No. 646,729. Patented Apr. 3, 1900.

J. F. DUSTIN.

WARP STOP MOTION FOR LOOMS.

(Application filed Jan. 26, 1898.)

(No Model.) 2 Sheets—Sheet 1.

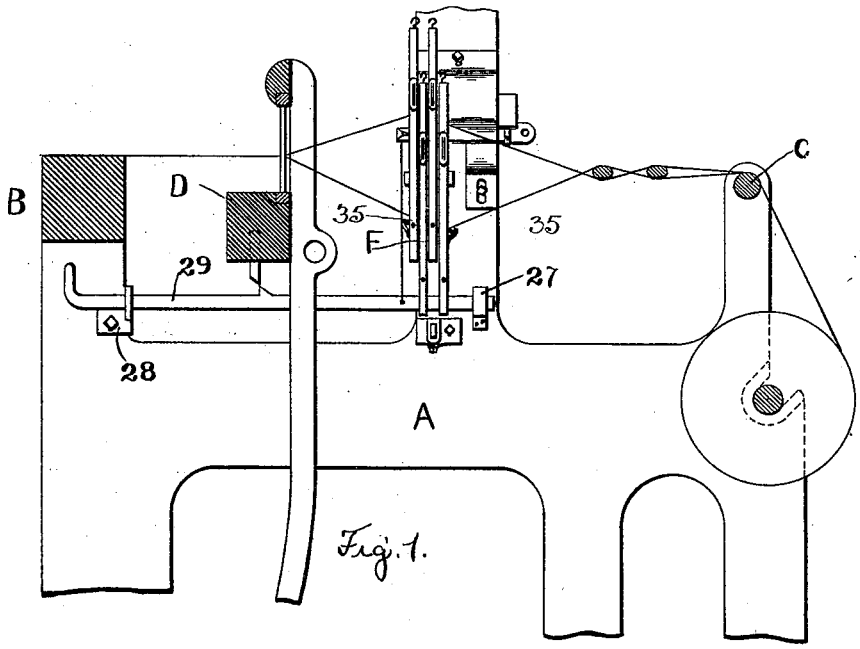

Fig. 1.

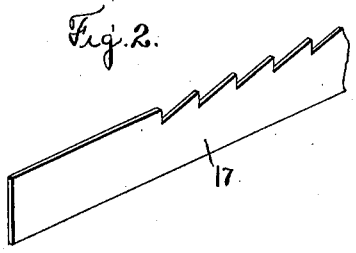

Fig. 2.

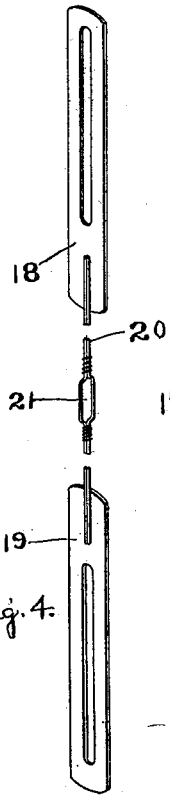

Fig. 4.

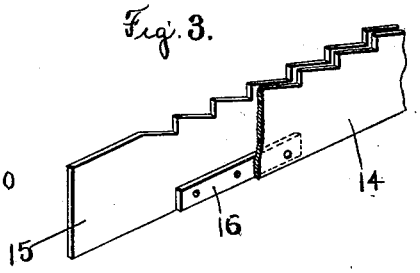

Fig. 3.

Witnesses.
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WARP STOP MOTION FOR LOOMS.

(No Model.) (Application filed Jan. 26, 1898.)

