

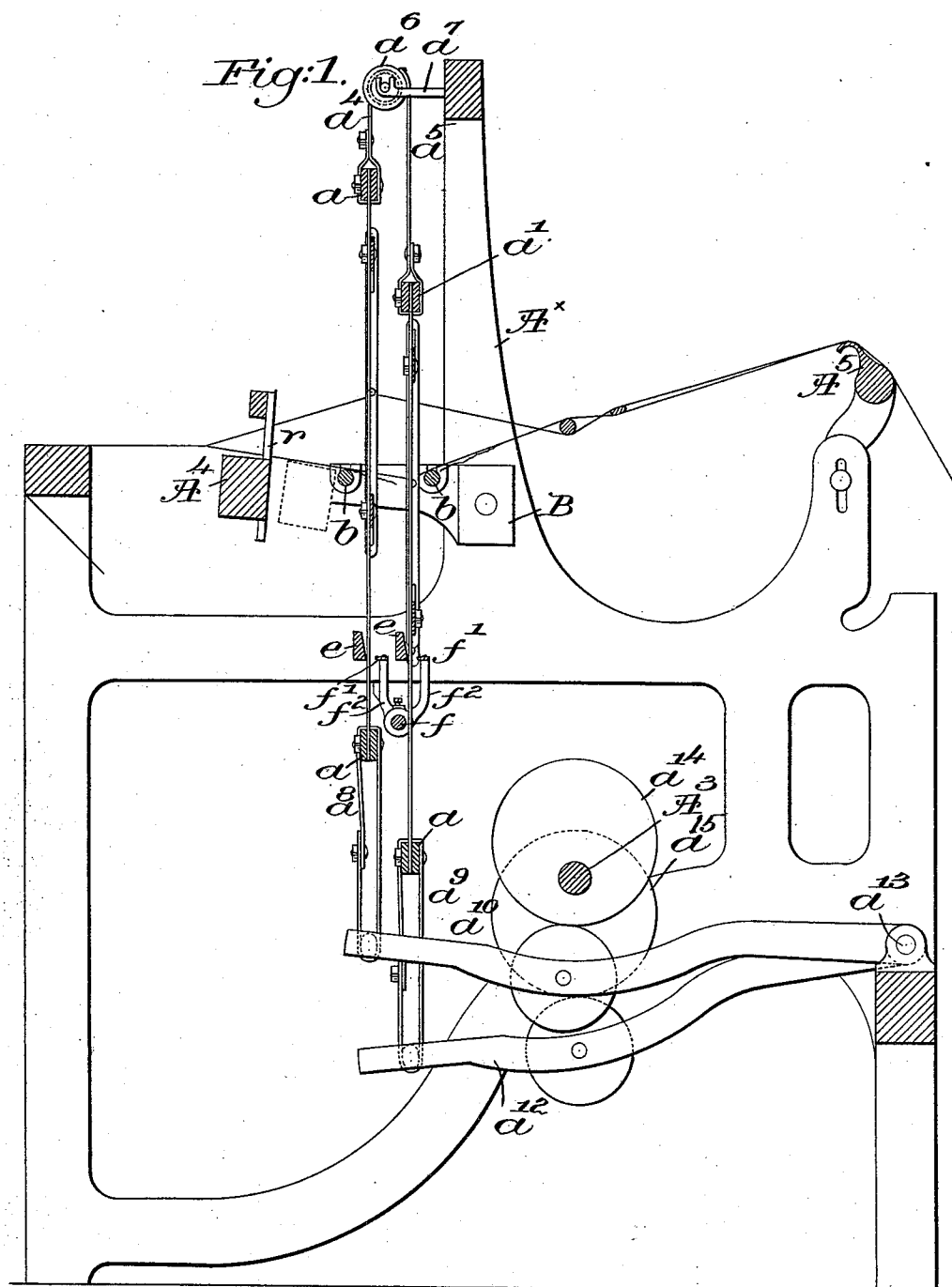
(No Model.)

3 Sheets—Sheet 1.

C. F. ROPER.
WARP STOP MOTION FOR LOOMS.

No. 536,969.

