

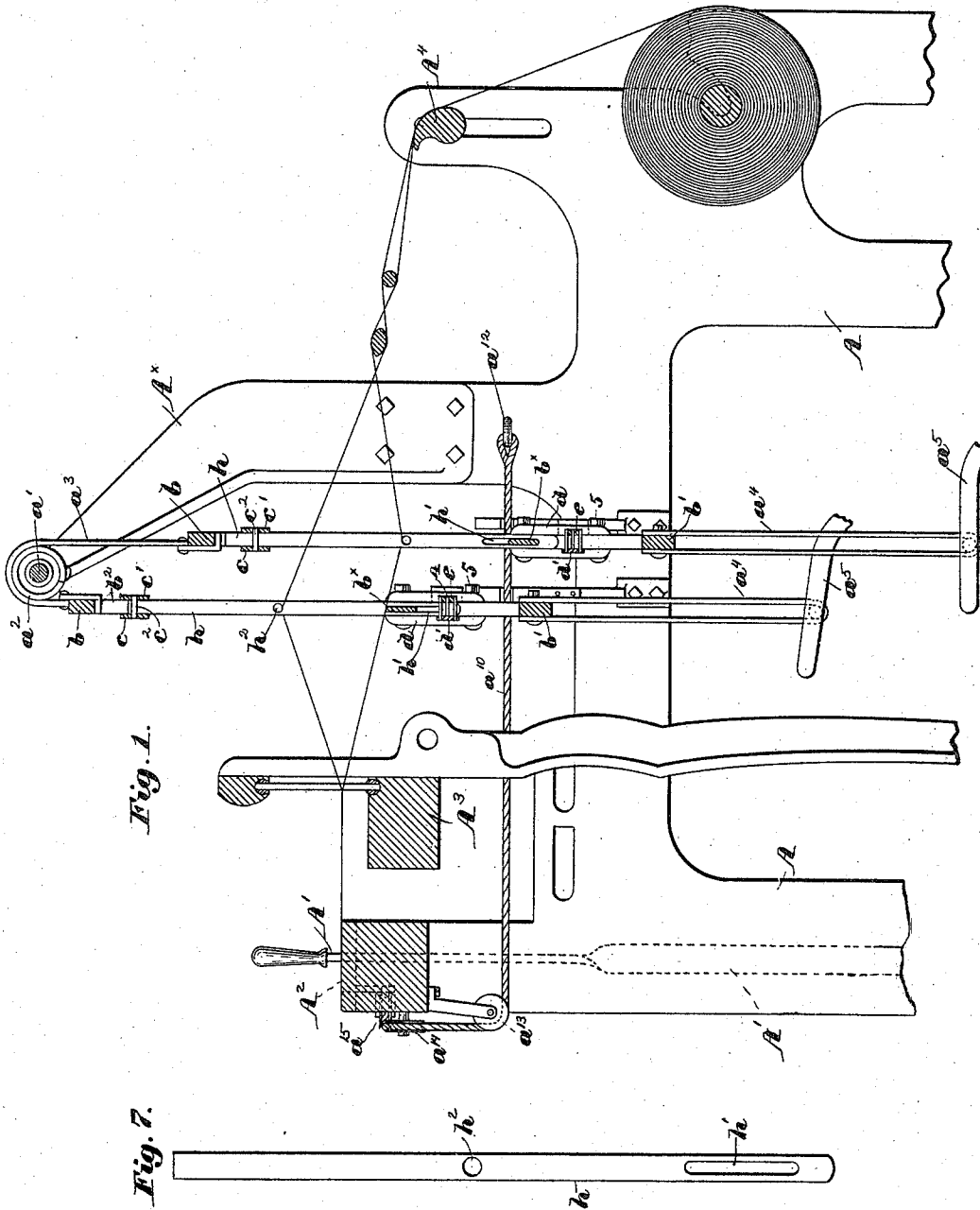
(No Model.)

2 Sheets—Sheet 1.

G. O. DRAPER.
WARP STOP MOTION FOR LOOMS.

No. 576,504.

Patented Feb. 2, 1897.



Witnesses:
Edward W. Allen.
Walter C. Lombard.

Inventor:
George O. Draper,
by Crosby Gregory,
Attys.