2 Sheets—Sheet 2.

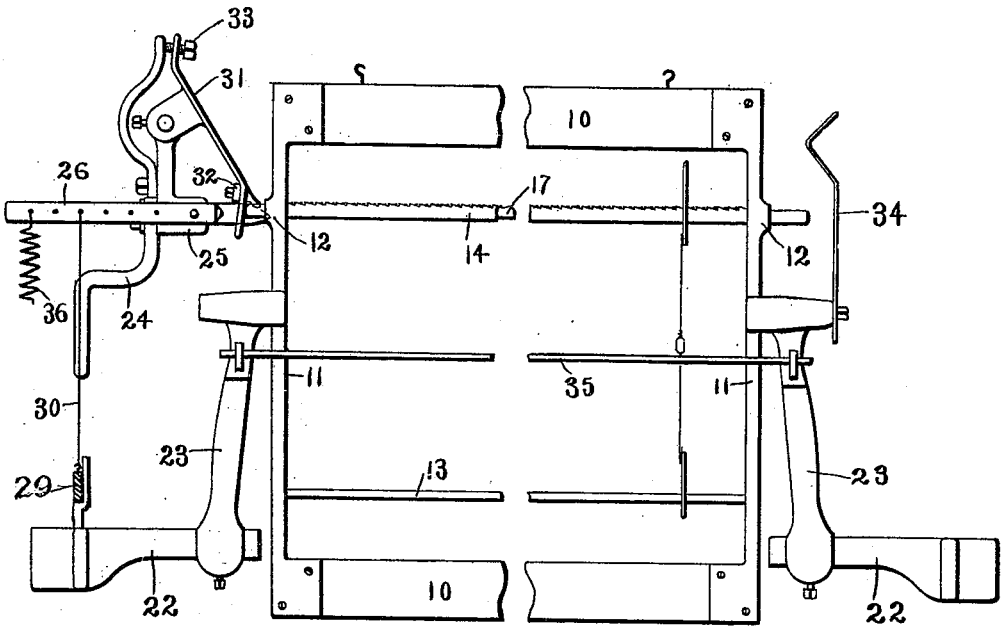

Fig. 5.

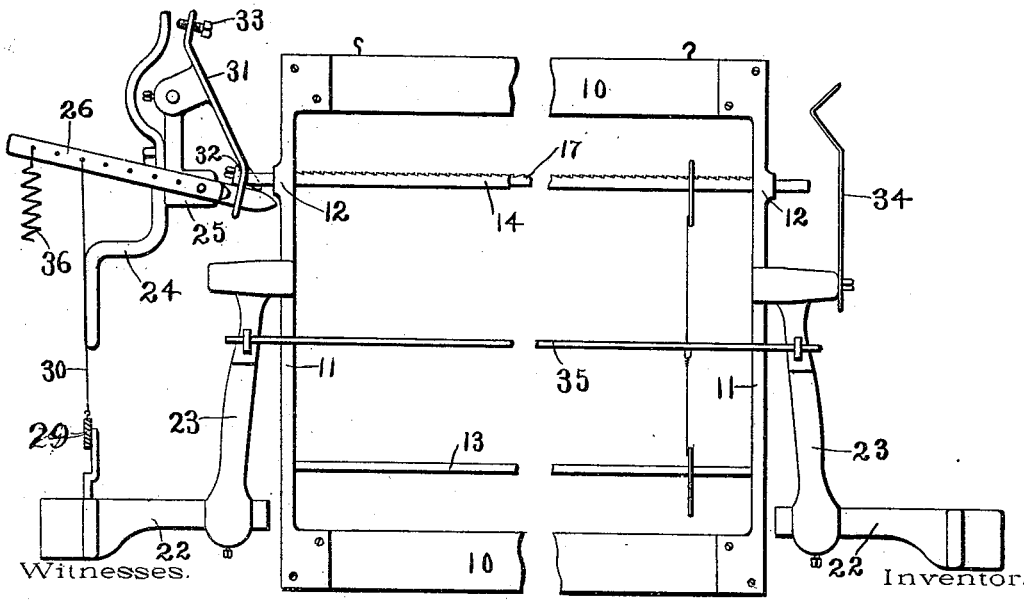

Fig. 6.

Witnesses.
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UNITED STATES PATENT OFFICE.

JOHN F. DUSTIN, OF FITCHBURG, MASSACHUSETTS, ASSIGNOR TO HIMSELF AND THE PARKHILL MANUFACTURING COMPANY, OF SAME PLACE.

WARP STOP-MOTION FOR LOOMS.

SPECIFICATION forming part of Letters Patent No. 646,729, dated April 3, 1900.