Patented Apr. 2, 1895.



Witnesses.

Fred S. Grumbaf.

Thomas F. Drummond.

Inventor

Charles F. Roper,

by Crosby & Gregory
attys.

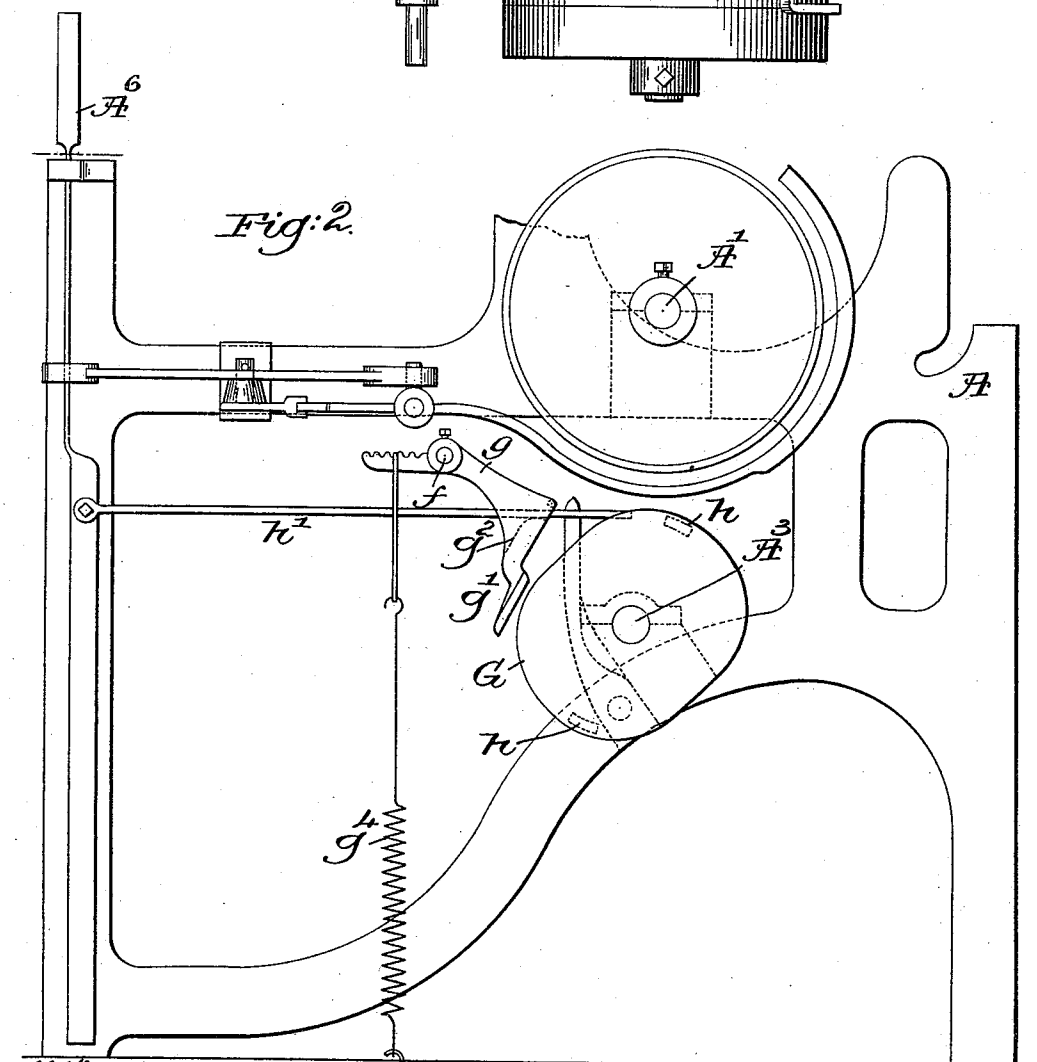
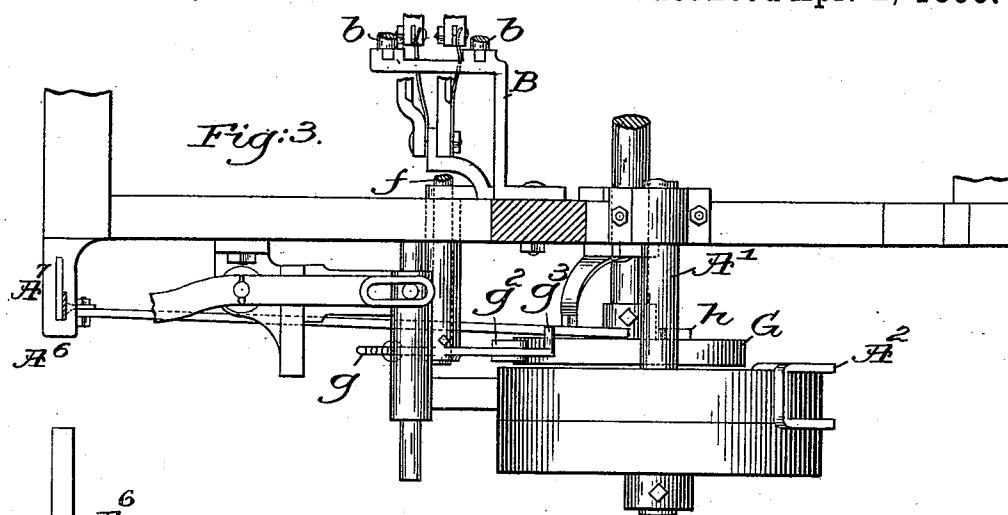
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3 Sheets—Sheet 2.