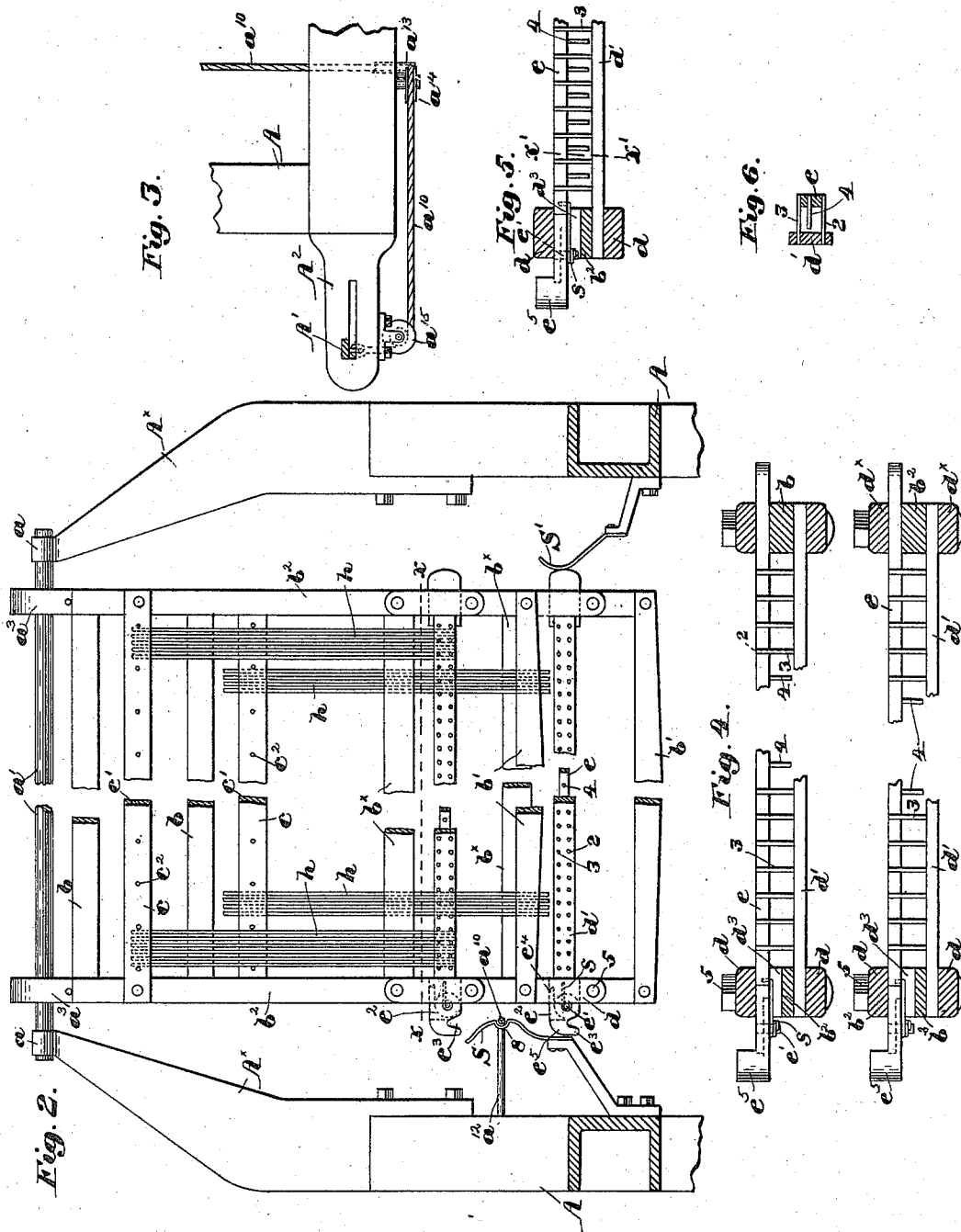
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UNITED STATES PATENT OFFICE.

GEORGE O. DRAPER, OF HOPEDALE, MASSACHUSETTS, ASSIGNOR TO THE
NORTHROP LOOM COMPANY, OF SAME PLACE AND SACO, MAINE.

WARP STOP-MOTION FOR LOOMS.

SPECIFICATION forming part of Letters Patent No. 576,504, dated February 2, 1897.

Application filed May 25, 1896. Serial No. 592,908. (No model.)

