, or by causing a movable plate to be projected across the path of the drops. I will first describe the application of the invention to the pile warp drops.

Referring to Fig. 1 the numeral 33 designates a stop plate fixed to the loom frame below each series of pile warp drops so that as the easing rods 26 are lowered the drops will rest upon the corresponding plate 33 and remain thereon while the said rods continue their downward movement. This causes the drops to be raised from the supporting pile warps a sufficient distance to permit any lint which may have become banked up against the side of a drop to pass on through the slot 25, and as the drops are continually raised and lowered such temporary release of the drops from the warps will either prevent the accumulation of any lint at all, or only such an insignificant amount as not to be noticeable in the fabric. Care should be observed in placing the plates 33 and in providing a slot 24 in the drop of sufficient length as to permit of the desired movement of the drop to free it from the warp without causing the drop to engage the blade 29 of the compound terminal. That is, the distance between the lower side of the bar 28 of said terminal and the lower end wall of slot 24 of the drop should be such as to permit the drop to rise a sufficient distance to clear its supporting warp thread; and on the other hand, when the easing rods are raised the warp thread should engage the end wall of slot 25 of the corresponding drop before opportunity is given the blade 29 to engage the upper end wall of slot 24 which would effect the knocking off of the loom.

The drops of the left hand series in Fig. 1 are shown in contact with their plate 33 to permit the escape of lint if any has accumulated, while the drops of the right hand series are shown in their uppermost position and supported on the corresponding pile warps. Should a pile warp happen to break while the corresponding drop is on its plate 33, circuit 9 will be closed when the compound terminal in its upward movement picks up the fallen drop.

In some types of pile fabric looms it is difficult, if not impossible owing to lack of

space, to provide two supporting easing rods for each set of pile warps to enable the proper disposition of the drop devices as indicated in Fig. 1. When it is not feasible to follow that plan I may employ the arrangement shown in Fig. 8 in which the pile warps 4 are carried in a horizontal plane over a fixed plate 34 interposed between the beam 3 and the let-off rolls 5, the easing rods being indicated at 26'. The plate 34 is similar to that heretofore described except that instead of being mounted on a movable member it is fixed to the loom frame. For the purpose of lifting the pile warp drops in the arrangement illustrated in Fig. 8 I provide cams 36 mounted on a suitable shaft 35 at opposite sides of the loom, only one of said cams being shown. Engaging said cams are followers 37 carried by levers 38 which, through links 39, are connected to pivoted plates 40 extending across the loom and which are adapted to be moved against the drops to raise the latter from their supporting warp threads when followers 37 ride over the high points of the cams. Cams 36 may be so timed as to raise the drops at any stated interval to carry out the intended purpose of the invention.

The invention is equally well adapted to the drops on the back warp threads in a pile fabric loom, or to the warp threads of an ordinary loom, especially when using single end warps or any yarn which is weak and throws an appreciable quantity of lint resulting from the chafing of the yarn against the drops. Such application is shown in Fig. 1 in which the back warp drops 8' are suspended over horizontal plates 41 carried by rods 42 on opposite sides of the loom, only one of said rods being shown. The rods 42 are connected at their lower ends to levers 43 pivoted at 44 and carrying followers 45 which engage cams 46. The latter are rotated through gears 47, or other suitable means. As here shown, when followers 45 ride over the low points of cams 46 lever 43 will be rocked to move the plates 41 upward the proper distance to contact with drops 8' and to thereby raise them from the supporting warps. The normal position of plates 41 is indicated in Fig. 1, the cams 46 being cut so as to move said plates a sufficient distance for the desired purpose. Brackets 48 are provided to guide the rods 42 in their movements, and springs 49 to hold followers 45 in engagement with the cam faces.

The same precautions should be observed as to the extent of the lifting movement of the drops and the length of slots 24 of the drops in the adaptation of the invention to the back warps, or that illustrated in Fig. 8 on the pile warps, as heretofore described in connection with the pile warp drops of Fig. 1.

