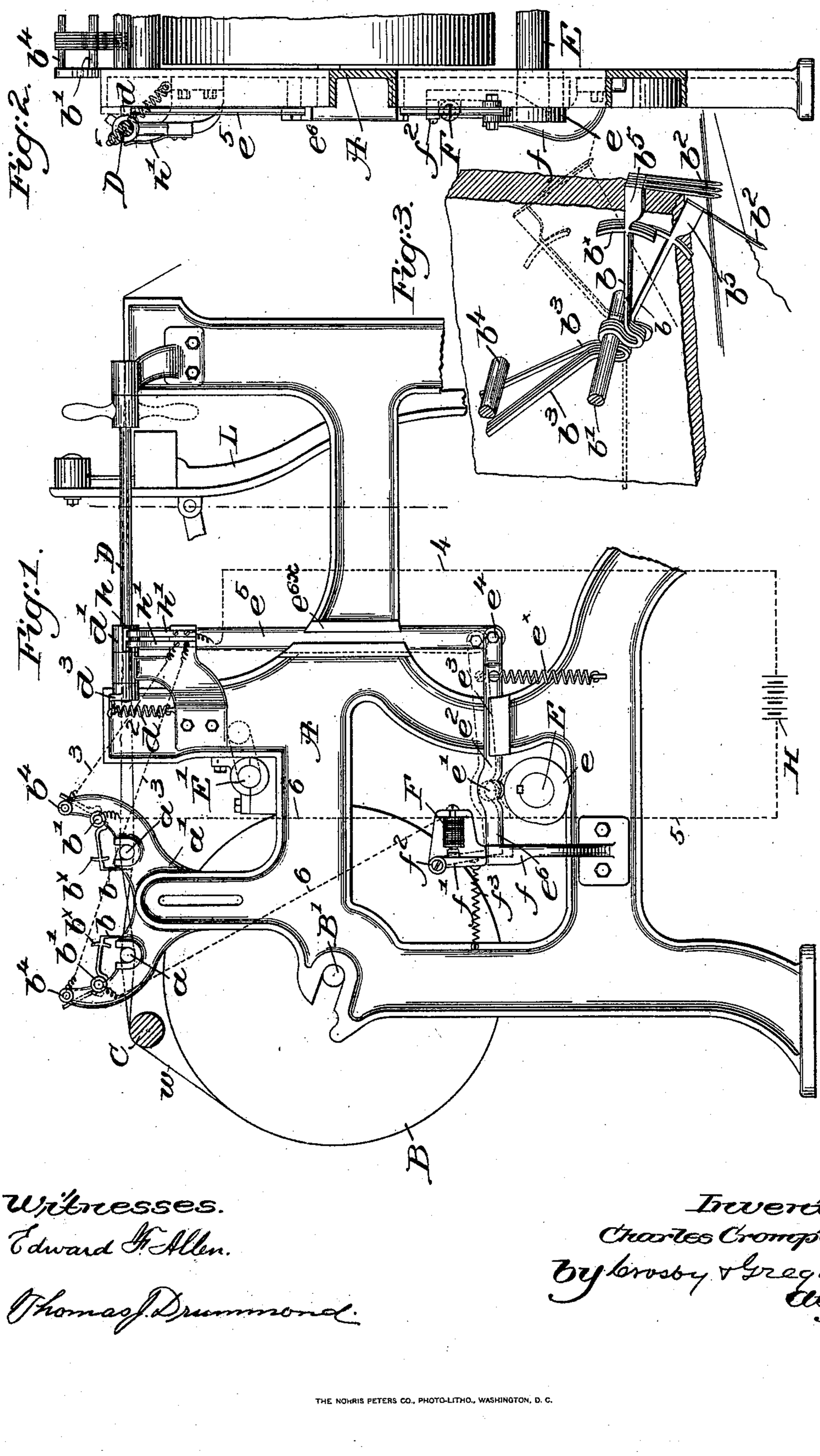
(No Model.)

C. CROMPTON.

WARP STOP MOTION FOR LOOMS.

No. 599,832. Patented Mar. 1, 1898.



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UNITED STATES PATENT OFFICE.

CHARLES CROMPTON, OF WORCESTER, MASSACHUSETTS, ASSIGNOR TO THE CROMPTON & KNOWLES LOOM WORKS, OF SAME PLACE.