To all whom it may concern:

Be it known that I, GEORGE O. DRAPER, of Hopedale, county of Worcester, State of Massachusetts, have invented an Improvement
5 in Warp Stop-Motions for Looms, of which the following description, in connection with the accompanying drawings, is a specification, like letters on the drawings representing like parts.

10 This invention has for its object the production of a simple and efficient warp stop-motion for looms, contained in the harness, the heddles not only controlling the warp in the formation of the shed, but also acting in
15 automatically stopping the loom when a warp-thread breaks.

In stop-motion devices heretofore patented, so far as I am aware, the heddles have been supported either by two transverse bars or
20 rods, one above and the other below the warp-eye, extended through slots in the heddles, or by one of such bars at the upper ends of the heddles, while in my present invention I support the heddles by a transverse bar below
25 the plane of the warp, thus leaving the upper ends of the heddles free to a certain extent. Furthermore, instead of using stop-motion devices which are independent of the harness-frame I provide the frame itself with the stop-motion devices, and in consequence I do not
30 have to depend upon such fine adjustment of the parts, as the relative position of the harness-frame and stop-motion device is unchanged.

35 I have dispensed with stationary guides for the heddles, the stationary warp-support, and the vibrator adapted to move in the direction of the length of the warp-threads, such devices being shown in other patents.

40 Figure 1 is a section, from front to back, of a sufficient portion of a loom to be understood with my improvements embodied therein. Fig. 2 is a front elevation, broken out centrally to save space, of the harness-frames
45 and heddles and the stop-motion mechanism. Fig. 3 is a detail in plan view of a part of the loom-frame, showing in section the shipper-handle and part of its connection with the controlling mechanism therefor. Fig. 4 is an
50 enlarged transverse section, taken below the line $x\ x$, Fig. 2, and centrally broken out, of

the two harness-frames, showing the feeler in normal position, the heddles being omitted. Fig. 5 is a similar detail view showing the feeler as changed in its position relative to
55 the harness-frame to detect a dropped heddle. Fig. 6 is a transverse sectional view on the line $x' x'$, Fig. 5; and Fig. 7 is an enlarged side elevation of a form of heddle used herein.

The loom-frame A, the belt-shipper handle
60 A', the notched plate A² to hold it in place when the loom is moving properly, the lay A³, carrying a reed, and the whip-roll A⁴ are and may be all as common in looms. Two up-
rights A^x, one at each side of the loom-frame, 65 are provided with bearings a for a shaft a' , having thereon suitable pulleys a^2 , over which are passed suitable straps a^3 , connected to the upper bars of the heddle or harness frames, the loom herein shown having two heddle-
70 frames, although a greater number may be employed, if desired.

Each heddle-frame is composed of a top bar b , a bottom bar b' , and rigidly-attached
75 side bars b^2 , the lower bars of the frames being herein shown as connected by suitable straps a^4 to the usual actuating-levers a^5 , partially shown in Fig. 1. Each frame has attached thereto a transverse heddle-supporting
80 bar b^x , which passes through elongated slots h' (see Fig. 7) at the lower ends of the heddles h , the latter having warp-eyes h^2 .

The upper ends of the heddles are freely movable vertically in a guide, shown as composed of bars $c\ c'$, secured, respectively, to
85 the front and back of the side bars b^2 , the guide steadying the heddles from movement in the direction of the warps without interfering with their vertical movement relative to the heddle-frame, cross-pins c^2 , extended
90 from one to the other of the bars $c\ c'$, dividing the series of heddles into groups and preventing their bending or swaying laterally beyond a limited distance, such side movement permitting large warp ends or bunches
95 to pass freely at the eye portions of the heddles. Such side movement is not retarded or hindered by the bars at the back and front of the heddles, but it would be materially hindered if not practically prevented by a
100 supporting-bar extended through the upper ends of the heddles.

The top bar b of the heddle-frame above the heddle ends prevents the weaver's arms from engaging the heddle ends when piecing up the warp, and also strengthens the frame.

5 In case of heddles supported only at their upper ends or above the warps it sometimes happens that when used with coarse warps the heddles will buckle when pushing down the warps to form the lower plane of the shed, and an uneven layer of thread is presented for the shuttle to pass over. The evenness of the lower plane of the shed is of much more importance than that of the upper plane, obviously, and by locating the heddle-support below the warp-threads the threads in the lower plane of the shed will always be presented in an even layer, while at the same time the upper ends of the heddles remain to some extent free.

