

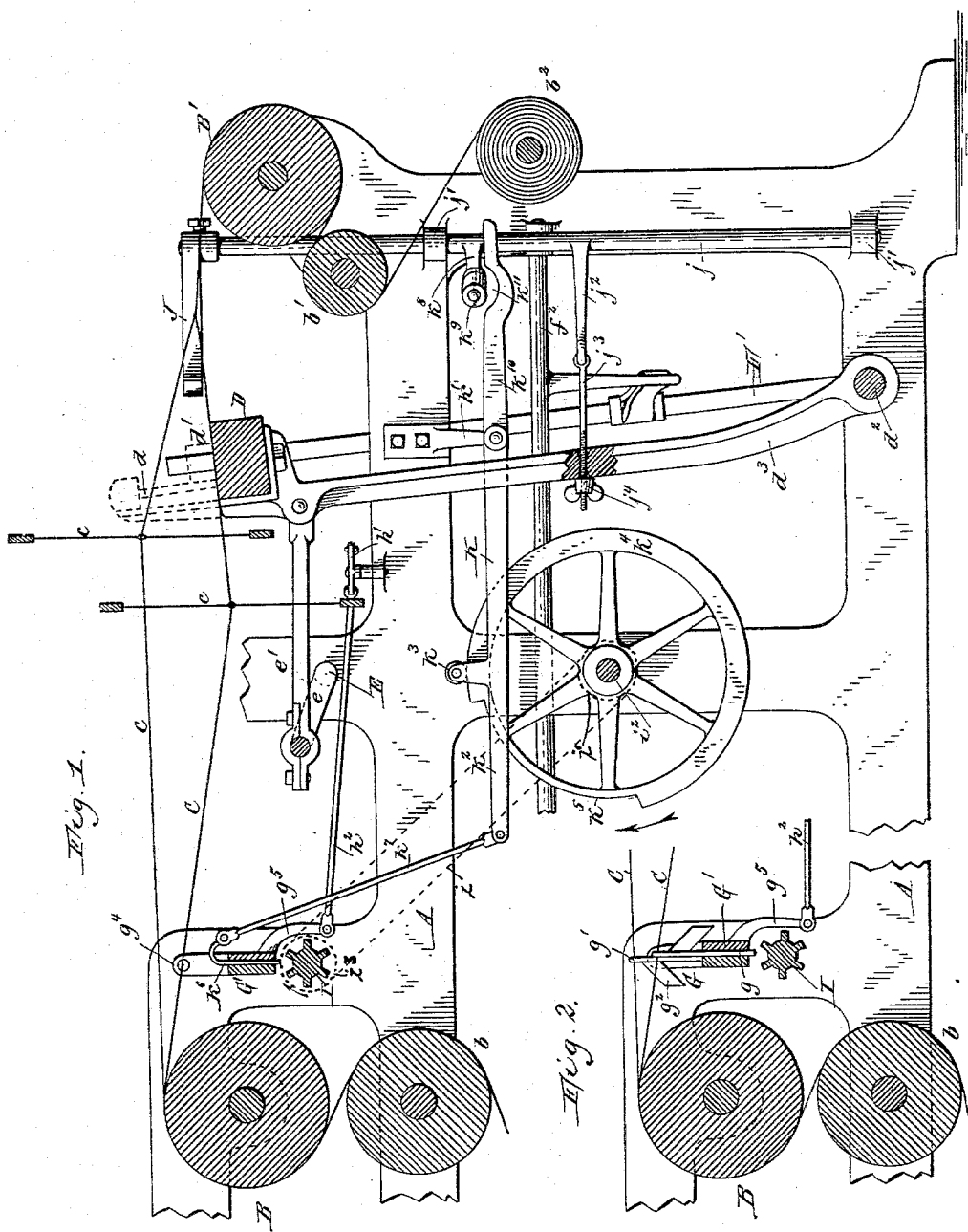
(No Model.)

4 Sheets—Sheet 1.

W. H. CRAIG.
STOP MOTION FOR LOOMS.

No. 546,418.

Patented Sept. 17, 1895.



Witnesses:

Theo. L. Popp.
Jacob Rupenblatt.

William H. Craig, Inventor.
By Edward Wilhelm.
Attorney.

