(No Model.)

C. A. LITTLEFIELD.

WARP STOP MOTION FOR LOOMS.

No. 600,008. Patented Mar. 1, 1898.

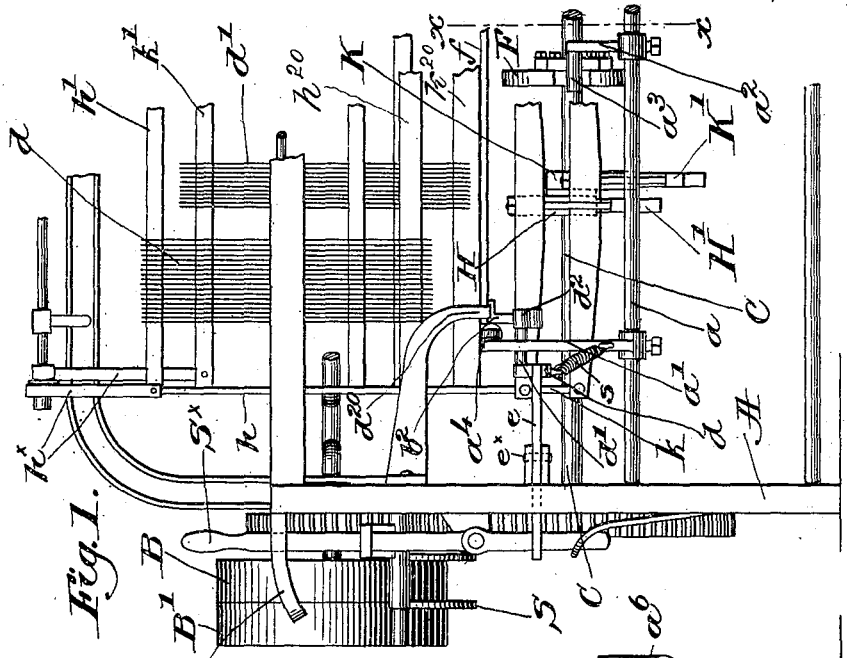

Fig. 1.

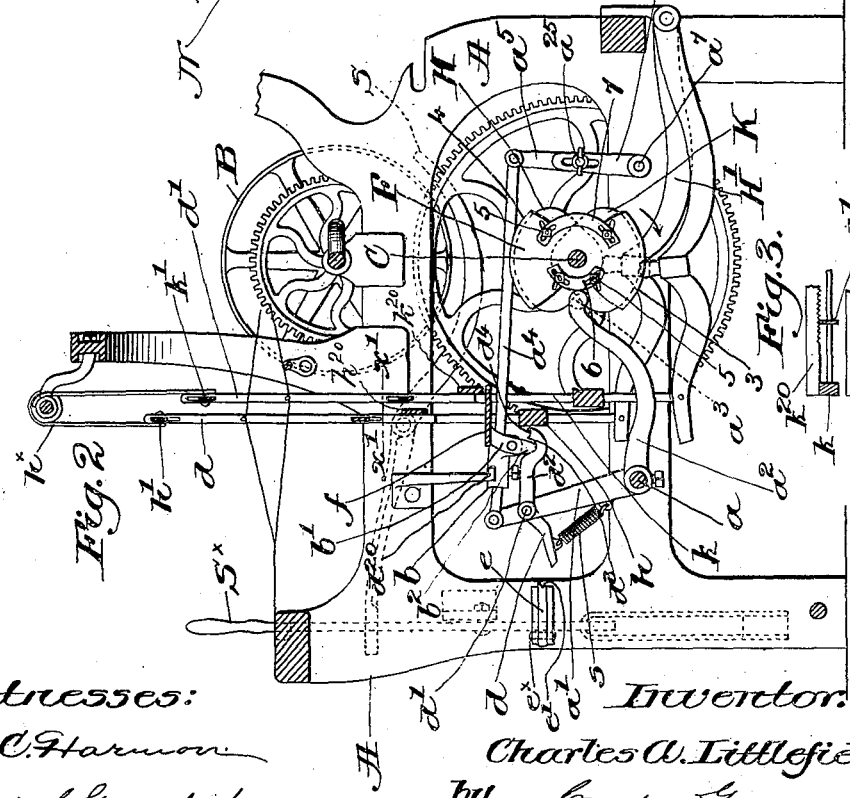

Fig. 2.

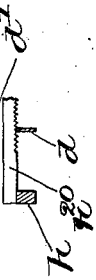

Fig. 3.

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UNITED STATES PATENT OFFICE.

CHARLES A. LITTLEFIELD, OF LOWELL, MASSACHUSETTS, ASSIGNOR TO THE DRAPER COMPANY, OF PORTLAND, MAINE, AND HOPEDALE, MASSACHUSETTS.

WARP STOP-MOTION FOR LOOMS.

SPECIFICATION forming part of Letters Patent No. 600,008, dated March 1, 1898.

Application filed October 6, 1897. Serial No. 654,223. (No model.)