20 Brackets or holders $d d^x$ are attached to the sides of each heddle-frame opposite each other by suitable bolts, as 5, to carry the controlling members of the stop-motion mechanism, a cross-bar d' , rigidly secured to the holders, having upon its inner face a double series of projections or teeth 2 and 3, arranged in two horizontal rows, the teeth in the two rows being in vertical alinement. The holders are slotted to receive a feeler, shown as a slide-bar e , movable longitudinally between the two rows of projections 2 3 on the fixed bar d' and provided with a single row of projections or teeth 4, which extend toward the inner face of the cross-bar d' . One of the holders, as d , is recessed at d^s to receive a stud e' on the slide-bar e , on which is pivoted an ear e^2 , having a downwardly-hooked outer portion e^3 and a laterally-extended arm e^4 , which projects above the top of the bar e , a spring s , mounted on the stud e' , having its ends attached to the ear and slide-bar, respectively, to normally maintain the ear in the position shown in Figs. 2, 4, and 5. It will be observed that while the hooked portion e^3 may be depressed by partial rotation of the ear e^2 , raising the arm e^4 , the latter acts as a stop when engaging the slide-bar, preventing relative rotative movement of the ear in the opposite direction, the outer face e^5 of the hook being broadened and curved.

A cord or wire a^{10} is secured at one end to a fixed part of the loom-frame, as to a strut a^{12} , and the connection a^{10} is connected at its other end directly to the shipper-handle A' , passing over suitable guide rolls or sheaves a^{13} , a^{14} , and a^{15} , Figs. 1 and 3, a portion of the said cord or wire passing the heddle-frames in the paths of movement of the hooked ears e^2 when the slide-bars or "feelers," as they may be termed, are in operative position.

When the loom is working properly, the heddle-frames will act as usual loom-harnesses, opening the shed at the proper times for the passage of the weft or filling, but when a warp-thread breaks, its heddle, being no longer sustained thereby while its frame is in its downward movement, will drop a

distance equal to the excess of the heddle-slot h' over the width of its support b^x , (see Fig. 1,) and the lower end of the dropped heddle will pass between the rows of pins or teeth on the two bars d' and e . As the heddle-frame approaches the end of its downward movement a spring S , shown in Fig. 2 as secured to a bracket A^{10} on the loom-frame, will engage the curved outer end of the ear e^2 on the slide-bar e and will tend to move said slide-bar longitudinally. Such movement is opposed by the dropped heddle, which extends between the pins 2 3 on the member d' and the pins 4 on the member or feeler e , and as the latter is thus held from longitudinal movement it will compress the spring S , exposing the cord or wire a^{10} , which is engaged by the hook e^3 of the ear. The movement of the parts is so timed that a slight further downward movement of the heddle-frame will cause the hook to pull on the cord or wire, and thus disengage the shipper-handle A' from its retaining-notch and stop the loom.

As shown in Fig. 2, the spring S is provided with a bend 8 to normally secure the cord or wire a^{10} , so that if no heddle has dropped the spring will continue to act upon the feeler e as it passes by, moving it longitudinally in the holders $d d^x$, carrying the point of the hook e^3 past the cord or wire a^{10} without engaging therewith. The opposite end of the slide-bar or feeler e thus is projected beyond the holder d^x , and a second spring S' extends into the path of the projecting end of the feeler to return the latter to normal position.

The action of the returning or resetting spring S' for the "feeler," as it may be termed, is as follows: When the heddle-frame begins to rise, it will move independently of the heddles h , the heddle-support b^x rising a distance equal to the additional length of the slots h' in the heddles. During this movement the resetting-spring S' acts to slide the feeler e back into normal position (see Fig. 2) before the lower ends of the heddles enter the spaces between the teeth 2 3 and the series 4 on the feeler, the several series of teeth occupying the relative positions shown in Figs. 2 and 4.

After the movement of the feeler e the heddles enter the spaces between the teeth, and in continued upward movement of the heddle-frame the slide-bar or feeler e will be locked in position by the heddles. The hook e^3 on the feeler will be projected when it again engages the spring S , but as the feeler is locked the spring will be inoperative to effect any change in the position of the feeler. As the feeler continues to rise, however, its ear e^2 will turn on its pivot-stud e' as it passes the cord or wire a^{10} , the ear-spring s returning the ear to normal position as it is moved beyond the cord ready to engage the latter on its descent, as has been described, if a heddle drops.