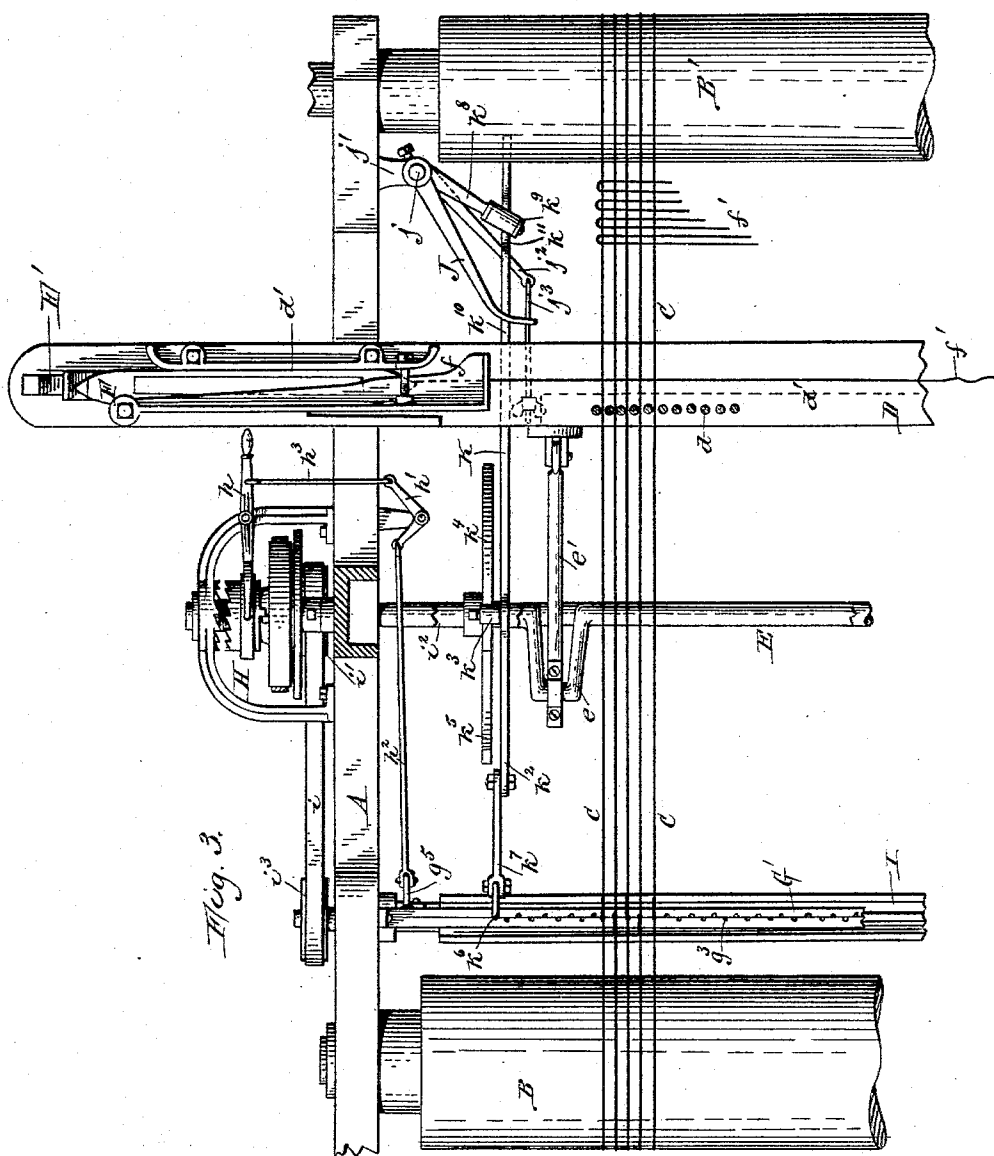
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4 Sheets—Sheet 2.