WARP STOP-MOTION FOR LOOMS.

SPECIFICATION forming part of Letters Patent No. 599,832, dated March 1, 1898.

Application filed July 28, 1894. Serial No. 518,789. (No model.)

To all whom it may concern:

Be it known that I, CHARLES CROMPTON, of Worcester, county of Worcester, 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 has for its object to provide an improved warp stop-motion for looms.

In carrying out this invention I employ a series of preferably-pivoted warp-detectors, each provided with an eye, said series of detectors receiving in their eyes the series of warp-threads, said detectors being sustained in their normal positions by the unbroken threads. Upon the breakage of the lifted tense thread the detector sustained thereby is dropped into its abnormal position to thereby effect the stopping of the loom, as will be hereinafter described. These detectors are herein shown as provided with tails extending back of their pivotal points, and the tail of a dropped detector is thus lifted above the tails of adjacent detectors, so that the operator running the loom may readily engage the uplifted tail of the detector which is dropped and by depressing may bring the eyed extension of the detector up above the plane occupied by the warps, so that said eyed extension may be readily threaded in case the warp-thread has escaped from said eye, or may be readily tied in case the warp-thread has been lifted by raising the said detector. The detectors are preferably provided with guide-arms by which they are maintained always in proper alinement one with relation to another without the use of intervening fixed guides. In the preferred construction the detectors, when permitted to move into their abnormal positions, operate to close an electric circuit, which, through the armature of an electromagnet and suitable mechanism controlled thereby, stops the loom. These, together with other features constituting my invention, will be hereinafter more fully described, and pointed out in the claims.

Figure 1 represents in end elevation, partially broken away, a portion of a loom-frame carrying the essential parts of a stop-motion embodying my invention; Fig. 2, a partial front or right-hand view of the parts shown in Fig. 1; and Fig. 3, a perspective detail on an enlarged scale, showing several of the detectors in position.

Referring to the drawings, the frame A, the beam B, whip-roll C, shipper D, (shown as a rock-shaft,) cam-shaft E, crank-shaft E′, and the lay L, adapted in practice to be vibrated from connections between it and the crank or lay shaft, are and may be of suitable or desired construction, such as usually found in looms now in use.

In the preferred construction I provide two warp-supports, shown as rolls $a\ a$, journaled in brackets a' on the frame, the warp-threads w from the beam B being passed over the whip-roll and carried over and under the said warp-supports, as shown in Fig. 1, from which they pass to and through the usual reed on the lay. The bracket a', as herein shown, also carries two rods b', which extend across the loom from side to side, said rods constituting pivots for the warp-detectors b, loosely mounted thereupon and provided with eyes b^2, through which are passed one or more warp-threads w, as best shown in Fig. 3, the warp-threads, if unbroken, sustaining the said detectors in their elevated or normal full-line position, Fig. 3, the tail portions b^3 of the detectors at such time being held back out of engagement with the fixed contact-rods b^4, also carried by the said brackets a'. (See Fig. 1.)

F represents an electromagnet of suitable construction mounted upon the frame the same as herein shown, being carried by a bracket f, secured to one of the end frames, the armature f' of said magnet being shown as pivoted, as f^2, at its upper end to the bracket f.

The cam-shaft E, as herein shown, is provided with a cam e, upon which rests a roll e', journaled in a lever e^2, held in suitable guides e^3 in the frame, and jointed at its end e^4 to the lower end of an upright push-lever e^5, fitted to slide in suitable guideways $e^{6\times}$, preferably in the frame, and with its upper end directly beneath a lug d at the inner side of a

hub d' on the shipper rock-shaft D, (see Fig. 2,) said shaft being retained in either of its two extreme positions (represented by full and by dotted lines, Fig. 2) by a spring d^2, attached to the frame and to an arm d^3 on the back end of said shipper. When the shipper is rotated slightly in the direction of the arrow, Fig. 2, the spring d^2 automatically throws the shipper through the remainder of its movement into its position to operate the stopping mechanism to stop the loom. Upon the hub d' of the shipper in this present construction I have placed a metallic contact-strip h, upon which press two spring-contacts h' h', one of which is connected by wires 3 3 with the two fixed stop-contacts b^4, while the other of said springs is connected by a wire 4 with a suitable electric generator, as the battery H, which latter is again connected by a wire 5 with the electromagnet F, all parts being properly insulated. The magnet F in turn is connected by wires 6 with the pivot-rods b' of the two series of detectors, the operation of my improved stop-motion then being as follows:

During the normal operation of the loom the unbroken warp-threads passing toward the lay sustain the detectors b of the two series in their normal elevated positions, with their tail portions b^3 turned back away from the fixed stop-contacts b^4, the circuit through the magnet F being broken at each stop-contact and the armature f' of the magnet F held in its retracted position by a suitable spring, as f^3.