Referring to Fig. 1, it will be seen that the heddle-supporting bars b^x are so positioned

that when the shed is open the lower plane of the warp-threads will be adjacent or intercepted by the cross-bar b^x of the upper heddle-frame. This construction prevents undue slackness in any warp-thread in the lower plane of the shed from permitting its heddle to drop sufficiently to stop the loom, and so said bar acts as a warp-rest.

It is not necessary to place the pins or teeth on the bar d' close enough to provide a separate opening for each heddle, and two or more heddles are arranged to enter the same space. The pins or teeth, whether in the series 2 3 or in the series 4, are rounded, as shown, so that a heddle when dropping cannot rest on the top of a pin, but must enter between a pair of them.

When a heddle has dropped, it will be held so firmly between two of the pins on the bar d' and a pin on the feeler e that it will have ample strength to resist the pressure of the spring S as it bears upon the projecting end of the feeler, the action of the heddle thus being very positive and preventing bending or distortion of the heddle.

Obviously the two sets of pins could be put on the movable member or feeler, and the cooperating single set on the relatively-fixed member, without departing from the spirit and scope of my invention, and various other modifications may be made in the construction and arrangement of parts as herein set forth.

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

1. A loom-harness comprising a frame, a series of metallic heddles slotted at their lower ends only, a cross-bar on said frame, extending through said slots and supporting the heddles vertically, guide-bars to confine the upper ends of the heddles in the direction of the warp, and cross-supports to divide the heddles into sections, substantially as described.

2. In a loom wherein the heddles are free to move vertically on their support for a limited extent, a heddle-frame and a horizontally-extended warp-rest attached thereto below the warp, said warp-rest when the frame is raised acting as a support for such slack threads in the lower plane of the shed as are abnormally depressed by the weight of their controlling-heddles, substantially as described.

3. In a loom, a heddle-frame provided with a horizontal bar and a series of metallic heddles having warp-eyes, and elongated slots at their lower ends, through which the bar is extended, combined with a feeler having projections to engage a dropped heddle, two series of horizontal projections fixed in position above and below the projections of the feeler respectively, means to normally move said feeler back and forth between the series of fixed projections, at right angles to the length

of the warp, stopping mechanism for the loom, and connections between the feeler and said stopping mechanism, to control the latter, substantially as described.

4. In a loom, a heddle-frame provided with a cross-bar and a series of metallic heddles each having a warp-eye and an elongated slot, to embrace and be moved vertically on said bar, combined with a transverse bar having two series of projections one above the other, to extend between and guide the lower ends of the heddles controlling the warps in the lower plane of the shed, a feeler movable at right angles to the length of the warp and between the two series of projections on the said transverse bar, to contact with a dropped heddle, the projections of the bar controlling and preventing lateral movement or bending of a heddle when engaged by the feeler, stopping mechanism for the loom; and connections between the feeler and said stopping mechanism, to control the latter, substantially as described.

5. In a loom, a heddle-frame provided with a cross-bar and a series of heddles adapted to move independently of said bar, a transversely-vibratable feeler carried by the frame, to engage and be held stationary by a dropped heddle, and a hooked ear mounted on said feeler, combined with a shipper-handle, a cord or wire attached thereto and normally in the path of the hooked ear, and means to move the feeler and its ear into inoperative position when the loom is working properly, a dropped heddle preventing such movement of the feeler, whereby the cord or wire is engaged by the hooked ear and the shipper-handle released to stop the loom, substantially as described.

6. In a loom, a heddle-frame provided with a horizontal bar and a series of metallic heddles each having a warp-eye and an elongated slot to embrace and be moved vertically on said bar, combined with a fixed transverse bar and a transversely-vibratable bar or feeler adjacent thereto, two sets of horizontal projections on one of said bars, and a third series of similar projections on the other bar and located between the first two series, and means to normally move said feeler back and forth at right angles to the length of the warp, a dropped heddle being held between a projection of the single series and corresponding projections in the double series, preventing bending or distortion of said heddle and stopping the movement of the vibratable bar, substantially as described.

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

GEORGE O. DRAPER.

Witnesses:

E. D. BANCROFT,
HENRY BROWN.