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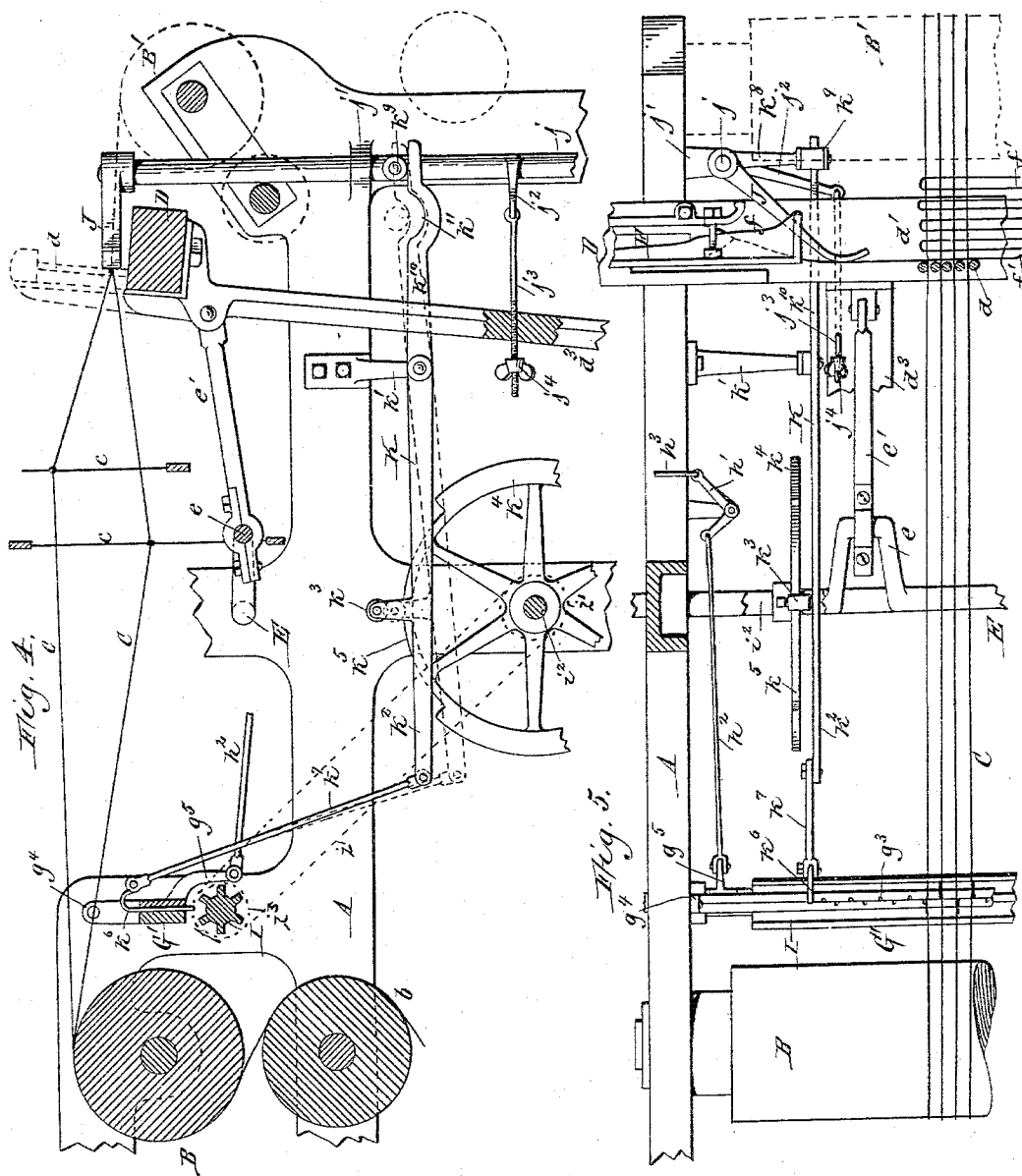
Witnesses:
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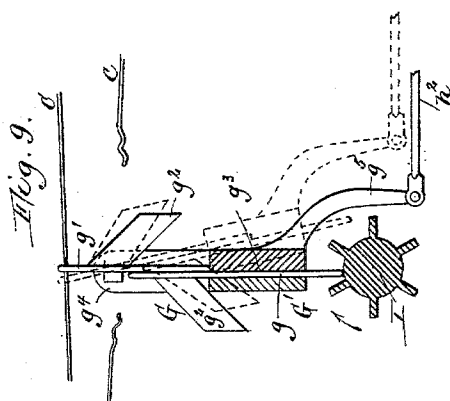
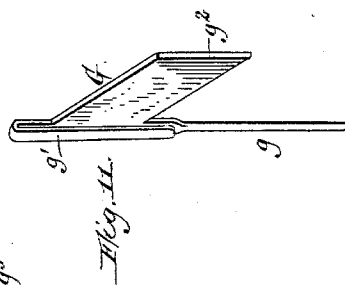
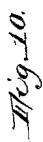
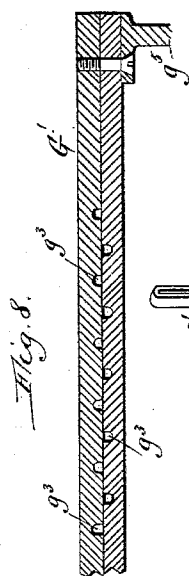
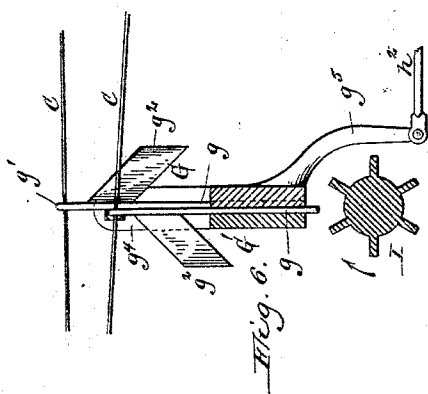
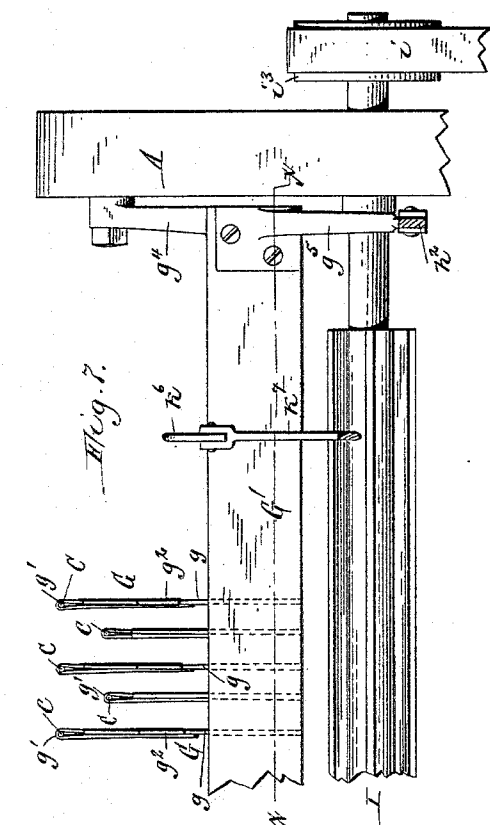
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UNITED STATES PATENT OFFICE.