Application filed January 26, 1898. Serial No. 667,956. (No model.)

To all whom it may concern:

Be it known that I, JOHN F. DUSTIN, a citizen of the United States, residing at Fitchburg, in the county of Worcester and State of Massachusetts, have invented a new and useful Warp Stop-Motion for Looms, of which the following is a specification.

My invention relates to a construction for automatically stopping a loom whenever a warp-thread is broken; and the object of my invention is to provide a simple and efficient warp stop-motion which can be applied to any of the ordinary existing or new forms of looms, but which is especially applicable to fancy looms employing a comparatively-large number of heddle-frames.

A further object of my invention is to construct the parts constituting my warp stop-motion for looms so that the same can be applied to looms which are geared or driven either at the right or left hand side thereof.

To these ends my invention consists of a novel form of heddle and of the parts and combinations of parts, as hereinafter described, and more particularly pointed out in the claims at the end of this specification.

In the accompanying two sheets of drawings, Figure 1 is a transverse sectional view of sufficient parts of a loom to illustrate the application of my invention thereto. Figs. 2 and 3 are perspective views illustrating sections of a toothed feeler and of a toothed heddle-rod in which the same is mounted, respectively. Fig. 4 is a perspective view illustrating the form of heddle which I preferably employ. Fig. 5 is a front view illustrating the position of the parts employed in my warp stop-motion during the normal operation of the loom, and Fig. 6 is a similar view illustrating the position assumed by the parts on the failure or breaking of a warp-thread.

A warp stop-motion for looms constructed according to my invention is designed to be controlled by the position of heddles which are movably mounted on their heddle-rods, and the operation of my warp stop-motion depends upon toothed feelers, which are threaded through the heddle-eyes and are reciprocated or moved in opposite directions as the heddle-rods are moved up and down by the harness-motion of the loom.

In the preferred construction of my warp stop-motion for looms the upper heddle-rod of each heddle-frame is formed of two strips provided with ratchet-teeth facing in one direction. Movably mounted between the plates forming this heddle-rod is a feeler having ratchet-teeth facing in the opposite direction. When a heddle-frame is drawn down by the harness-motion, the tension of the warp-threads will raise the heddles to their highest position in their heddle-frames. Upon the breaking or undue slackening of a warp-thread its heddle will be allowed to drop down into engagement with the toothed upper edges of the heddle-rod and its feeler. A heddle in this abnormal position will engage between the teeth or projections of the heddle-rod and of the feeler, so as to lock the feeler from motion in one direction, while it will permit the same to slide or ratchet in the opposite direction. To reciprocate the feelers, I preferably employ cam-plates, one of which is fixed, while the other is normally stationary, but is mounted to yield and bring the stopping devices of the loom into action whenever a feeler is locked by a heddle having assumed an abnormal position. In connection with this form of warp stop-motion I have in some instances employed wire heddles of ordinary construction, except that the end loops are elongated to allow the heddles to be movably mounted; but in practice I have found that the elongated end loops or eyes of the wire heddles in some instances have permitted the heddle-eyes to cross—that is to say, the end eye of one heddle in some instances has been crowded through the eye of the next adjacent heddle. In some instances also I have employed heddles formed by flat metallic strips having central thread-receiving eyes and elongated end slots. Metallic heddles of this construction I have found to be undesirable, as the thread-receiving eye and end slots are in the same plane, which necessitates each warp-thread being deflected as it passes through its heddle. To overcome these objections, I have devised a composite heddle having slotted sheet-metal end pieces and a wire body or central portion having a thread-receiving eye formed therein, which may, if desired, be in a plane at right angles to the plane of the

end pieces. Heddles of this construction do not become snarled or entwined with each other at their ends, and the warp-threads do not have to be deflected to pass through the thread-receiving eyes.

Referring to the drawings and in detail, which illustrate a construction which is the best now known to me, but which of course can be modified to suit different forms of looms, A designates the side frame of a loom; B, the breast-beam thereof; C, the whip-roll, and D the vibrating lay. These parts may be of the ordinary or any approved construction and need not be herein described at length.