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3 Sheets—Sheet 3.

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Fig:4.

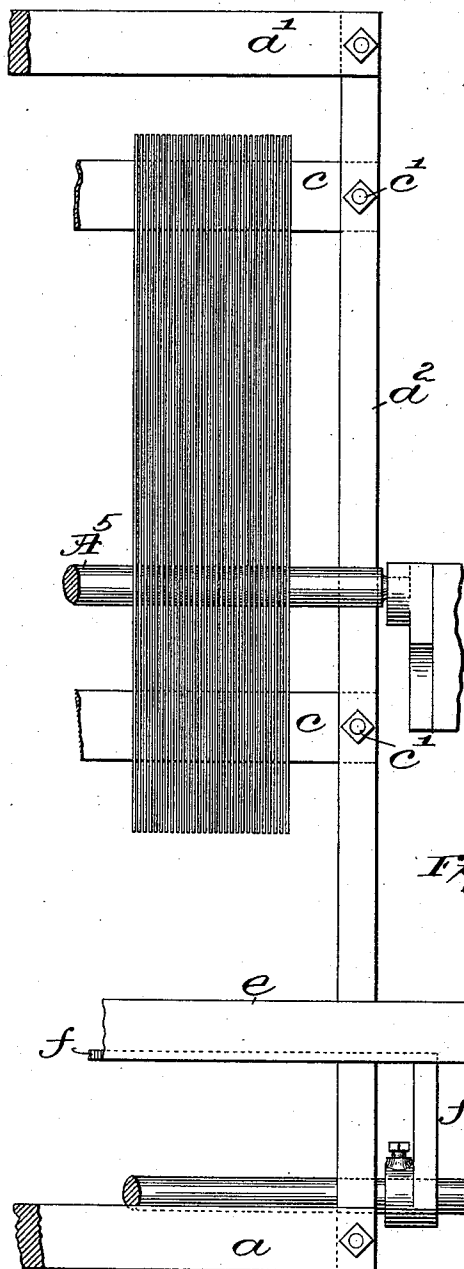


Fig:5.

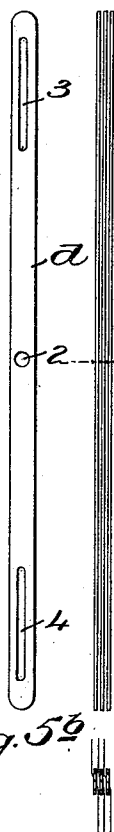


Fig: 7.