WILLIAM H. CRAIG, OF SYRACUSE, NEW YORK, ASSIGNOR TO THE E. C. STEARNS & COMPANY, OF SAME PLACE.

STOP-MOTION FOR LOOMS.

SPECIFICATION forming part of Letters Patent No. 546,418, dated September 17, 1895.

Application filed August 5, 1890. Serial No. 361,117. (No model.)

To all whom it may concern:

Be it known that I, WILLIAM H. CRAIG, a citizen of the United States, residing at Syracuse, in the county of Onondaga and State of New York, have invented a new and useful Improvement in Stop-Motions for Looms, of which the following is a specification.

This invention relates to a stop mechanism for looms whereby the operation of the loom is automatically stopped when one of the warp-threads or the weft-thread is broken. When a breakage of either of these threads occurs, it is necessary to immediately stop the action of the loom in order to avoid spoiling a portion of the fabric already woven.

The object of my invention is to provide means whereby a clutch is acted upon by the breakage of either of the threads and the loom is stopped, as will be hereinafter fully described.

In the accompanying drawings, consisting of four sheets, Figure 1 is a fragmentary longitudinal sectional elevation of a wire-cloth-weaving loom provided with my improvements and showing the lay in its backward position. Fig. 2 is a fragmentary sectional elevation of the pendant-frame and connecting parts, showing a pair of pendants attached to the warp-threads. Fig. 3 is a fragmentary plan view of the loom in the position shown in Fig. 1. Fig. 4 is a fragmentary longitudinal sectional elevation of the loom, showing the lay in its forward position. Fig. 5 is a fragmentary plan view of the same. Fig. 6 is an enlarged sectional elevation of the pendant-frame and connecting parts. Fig. 7 is a fragmentary front elevation thereof. Fig. 8 is a horizontal section in line *xx*, Fig. 7. Fig. 9 is an enlarged sectional elevation of the pendant-frame, showing the parts in the position which they assume when one of the warp-threads is broken. Fig. 10 is a sectional elevation of the pendant-frame, showing the weft-pendant. Fig. 11 is a perspective view of one of the warp-thread pendants.