To all whom it may concern:

Be it known that I, CHARLES A. LITTLEFIELD, of Lowell, county of Middlesex, State of Massachusetts, have invented an Improvement in Warp Stop-Motions for Looms, of which the following description, in connection with the accompanying drawings, is a specification, like letters and numerals on the drawings representing like parts.

This invention relates to warp-stop-motion mechanism for looms wherein the stoppage of the loom is effected automatically upon breakage or undue slackening of one or more warp-threads by or through the movement of stop-motion-actuating detectors.

In this invention a vibrating feeler coöperates with said detectors, the means for effecting movement of the feeler operating to move the same through different distances on successive strokes to coöperate first with one and then another set of detectors, according to the number of sets thereof.

Several other novel features of my invention will be hereinafter described, and particularly pointed out in the claims.

Figure 1, in front elevation, represents a sufficient portion of a loom to be understood with my invention embodied therein. Fig. 2 is a vertical section on the line $x\ x$, Fig. 1, looking toward the left; and Fig. 3 is an enlarged sectional detail view on the line $x'\ x'$, Fig. 2, looking down.

The loom-frame A, of suitable shape to provide bearings for the operative parts, the fast and loose pulleys B B′, the belt-shipper S and shipper-lever $S^{\times}$, and the holding-plate N may be and are as usual in looms, the lay being omitted for the sake of clearness.

I have herein shown the actuating-detectors also serving as heddles; but the use of the detectors independently of the shedding mechanism is, as will be understood, within the spirit and scope of my invention.

Two heddle-frames $h\ k$, having flexible overhead connections $h^{\times}$, are provided with cross-bars $h'\ k'$, extended through elongated slots in the thin flat detector-heddles $d\ d'$, respectively, which latter have a limited vertical movement relative to the frames, substantially as in United States Patent No. 536,969, dated April 2, 1895.

A cam-shaft C has actuating-cams H K, which operate usual treadles H′ K′, connected with the lower ends of the heddle-frames, to reciprocate the latter, the warp-threads passing through eyes in the detectors.

A rock-shaft a, mounted in suitable bearings in the loom sides, has fast thereon arms $a'\ a^2$, the latter being provided with a roller or other stud a^3, which is held against the periphery of a feeler-actuating cam F on the shaft C. This cam has, as shown in Fig. 2, two opposite and like high portions 3 4 and intermediate unequal reëntrant or low portions, the latter being crossed by adjustable segments 6 7, said segments being located at different distances from the center of the cam and held in adjusted position by suitable bolts 5. Obviously upon rotation of the cam in the direction of the arrow, Fig. 2, the shaft a will be rocked to swing the arm a' outward twice at each rotation and an equal distance each time by the high parts 3 4 acting on the arm a^2. As the low portions are of unequal depth, however, the inward stroke of arm a will be less when the part 7 is operating than when the part 6 engages the roll a^3, such differences in stroke being utilized in the vibration of the feeler, as will be described.

While only one arm a' is shown, it is to be understood that there are two such arms, one near each side of the loom, each being jointed to a link a^4, the rear end of each link being in turn jointed to an adjustable two-part arm $a^5\ a^6$, fulcrumed on the loom side at a^7. (See Fig. 2.) A collar b is adjustably secured to each link, and on these collars the feeler f is pivoted by ears b', the feeler being shown as a flat plate extended across the width of the sets of detectors and vibratable below the normal paths of movement of the latter. As the feeler has first a short and then a long stroke inward it is adapted on the former to coöperate with a dropped detector of the front set and on the next stroke with one of the rear set, engagement by a detector causing the feeler to tip or rock on the collar b, it be-

ing understood that the latter is vibrated by movement of the links a^4.

One of the ears b' is extended downwardly, as at b^2, (see Fig. 2,) to form a controller for a bunter d, mounted on a short shaft d', pivoted in the adjacent arm a', said shaft having a rearwardly-extended arm d^2, concaved at d^3 to normally receive the device b^2, and having a notch d^4 in its end. The controller b^2 normally rests in the concavity d^3, as shown in Fig. 2, a spring s holding the bunter-arm d^2 in the position shown, and as the bunter and feeler move with the arm a' the outer end of the bunter will normally pass to one side of the preferably-notched end e' of the knock-off arm e, shown as pivoted at $e^\times$ in a suitable bracket on the loom side. The other end of the knock-off lever is adapted to engage the shipper-lever $S^\times$ and to release the same from the notch in the holding-plate N when the bunter engages the knock-off arm.

Supposing that one of the detectors moves into abnormal position, due to breakage or undue slackening of its warp, the lower end of such detector will then be in the path of the advancing feeler, and when the latter is engaged by the detector it will be tipped or rocked rearwardly on the pivots of the ears b', and such movement will swing the controller b^2 inwardly, depressing the arm d^2 until said controller enters the notch d^4 and retains the bunter d in position to engage and actuate the knock-off lever on the next forward movement of the arm a'.