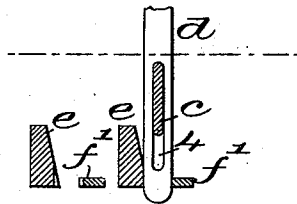


Fig. 5^a

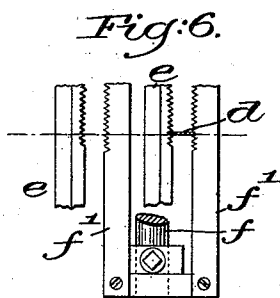


Fig:6.

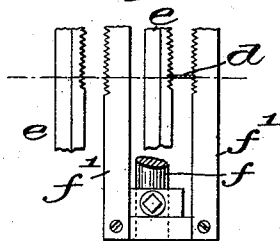


Fig:8.

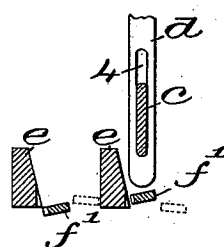
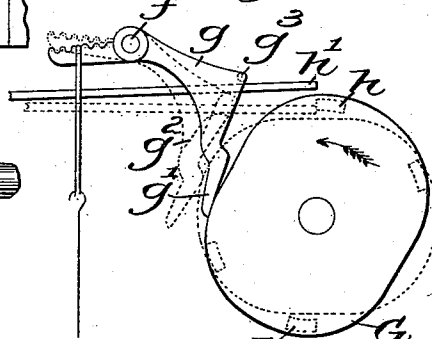


Fig:9.



Witnesses.

Fried. S. Grumbaf.

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Inventor:

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by Crosby & Gregory
Attys.

UNITED STATES PATENT OFFICE.

CHARLES F. ROPER, 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. 536,969, dated April 2, 1895.

Application filed September 4, 1893. Serial No. 484,723. (No model.)

To all whom it may concern:

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

10 This invention has for its object to improve that class of loom wherein the heddles, used to control the warp in the formation of the shed for the reception of the weft or filling, are made instrumental in automatically stop-
15 ping the loom when a warp thread breaks.

The heddles in the form in which I have herein chosen to illustrate my invention are represented as composed of thin sheet-metal strips provided each with a warp receiving eye
20 and with an elongated eye which is entered by a cross-bar of less depth than the length of said elongated eye, said cross-bar forming part of a harness frame, said elongated eye enabling the heddle co-operating with the
25 warp threads put into the lower plane of the shed to be sustained wholly by said threads in such manner than when a warp thread in the lower plane of the shed breaks the heddle sustained by it is free to drop with relation
30 to said cross-bar, thus putting the lower end of the heddle in front of a feeler-bar having a movement in the direction of the length of the warp, rather than at right angles thereto.

The elongated slots referred to enable the
35 heddles to be moved longitudinally independently of the cross-bar of the harness-frame. In order, however, to enable those heddles co-operating with the unbroken warp threads in the lower plane of the shed to be
40 properly held up out of the path of movement of said feeler I have had to combine with the described heddles strung on the cross-bar, as described, means for arresting the warp threads in what is to be the bottom plane of
45 the shed before the cross-bar of the heddle-frame has completed its full descent to effect the opening of the shed, said arresting means being herein exhibited as rods or bars extended across the loom from side to side, one
50 being located directly behind and the other directly in front of the heddles, and prefer-

ably close to the vertical plane in which the heddles are to move, the arresting means, by supporting the warp threads close to where
the said threads hold up the weight of the
55 heddles, preventing the uneven dropping of the heddles, as it is obvious would be the case owing to the very considerable distance between the usual whip-roll and the fell of the cloth.

60 A support for the warp in the lower plane of the shed and near the vertical plane in which the heddles work is a necessity for the complete success of my invention, and this whatever may be the form of the heddle.

65 The employment of a thin sheet metal heddle, as herein illustrated, in combination with a feeler moving parallel to the warp-threads is also advantageous, for in such plan the strain on a dropped heddle comes in the line of
70 its greatest resistance to strain, which would not be the case if the feeler should be worked in a line at right angles to the length of the warp.