Like letters of reference refer to like parts in the several figures.

In the drawings only one side of the loom is shown, as the parts of the loom on both sides are identical.

A represents the side frames of the loom; B, the warp-beam; *b*, a let-off tension-roller arranged underneath the warp-beam; B', the cloth-beam; *b'*, the cloth-tension roller, and *b*² the take-up roller.

C represents the warp-threads passing from the warp-beam to the cloth-beam and forming a shed by means of the heddles *c*.

D represents the lay, provided at its upper end with the usual reed *d* and shuttle-race *d'* and supported on the transverse rock-shaft *d*² by means of arms *d*³. An oscillating motion is imparted to the lay by the main driving-shaft E, which is provided with a crank *e*, connected with the lay by a pitman *e'*.

F represents the shuttle, *f* the shuttle-boxes at each end of the lay, and *f'* the weft or shuttle thread.

F' represents the picker-sticks, to which a rocking motion is imparted from a rock-shaft *f*² in the usual manner.

G represents pendants, one of which is suspended from each of the warp-threads in front of the warp-beam. Each of these pendants is composed of a lower vertical portion or shank *g*, an upper hook-shaped portion *g'*, and a weight or wing *g*², which is arranged between the lower portions and the hook and which projects either forwardly or rearwardly. These pendants are hung with their hooks upon the warp-threads and play with their shanks in vertical openings *g*³, formed in a frame G', which is pivoted to the side frames of the loom. The hook of each pendant is preferably elastic and bears with its end lightly against the shank to prevent the pendant from becoming detached from the warp-thread. The pendants rise and fall with the vertical movements of the warp-threads, and in so doing their shanks *g* move vertically in the pendant-frame G' and are held in engagement with the warp-threads by the weights *g*². The latter are arranged to hang alternately on the front and rear sides of the pendant-frame, so as to permit the pendants to be arranged closely together and also balance the pendant-frame. The pendant-weights are preferably lozenge-shaped and incline downwardly from the shanks to form a wedging edge, which guides the weights upwardly be-

tween the adjacent descending warp-threads and prevents catching against the latter. The pendant-frame is preferably composed of two flat bars having their contiguous surfaces grooved, so that on securing them together the grooves will break joint and form vertical openings, which receive the shanks g of the pendants, as shown in Figs. 3, 5, and 8. The pendant-frame is provided at both ends with upwardly-projecting arms g^4 , which are pivoted to the side frames A and permit of a swinging movement of the pendant-frame and its pendants.

g^5 represents a depending arm secured to the front side of the pendant-frame and connected with the hand-lever h of a clutch H by means of a bell-crank h' . The latter is pivoted to one of the side frames and connected by rods h^2 h^3 with the depending arm of the pendant-frame and the hand-lever of the clutch. The clutch is mounted on the outer end of the main driving-shaft E and connects the loom with the driving mechanism or disconnects it therefrom.

I represents an elongated star-wheel or longitudinally-grooved roller arranged underneath the pendant-frame and journaled in the side frames. This star-wheel is rotated continuously in the direction of the arrow by a belt i , running around a pulley i' on the outer end of a transverse shaft i^2 and a pulley i^3 on the outer end of the star-wheel. So long as the warp-threads remain intact the pendants rise and fall with the warp-threads over the star-wheel and do not touch the latter. When one of the warp-thread breaks, its pendant drops and the lower end of its shank engages in one of the grooves of the star-wheel. The latter continues to revolve and moves the dropped pendant and the pendant-frame forwardly into the position indicated in dotted lines in Fig. 9. This forward movement of the pendant-frame throws the clutch out of engagement, owing to its connection with the pendant-frame, by means of the bell-crank and connecting-rods, and thus stops the loom.