The cam e on the rotating shaft E at each rotation of the latter raises the end e^6 of the lever e^2, its opposite end e^4, jointed to the push-bar e^5, being held down by a spring $e^\times$, (see Fig. 1,) the said free end e^6 at each movement rising in front or at the immediate right of the armature, as shown by dotted lines. This operation of the loom continues so long as all the warp-threads remain unbroken or under proper conditions. When, however, any thread or threads become broken or unduly slack, the detector, previously sustained in its normal position by said thread or threads, is permitted to drop into its abnormal position, as shown in Fig. 3, until stopped by contact of its tail portion b^3 with one of the stop-contacts b^4, such contact completing the electric circuit through the magnet F, as follows: from the generator H through wire 5, magnet F, wire 6, pivot-rod b' of the detector dropped, thence through the tail of the dropped detector, its stop-contact b^4, wire 3, contact-springs h', strip h, and wire 4 back to the generator. Completion of the circuit in this manner energizes the magnet F, causing the latter to attract and draw its armature f' into the dotted position, Fig. 1, with its free end standing just above the free end e^6 of the lever e^2, so that as the cam e, during further rotation of the shaft E, raises the roll e' the free end of said lever cannot be raised as before, but will be held down by the armature f', thereby constituting said free end of the lever the fulcrum end and causing the opposite end e^4 with the push-rod e^5 to be raised, the upper end of said push-rod acting upon the lug d on the shipper to rotate the latter in the direction of the arrow, Fig. 2, whereupon the spring d^2 quickly turns the shipper into its dotted position, Fig. 2, stopping the loom and moving the contact-strip h out of electrical engagment with the contact h' to break the circuit at that point and thereby prevent draining the battery by continuous contact of the dropped detector with its stop-contact. The operator, glancing along the two series of detectors, is enabled to at once detect the location of the broken thread by means of the dropped detector with its tail resting against the stop-contact b^4, and by means of the tail of the detector the operator is enabled to raise the inner or eye end of the same into an elevated position, as shown by dotted lines, Fig. 3, to raise the end of the broken thread into position where it may be quickly knotted or mended. The broken thread having been mended, the shipper is thrown back again into its full-line position by hand, as shown, to start the loom, such movement of the shipper again carrying the contact-strip h into engagement with the contact-springs h' to complete the circuit again at that point. Such closure of the circuit does not, however, again stop the loom, for the mended thread now sustains its detector in its normal position with its tail away from and breaking the circuit at the stop-contact b^4. The operation continues until another thread loosens or breaks, when its detector will again stop the loom in the manner described.

Referring to Fig. 3, I prefer to provide each of the detectors b with an arc-like guide $b^\times$, the several guide-arms coöperating to maintain the detectors always in proper alinement with relation to each other, thus permitting the detectors to have a considerable range of movement without requiring fixed guides to keep them, owing to their extreme lightness, from springing out of their proper positions and catching one upon another as they would be apt to do were no guides of any kind provided.

I prefer to employ two series of detectors arranged as herein shown, the detectors of one series being staggered or arranged between the detectors of the other series and coöperating with different threads, this arrangement enabling me to make the detectors thicker than would be possible were the entire number of detectors arranged side by side in a single series.

While I have herein shown only two series, yet it is evident that three or more series may be employed, if desired, to accommodate a larger number of threads or shades, or different arrangements of threads for various classes of work.

I prefer to employ the rolls a a or their equivalent warp-supports to steady and sup-

port the warp-threads at each side of the warp-detectors, though said supports may be omitted, if desired, it being essential only that the said detectors be sustained in their normal position by the unbroken warp-threads.

I have herein weighted the fine ends of the several detectors, as at b^5, to render the downward gravitating movements of the same more positive.