In order to enable thin sheet metal heddles
75 to be used and not be twisted out of shape when struck by the feeler in case a warp breaks, I have provided the loom with heddle guides made as bars independent of the harness frames, and notched for the reception of
80 the edges of those heddles controlling the warp threads put into the lower plane of the shed, said notches also preventing any lateral displacement of the lower ends of the lowered heddles. The feeler or vibrator is also notched
85 at its acting edge to embrace the edge of the heddle struck by it, both edges of a lowered heddle when struck by the feeler being, it will be understood, embraced by notched portions
90 of the guide-bar and feeler, and hence said heddles cannot be shifted laterally, or overturned, or twisted out of shape or bent. This provision to prevent lateral displacement of the dropped heddles, as well as to prevent
95 them from being twisted or bent, is another important feature of this invention. The feeler or vibrator herein shown, it constituting a part or member of a stop-motion mechanism, is also as herein shown supported independently of the harness frames, thus re-
100 ducing the weight of said frames, and consequently the strain on the cording supporting

said frames, and the power required to open the shed.

As before stated, the elongated slots at the ends of the heddles fit the cross-bars of the heddle-frames loosely and in such manner that said heddles may move vertically of the bars, the heddles, however, when the bar carrying them is depressed to thus put the threads controlled by it into the lowest plane of the open shed resting each one on a warp thread, each thread sustaining its own heddle and consequently in case any one thread in the lower plane of the shed should be broken the heddle which contained it may drop by gravity for a distance determined by the slots referred to, thus placing the said heddle in the range of movement of a suitable vibrator or feeler forming part of a stop motion mechanism, the arresting of the movement of the vibrator or feeler causing the usual shipper handle of the loom to be released to disconnect the driving power from the usual power or cross shaft of the loom.

Figure 1 is a longitudinal section of a sufficient portion of a loom with my improvements added to enable my invention to be understood; the shed being shown as open. Fig. 2 is a right-hand side view of the loom, said figure showing parts broken away from Fig. 1. Fig. 3 is a plan view of the parts shown in Fig. 2. Fig. 4 is a detail enlarged of the heddle frame and heddles, such figure also showing a portion of the whip roll and portions of the warp stop motion mechanism. Fig. 5 shows one of the heddles enlarged. Fig. 5^a shows three of the heddles side by side. Fig. 5^b is a section in the dotted line Fig. 5^a. Fig. 6 is a partial plan view of the vibrator or feeler co-operating with the heddle. Figs. 7 and 8 show parts of a heddle and parts of the devices co-operating therewith, the vibrator or feeler being shown in different positions. Fig. 9 is a detail to be referred to, said figure showing the controller for the shipper handle in different positions.

The loom frame A, the crank or lay shaft A' therein, having suitable fast and loose pulleys adapted to receive a belt under the control of a belt shipper A², the cross or cam shaft A³, the lay A⁴ carrying a reed, the whip roll A⁵, the shipper handle A⁶, and the notched plate A⁷ to hold it in place while the loom is moving properly, are and may be all as common in looms.

I have attached to the uprights A^x, one at each side the loom frame, suitable like stands B having bearings for the reception of journals of one or more, preferably two, warp arresting or supporting devices illustrated as rolls or rods b, shown best in Figs. 1 and 3, said rolls or rods being represented as sufficiently separated to permit the heddles or harness frames to move between them. The warp arresting rods or rolls besides possessing the advantages hereinbefore stated also insure the retention in a definite and in substantially the same horizontal plane or level

of all the warp threads in the lower half of the shed, thus insuring a more uniform opening for the passage of the shuttle, and further, owing to the fact that the warps contact with the arresting devices, whatever tendency the individual warp threads with the weight of the heddles on them might otherwise have to sway or swing laterally is substantially negated.

I have herein shown a loom having two heddle frames each frame being composed essentially of a bottom bar a, a top bar a', said bars being connected as shown best in Fig. 4, by side bars a², thus making a rigid quadrilateral frame.

Each heddle frame has suitably attached to it heddle carrying bars c, the connection in this instance of my invention being by suitable bolts c'.