The heddle-frames, which are alternately moved up and down by any of the ordinary harness-motions, are designated by the reference-letter F, and in the present instance I have illustrated a construction employing four heddle-frames; but it is to be understood that my warp stop-motion can be applied to looms employing a lesser or greater number of heddle-frames, as desired. The construction of heddle-frame which I preferably employ is most clearly illustrated in Figs. 5 and 6. As shown in these figures, the top and bottom bars 10 of the heddle-frame are preferably made of wood, and the end bars 11 are preferably formed of malleable-iron castings or of metal and have bosses or guides 12 for the movable feelers, hereinafter described. The lower heddle-rods 13 of the heddle-frames are of the ordinary construction, and the upper heddle-rods are formed, preferably, by means of plates 14 and 15, having ratchet-teeth along their upper edges, which plates 14 and 15 are separated and secured together at their lower edges by strips 16. Mounted between the plates 14 and 15 of the upper heddle-rods are feelers 17, having ratchet-teeth along their upper edges facing in the opposite direction to the teeth formed in the upper edges of the plates 14 and 15.

To properly guide the heddle-frames and prevent the same from swaying back and forth in the loom, I preferably provide guides for engaging the opposite sides thereof. As illustrated, bracket-pieces 22 are bolted to the loom sides, and adjustably mounted on the brackets 22 are guiding-pieces 23. (See Figs. 5 and 6.) Secured on one of the guiding-pieces 23 is a sheet-metal cam-plate 34 for throwing the feelers 17 in one direction when the heddle-frames are moved up. A second cam-plate for throwing the feelers in the opposite direction when the heddle-frames are moved down is mounted at the opposite side of the loom, so as to yield and bring the stopping devices into action when a feeler is locked in place by a heddle in an abnormal position. A bracket 24 is bolted onto the loom side, and, if desired, one of the bolts used for securing the arch of a loom to the side frames may be employed for securing this bracket in place. Adjustably mounted on the bracket 24 is a yoke 25, journaled in which is a rock-shaft carrying the cam-plate 31. Bolted at one side of the cam-plate 31 is a finger 32 for engaging a lever 26, pivoted in the yoke-piece 25. The rear end of the lever 26 is connected by a downwardly-extending rod or wire 30 to a stopping slide or link 29, which is mounted in guiding-pieces 27 and 28, as shown in Fig. 1, and is normally located below the path of the vibrating lay, but can be moved up, so as to bring a notch or lug thereon in position to coöperate with a stop on the vibrating lay. At its front end the stopping slide or link 29 is provided with an upturned finger located in position to engage the ordinary knock-off lever of the loom, which is usually pivoted on the under side of the breast-beam and is operated by the ordinary weft stop-motion and which need not be herein shown or described. Also secured to the rear end of the lever 26 and connected to any suitable part of the loom is a spring 36, which normally raises the front end of the lever 26 and holds the cam-plate in position to move the feelers 17 to the right as the heddle-frames move down, as illustrated in Fig. 5. Threaded into the upper part of the cam-plate 31 is a set-screw 33, which can be adjusted to regulate the normal position of the cam-plate 31, so as to impart a greater or less motion to the feelers 17, as desired. By means of this construction the feelers 17 will be reciprocated or moved in opposite directions by the cam-plates 34 and 31 during the normal operation of the loom.

When a heddle assumes an abnormal position by reason of the failure of its warp-thread, the feeler 17 will be free to ratchet or move to the left, as illustrated in Fig. 5, but will be locked against motion to the right, and on the next downward motion of its heddle-frame it will tip the cam-plate 31 to the position illustrated in Fig. 6 and will raise the stopping-slide 29, so that at the next motion of the vibrating lay the stopping-slide will be shifted by the lay to operate the knock-off lever and stop the loom in the ordinary manner. In the present instance I have illustrated my warp stop-motion as applied to a loom which would be driven at the left-hand side thereof; but in order to employ the parts constituting my warp stop-motion in a loom which is driven at the right-hand side thereof it is simply necessary to secure the stationary cam-plate to the other guiding-piece 23 to turn the heddle-frames around so as to present the opposite sides thereof toward the front and to change the relative adjustment of the bracket 24 and yoke 25, so that when these parts are secured to the opposite side frame of the loom the cam-plate will be presented in proper position to coöperate with the feelers.