The particular mechanism herein shown whereby the movement of the armature f' causes the stopping of the loom is well adapted for the particular loom shown; but it is evident such mechanism may be changed, as desired, to adapt the stop-motion to looms of different constructions.

The invention is not limited to the particular shape or construction of detectors herein shown, for it is evident the same may be varied without departing from the spirit and scope of the invention.

While both series of warp-detectors are herein shown as mounted upon a common bracket a', yet the two series are, in effect, mounted in separate and independent supports—the arms of the bracket—the term "independent support" being herein used as distinguished from a common pivot-rod for all the detectors.

I claim—

1. A warp stop-motion for looms, containing the following instrumentalities, viz: a series of warp-detectors adapted to be sustained by the unbroken warp-threads, and a support for the said detectors; a contact into electrical engagement with which said detectors are moved by the breakage of their respective threads; an electromagnet in circuit with said contact; an armature therefor, a stopping mechanism for the loom controlled thereby and including a rotatable shipper-shaft; mechanism operated by said electromagnet to move said shipper-shaft slightly, and a spring to quickly complete the movement of said shipper-shaft to stop the loom, substantially as described.

2. A warp stop-motion for looms, containing the following instrumentalities, viz: a series of warp-detectors in continuous contact with and sustained in their normal positions by the unbroken warp-threads; guides fixed on the free ends of said detectors to move with and direct the same out of interfering contact; a fixed contact-stop into engagement with which said detectors are moved upon breakage of their respective thread or threads; an electromagnet in circuit with said contact-stop; its armature; and a stopping mechanism controlled thereby, substantially as described.

3. A warp stop-motion for looms, containing the following instrumentalities, viz: a series of warp-detectors adapted to be sustained by the unbroken warp-threads and a support for the said detectors; a contact into electrical engagement with which said detectors are moved by the breakage of their respective threads; an electromagnet in circuit with said contact; an armature therefor, a stopping mechanism for the loom controlled thereby and including a rotatable shipper-shaft; mechanism operated by said electromagnet to move said shipper-shaft slightly, and a spring to quickly complete the movement of said shipper-shaft to stop the loom; a contact on said shipper-shaft and rotatable therewith into and out of circuit with said detectors, substantially as described.

4. In a warp stop-motion for looms, a frame, pivoted warp-detectors arranged in sets or series closely alined, the detectors of one set being staggered with relation to those of an opposite set, each set or series coöperating with a different series of warp-threads, independent widely-separated supports for each series of warp-detectors to provide an open intervening space between the sets or series for easy access to said pivoted detectors, and a stopping mechanism for the loom controlled in its operation by said detectors, substantially as described.

5. In a warp stop-motion for looms the following instrumentalities, viz: a support, a series of lever-like pivoted warp-detectors having eyed extensions to receive each a warp-thread, a shipper, actuating devices therefor, connections set in motion by said detectors to effect the operation of the shipper, said detectors being normally sustained each by the warp-thread in its eye and being adapted to drop below the plane of the warp when the thread breaks, said detectors having dropped due to the breakage of a thread being free to be turned each on its support to elevate the said eyed extension above the plane of the warp, substantially as and for the purpose set forth.

6. A warp stop-motion for looms, containing the following instrumentalities, viz: a series of warp-detectors; a coöperating fixed electrical contact; a stopping mechanism for the loom; a rotating shaft; a lever vibrated by said shaft, and connected at one side its fulcrum with said stopping mechanism; an electric magnet in circuit with said fixed contact; its armature adapted when attracted by said magnet to obstruct movement of the free end of said lever and thereby cause movement of the opposite or fulcrum end by said shaft to stop the loom, substantially as described.

7. In a warp stop-motion for looms, a support for a series of warp-detectors, a series of detectors pivoted thereon and provided with angular extensions having eyes for the reception of the warp-threads, and having also guide-arms extended therefrom, a guide-arm of one detector running against the guide-arm of a second detector alongside of it, combined with a stopping mechanism controlled as to its movement by the dropping of a detector, substantially as described.

8. As an article of manufacture, a warp-detector adapted to be pivoted between its ends,

and having at one end an angular extension provided with an eye for the reception of a warp-thread, said detector being weighted at its eyed end and provided with a guiding-sector extended therefrom, substantially as described.

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

CHARLES CROMPTON.

Witnesses:
JUSTIN A. WARE,
SAMUEL B. SCHOFIELD.