J represents a feeling-finger which engages against the weft-thread as the latter is carried toward the cloth-beam by the reed on the lay. The feeling-finger is secured to the upper end of a vertical rock-shaft j , journaled in bearings j' in one of the side frames. j^2 represents a laterally-extending arm formed on the vertical rock-shaft and connected with the rock-arm d^3 of the lay by means of a sliding rod j^3 and thumb-nut j^4 .

K represents a longitudinal trip-lever pivoted on a bracket k' , secured to one of the side frames and provided on its inner arm k^2 with a laterally-projecting trip-roller k^3 . The latter rests on a carrying-wheel k^4 , which is mounted on the transverse shaft i^2 and provided with a segmental peripheral notch k^5 . k^6 represents an auxiliary pendant arranged in one of the vertical openings in the pendant-frame and connected with the inner end of

the trip-lever by a connecting-rod k^7 . This pendant, which I will call the "weft-pendant," is adapted to move downwardly and engage with the star-wheel, like the warp-pendants; but its vertical movements are controlled by the weft-thread through the medium of the feeling-finger and connecting parts.

k^8 represents an inwardly-projecting trip-arm formed on the rock-shaft of the feeling-finger and provided at its end with a roller k^9 , which is adapted to oscillate horizontally over the outer arm k^{10} of the trip-lever. The trip-lever is provided in its upper end side and near its end with a notch or depression k^{11} .

The weft-thread, when unbroken, as shown in Figs. 1 and 3, is carried toward the cloth-beam by the lay and reed in order to pack the last weft against the completed fabric. In its forward movement the weft-thread strikes the feeling-finger and carries the same forward into the position indicated in Figs. 4 and 5. This movement of the feeling-finger causes the trip-arm, secured to the vertical rock-shaft, to swing forwardly, so that its roller bears upon the upper side of the trip-lever, beyond the notch, and holds the outer arm of the trip-lever against upward movement. About the same time that the lay carries the weft forward and the latter strikes the feeling-finger the carrying-wheel has revolved, so that its notch stands underneath the trip-roller k^3 on the inner arm of the trip-lever. When the parts are in this position, the trip-roller and the inner arm of the trip-lever are held against downward movement and prevented from engaging in the notch of the carrying-wheel by the trip-arm k^8 on the rock-shaft of the feeling-finger bearing against the upper side of the outer arm of the trip-lever and holding this arm against upward movement, and consequently the inner arm against downward movement. The trip-arm k^8 remains over the outer arm of the trip-lever until the carrying-wheel has revolved sufficiently to carry its notch beyond the trip-roller of the trip-lever. The sliding rod j^3 has sufficient dead movement in the lay to permit the latter to move backward a short distance without moving the feeling-finger, and this dead movement of the lay takes place on its return stroke, during the time that the notch of the carrying-wheel is underneath the trip-lever roller. After the notch of the carrying-wheel has passed by the trip-roller the lay-arm strikes the thumb-nut on the sliding rod during the last portion of its return movement, whereby the feeling-finger is returned to its normal position, as shown in Figs. 1 and 3. In the normal position of the feeling-finger the trip-arm k^8 stands over the notch k^{11} in the outer arm of the trip-lever. It is therefore seen that so long as the weft is in its normal condition the trip-lever is supported either at its inner end by the trip-roller resting on the wheel or at the outer end by the trip-arm resting on the lever, and in this normal position the trip-lever holds the weft-

pendant out of engagement with the star-wheel.

In case the shuttle has not been propelled entirely across the shuttle-race, or if the weft-thread has been broken, the latter does not strike the feeling-finger during the forward movement of the lay and the feeling-finger remains in its position, which leaves the trip-arm K^8 standing over the notch k^{11} in the outer arm of the trip-lever. When the revolving carrying-wheel next presents its notch underneath the trip-roller, the inner arm of the trip-lever descends by reason of its overhanging weight and the outer arm of the trip-lever ascends. When the inner end of the trip-lever descends into the position shown in dotted lines in Fig. 4, it causes the weft-pendant k^6 to drop in the pendant-frame until it engages with the rotary star-wheel. The latter in continuing to rotate strikes the lower end of the weft-pendant and moves the latter and the pendant forwardly into the position heretofore described with reference to the warp-pendants, and which is shown in dotted lines in Fig. 9, whereby the clutch connected with the pendant-frame is disengaged.