The application of my warp stop-motion to to a loom does not prevent the ready removal of the heddle-frames from the loom for the purpose of drawing in fresh warps, and one especial advantage in the use of my warp stop-motion resides in the fact that the same

adds little or nothing to the thickness and weight of the heddle-frames, and as it does not require the use of attachments which extend out laterally from the heddle-frames my warp stop-motion is especially applicable to fancy looms, which employ a comparatively-large number of heddle-frames which are necessarily set close together and which from the nature of the construction cannot be provided with lateral extensions which would in any way interfere with the free up-and-down movement thereof.

The form of composite heddle which I preferably employ for controlling my warp stop-motion is most clearly illustrated in Fig. 4. As shown in this figure, each of the composite heddles is composed of slotted metallic end plates 18 and wire body or central portions 20, having a thread-receiving eye 21 in a plane at right angles to the plane of the metallic end plates 18. In practice the wire body portion 20 is preferably formed of two strands of wire, and the wire strands can be laced through the metallic end plates or may be brazed or secured thereto in any of the ordinary or desired manners.

In order to prevent some of the heddles from dropping down into position to lock the feelers 17 when the warp-threads have simply become slightly slackened without being actually broken, I preferably provide cross-rods 35, which are supported in sockets on the guiding-pieces 23 in such a position that when a heddle-frame moves down they will engage the abnormally-slack warp-threads and as a heddle-frame continues to move down will raise the heddles corresponding thereto up, so as not to be engaged by one of the feelers 17.

It is obvious, of course, that a warp stop-motion for looms constructed according to my invention can be operated by heddles of different forms from the composite heddle herein shown and claimed and that many changes can be made in the construction and operation of the parts without departing from the scope of my invention as expressed in the claims. I do not wish, therefore, to be limited to the forms which I have shown and described; but

What I do claim, and desire to secure by Letters Patent of the United States, is—

1. In a loom, the combination of a heddle-rod having teeth or projections, a feeler having coöperating projections, heddles movably mounted on the heddle-rod, a cam-plate for shifting the feeler in one direction when the heddle-rod moves down, means for shifting the feeler in the opposite direction when the heddle-rod moves up, a stopping-slide normally located below the path of the vibrating lay, and connections for raising the stopping-slide when the cam-plate is caused to yield by the feeler having been locked by a heddle in an abnormal position, substantially as described.

2. In a loom, the combination of a heddle-rod having teeth or projections, a feeler having coöperating projections, heddles movably mounted on the heddle-rod, cam-plates for shifting the feeler in relatively-opposite directions, a stopping-slide normally located below the path of the vibrating lay, and a connecting rod and lever for raising the stopping-slide into the path of the lay when one of the cam-plates is caused to yield by a feeler having been locked by a heddle in an abnormal position, substantially as described.

3. In a loom, the combination of a heddle-frame, a feeler movably mounted therein, a cam-plate for moving the feeler in one direction, means for moving the feeler in a relatively-opposite direction, and means for adjusting the inclination of the cam-plate to change the throw of the feeler, substantially as described.

4. In a loom, the combination of heddle-frames, guides for preventing the lateral vibration of said heddle-frames, a feeler mounted in each of said heddle-frames, a cam-plate secured to one of the guides for moving the feeler in one direction, a cam-plate for normally shifting the feeler in the opposite direction, and mounted to yield when the feeler is locked by a heddle in an abnormal position, and a yoke-piece and bracket for mounting said cam-plate on the side frame of a loom, said yoke-piece and bracket being adjustably secured together so that they can be employed for supporting the cam-plate in proper position in looms which are driven either at the right or left hand side thereof, substantially as described.

In testimony whereof I have hereunto set my hand in the presence of two subscribing witnesses.

JOHN F. DUSTIN.

Witnesses:
LOUIS W. SOUTHGATE,
PHILIP W. SOUTHGATE.