The present invention is equally well adapted to a mechanical warp stop motion

and for the purpose of illustration I have taken the stop motion described in United States Patents No. 796,692 and No. 796,693, dated August 8, 1905, and granted to W. H. Baker. Referring to said patents and to Fig. 9 of the present drawings the shaft 50 has mounted thereon an eccentric 51 to which is secured a rod 52 which actuates a bell crank lever 53. The upper arm of said lever is provided with one or more sets of resilient spring forks 54 adapted to engage a pin 55 projecting from the side of a notched bar 56. This bar is slidably mounted in a stationary support 57, said support being also notched or serrated. The pin 55 extends through a slot in the side wall of the support 57. The drop devices 58 may be of the form illustrated in Fig. 10 to embrace the support 57 so that during the normal running of the loom bar 56 will be reciprocated by reason of the engagement of pin 55 with the spring forks 54. As fully explained in the patents above noted, when a drop falls by reason of the breakage or undue slackness of its warp thread the movement of bar 56 will be arrested thereby permitting a feeler carried by a lever 59 to either impinge against the side of a bar 56 or to pass through an opening therein to set in operation the stopping mechanism.

The application of the present invention is effected by mounting eccentrics 60, one of which is shown and to which are connected rods 61, said rods being attached to and supporting a plate 62 which extends across the loom below the drop devices. As shaft 50 revolves the plate 62 will be raised so as to contact with the drop devices and momentarily lift them from their supporting warp threads for the purpose fully before described. It is to be understood that reference to the above patents is merely for the sake of illustration as the invention may be applied to other forms of mechanical warp stop motions. It is also to be understood that while the invention is illustrated as applied to the warp of a loom it is equally well adapted to warp stop mechanisms of any kind, such as warping machines, warp baling machines, warp beaming machines and the like.

What I claim and desire to secure by Letters Patent is:—

1. In a warp stop motion for looms the combination of stopping mechanism, drop devices supported on unbroken warp threads and adapted to set in operation the stopping mechanism when a warp thread breaks, a plate located below said drop devices, and means for producing a relative movement between said plate and drop devices for intermittently raising the latter from the supporting warp threads during the normal running of the loom.

2. In a warp stop motion for looms the

combination of stopping mechanism, a controlling circuit for said mechanism, drop devices supported on unbroken warp threads adapted to close said circuit when a warp
 5 thread breaks, a plate located below said drop devices, and means for producing a relative movement between said plate and drops for intermittently raising the latter from the supporting warp threads during the normal
 10 running of the loom.

3. In a warp stop motion for a pile fabric loom the combination of stopping mechanism, a controlling circuit for said mechanism, means for supporting the pile warps during a
 15 portion of their travel in a substantially horizontal plane, drop devices supported on the unbroken pile warps at such point said drops being adapted to close said circuit when a pile warp breaks, a plate located below said
 20 drops, and means for producing a relative movement between said plate and the drops for intermittently raising the latter from the supporting warp threads during the normal running of the loom.

25 4. In a warp stop motion for a pile fabric loom the combination of stopping mechanism, a controlling circuit for said mechanism, easing rods over which the pile warps pass, drop devices supported on unbroken warps

between the easing rods said drops being
 30 adapted to close said circuit when a pile warp breaks, and stationary plates extending transversely of the loom below and in the path of travel of said drops for intermittently raising the latter from the supporting warp
 35 threads during the normal running of the loom.

5. In a warp stop motion for a pile fabric loom the combination of stopping mechanism, a controlling circuit for said mechanism,
 40 means for supporting the pile warps at a point between the beam and the easing rods in a substantially horizontal plane, drop devices supported on unbroken warps at said point
 45 said drops being adapted to close said circuit when a pile warp breaks, a plate extending transversely of the loom below said drops, and means for intermittently moving said plate against the drops for raising the latter from the supporting warp threads during the
 50 normal running of the loom.

In testimony whereof I have hereunto signed my name in the presence of two subscribing witnesses.

HERBERT HORSFALL.

Witnesses:

ALFRED HOLROYD,
 ARTHUR OAKLEY.