It will be understood that the coöperation of the feeler with a detector takes place on the inward stroke of the feeler, while the movement of the bunter to operate the knock-off arm takes place during the outward stroke at the time when the rocker-arm a^2 is operated upon by the cam F in passing from a low to a high portion thereof. After the detent has effected the movement of the knock-off lever, as described, it is desirable to automatically return the parts to normal position, and this is herein effected by means of a stop d^{20}, shown as an arm extended into the path of the feeler to engage the latter at about the completion of its outward stroke when said feeler has been turned into abnormal position by engagement with a detector.

The stop engages the feeler just before the stroke is completed and turns it upon the pivots of the ears b' to withdraw the controller d^2 from the notch d^4 and into the recess or concavity d^3, so that at the next movement of the parts when the loom is started up they will have been returned to normal position without intervention of the attendant.

I have shown herein two sets of actuating-detectors located in vertical planes one behind the other, the feeler taking a long stroke and a short stroke alternately to alternately coöperate with the front and back sets of detectors; but it is obvious that I may use three or more sets of detectors and impart to the feeler corresponding strokes, the feeler-actuating cam being changed accordingly—that is to say, for three sets of detectors the cam would have three high and three low portions instead of two, as herein shown.

By means of the adjustable members of the cam the stroke of the feeler can be accurately adjusted when setting up the loom, each stroke having its own independent adjustment.

The two-part arm a^5 a^6 is adjustably held by a slot-and-pin connection a^{25}, so that the arm may be varied in length to raise or lower the path of movement of the feeler, and thus adjust the latter to detectors of different lengths.

The frames h and k are shown as provided near their lower ends with transversely-extended bars h^{20} k^{20}, respectively adapted to take up the back thrust of a detector when engaged by the feeler, and, as shown in Fig. 3, the said bars may be milled or serrated to more efficiently engage the longitudinal edge of a detector and prevent twisting of the same.

My invention is not restricted to the precise construction and arrangement of parts herein shown, as the same may be varied or rearranged without departing from the spirit and scope of my invention.

Having fully described my invention, what I claim, and desire to secure by Letters Patent, is—

1. In a warp stop-motion for looms, a plurality of sets of reciprocating stop-motion-actuating detectors normally controlled by the warp-threads, a coöperating feeler, means to move it through different distances on successive strokes, and stopping mechanism operative upon stoppage of the feeler by engagement with a detector in abnormal position, substantially as described.

2. In a warp stop-motion for looms, two sets of reciprocating stop-motion-actuating detectors normally controlled by the warp-threads, a common feeler vibratable below said detectors, means to give said feeler a long and a short stroke alternately, to coöperate with an abnormally-positioned detector of the rear or front sets of detectors respectively, and stopping mechanism operative upon stoppage of the feeler by engagement with a detector, substantially as described.

3. In a warp stop-motion for looms, a plurality of sets of stop-motion-actuating detectors normally controlled by the warp-threads, means to reciprocate them in different vertical planes, a feeler to engage a detector in abnormal position and be stopped thereby, means to normally vibrate the feeler across the paths of successive sets of detectors on successive strokes, a shipper-lever, means operative upon stoppage of the feeler to release said lever, and means to automatically reset said means after stoppage of the feeler, substantially as described.

4. In a warp stop-motion for looms, a plurality of sets of reciprocating stop-motion-actuating detectors normally controlled by the

warp-threads, a coöperating feeler, means to move it through different distances on successive strokes, stopping mechanism for the loom, operative upon stoppage of the feeler by engagement with a detector in abnormal position and means to adjust the length of stroke of the feeler, substantially as described.

5. In a warp stop-motion for looms, a plurality of sets of reciprocating stop-motion-actuating detectors normally controlled by the warp-threads, a coöperating feeler, means to move it through different distances on successive strokes, said means including a cam having independently-adjustable controlling portions, and stopping mechanism for the loom, operative upon stoppage of the feeler by a detector in abnormal position, substantially as described.

6. In a warp stop-motion for looms, a plurality of sets of reciprocating stop-motion-actuating detectors normally controlled by the warp-threads, a coöperating feeler, a vibrating support upon which it is adapted to rock when engaged by a detector, a bunter, a controller therefor carried by the feeler and operative upon rocking of the latter, means to vibrate the feeler-support, and stopping mechanism for the loom, actuated by the bunter when moved by the said controller into operative position, substantially as described.

7. In a warp stop-motion for looms, a plurality of sets of reciprocating stop-motion-actuating detectors normally controlled by the warp-threads, a coöperating feeler, a support on which the feeler is pivotally mounted, means to vibrate said support toward and from the detectors, a spring-controlled bunter, a controller therefor carried by the feeler, movement of the latter on its support by engagement with a dropped detector moving said bunter into operative position, a shipper-lever, and a knock-off arm therefor actuated by the bunter, substantially as described.

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

CHARLES A. LITTLEFIELD.

Witnesses:

JOHN C. EDWARDS,

A. C. HARMON.