In the drawings only one of the weft feeling-fingers and its connecting parts are shown, but in constructing looms two separate feeling-fingers are preferably provided on opposite sides of the loom, so that the breakage of the weft-thread can be determined at either end of the shuttle-race. The carrying-wheels on opposite sides of the loom are so arranged that their notches will alternately present themselves underneath the trip-rollers according to the position of the shuttle at one end or the other of the shuttle-race.

I claim as my invention—

1. The combination with the pendant frame, of pendants provided with shanks which slide in the frame, hooks which engage over the warp threads and projecting weights or wings, substantially as set forth.

2. The combination with the rock shaft provided with a feeling finger bearing against the weft thread and with a trip arm, of a trip lever engaging against said trip arm, a wheel provided with a notch which permits the trip lever to drop when the weft thread is broken, a clutch, and mechanism interposed between the trip lever and the clutch whereby the operation of the latter is controlled, substantially as set forth.

3. The combination with the main frame of a loom, of a rock shaft provided with a feeling finger bearing against the weft thread and with a trip arm, a clutch, mechanism connecting said trip arm with the clutch, a lay moving toward and from said rock shaft and a sliding connection between the lay and said rock shaft, whereby the movement of the lay toward said rock shaft presses the weft thread against the feeling finger and swings the latter in one direction, while the return movement of the lay swings the feeling finger in

an opposite direction by means of the sliding connection, substantially as set forth.

4. The combination with the main frame of a loom, of a rock shaft provided with a feeling finger bearing against the weft thread and with a trip arm, a lay moving toward and from said rock shaft, a sliding connection between the lay and said rock shaft, a trip lever engaging against said trip arm, a wheel provided with a notch which permits the trip lever to drop when the weft thread is broken, a clutch, and mechanism interposed between the trip lever and the clutch whereby the operation of the latter is controlled, substantially as set forth.

5. The combination with the main frame of a loom, of a rock shaft provided with a feeling finger bearing against the weft thread and with a trip arm, a lay moving toward and from said rock shaft, a sliding connection between the lay and said rock shaft, a trip lever engaging against said trip arm, a wheel provided with a notch which permits the trip lever to drop when the weft thread is broken, a clutch, a movable pendant frame connected with the clutch, a pendant arranged in said frame and connected with the trip lever, and a rotating star wheel adapted to engage against a dropped pendant and thereby move the pendant frame and the clutch, substantially as set forth.

6. The combination with the clutch, of a movable pendant frame connected therewith, a pendant arranged in said frame, a star wheel adapted to engage with a dropped pendant and thereby move the pendant frame and the clutch, a feeling finger bearing against the weft thread, and intermediate mechanism substantially as described, whereby the failure to move the feeling finger occasioned by the breaking of the weft thread causes the pendant to drop, substantially as set forth.

7. The combination with the clutch, of a movable pendant frame connected therewith, a pendant arranged in said frame, a star wheel adapted to engage with a dropped pendant and thereby move the pendant frame and the clutch, a trip lever connected with the pendant, a wheel provided with a notch which permits the trip lever to drop when the weft thread is broken, and a feeling finger bearing against the weft thread and connected with a trip arm whereby the trip lever is controlled, substantially as set forth.

8. The combination with the clutch, of a movable pendant frame connected therewith, a weft pendant connected with said frame, a feeling finger bearing against the weft thread, mechanism substantially as described whereby the feeling finger is connected with said weft pendant, a warp pendant arranged in said pendant frame and supported on the warp thread, and a star wheel arranged underneath said pendant frame and adapted to engage with either of said pendants when dropped, substantially as set forth.

9. The combination with the clutch, of a
movable pendant frame connected therewith,
a weft pendant arranged in said frame, a trip
lever connected with said weft pendant, a
5 wheel provided with a notch which permits
the trip lever to drop when the weft thread
is broken, a feeling finger bearing against the
weft thread and connected with a trip arm
whereby the trip lever is controlled, a warp
10 pendant, and a star wheel arranged under-

neath said pendant frame and adapted to
engage with either of said pendants when
dropped, substantially as set forth.

Witness my hand this 31st day of July,
1890.

WILLIAM H. CRAIG.

Witnesses:

CHESTER D. HOWE,

JOHN N. ARDNER.