Fig. 5 shows one of the heddles d separated from the heddle frame, said heddle being flat for its whole length and width, and having preferably a round central warp thread receiving eye 2, and, as herein represented, said heddle has long slots 3 and 4 at its upper and lower ends, said slots receiving through them the bars c, the slots being preferably longer than the bars are wide, so as to let the heddles have a movement vertically independently of the vertical movement of the heddle frame and bars.

The upper bars a of the heddle frames are connected by suitable straps a⁴, a⁵, with pulleys a⁶ mounted in a suitable stand a⁷, while the lower bars a' of the heddle frames are connected by suitable straps a⁸ and a⁹, with the levers a¹⁰, a¹², pivoted at a¹³ on a cross girt of the loom frame, said levers each having preferably a suitable roller which is acted upon by a suitable cam as a¹⁴, a¹⁵, carried by the cross shaft A³ before referred to. These cams, levers, straps and pulley are and may be all as usual in looms for weaving cotton cloth.

I have shown the loom frame as provided with guides e, extended from one to the other side of the loom, the harness frames bearing against said guides during their vertical movement, said guides steadying the harness frames especially when the vibrator or feeler to be described acts upon a dropped heddle. These guides are notched as shown, to act in engaging a dropped heddle to better advantage so as to prevent its twisting when being acted on by the vibrator.

The loom frame has suitable bearings for a rocker shaft f provided with suitable vibrators or feelers composed essentially of bars f', adapted to be moved in a direction parallel to the length of the warp threads, and shown as sustained entirely independently of the harness-frames, there being two such bars shown in this my present invention, said bars being carried by arms f² connected with said rock-shaft, said bars being preferably notched or toothed at their acting edges as best represented in Fig. 6, said teeth by embracing

the edges of the heddles obviating twisting the same out of proper position or obviating throwing the heddles laterally out of place on their carrying bars.

5 The rock-shaft *f*, see Figs. 1, 2 and 3, has fast upon it just outside the loom frame a controller lever *g* having a toe *g'*, a heel *g²* extended inwardly from one side of it, as represented by dotted lines in Figs. 2 and 9, and in
10 full lines Fig. 3, and a pin or projection *g³*, a spiral spring *g⁴* operatively connected to one arm of said controller lever acting normally to keep the toe *g'* of the said lever in contact with the cam *G* fast on the shaft *A³*, said cam having extended from its rear side suitable
15 pins or projections as *h*, said projections in the rotation of the said cam being adapted when the loom is working properly and the warps are unbroken, to pass under the elevated end, see Fig. 9, of the connecting rod *h'* attached to the shipper handle *A⁶*, the said
20 rod at such time resting upon the heel *g²* referred to and between it and the said pin *g³*, as best represented in Fig. 9, but in case a heddle drops into the position shown by one of the heddles in Fig. 1,—the warp thread then in the lower plane of the shed and which
25 should then support said heddle having been broken,—the feeler will strike said heddle and will prevent the toe of the controller lever from going back to the cam, and in such position of the controller lever, the end of the rod *h'* will be in the path of movement of one of the projections *h*, as in Fig. 2, so that
30 said projection in the further movement of the cam will disengage the shipper handle from the notch in the usual holding plate and will permit said released shipper handle to operate in the usual manner through usual
35 devices to cause the belt shipper or other equivalent device used, to pass the belt from the fast onto the loose pulley, thus stopping the loom. The lay has a reed *r* of usual construction.

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

1. A heddle frame provided with a cross-bar and a series of metallic heddles adapted to
50 move independently of said bar, and having also each an eye for the reception of a warp thread, combined with a roll or rod extended across the loom under the warp, said roll or rod supporting the warp threads brought to
55 the lower plane of the shed in a definite horizontal plane, thus insuring the retention at a definite point of the lower ends of those heddles which rest by their weight on the warp threads in the lower plane of the shed during the insertion of the filling, substantially as described.

2. A heddle-frame provided with a cross-bar and a series of metallic heddles adapted to move independently of said bar, said heddles
60 having each an eye to receive a warp thread, combined with two rolls or rods extending across the loom under the warp, one of said

rolls or rods being in front and the other behind the vertical planes in which said heddles move, said rolls or rods supporting the warp threads entering into the lower plane of the shed thereby enabling said threads in turn to uniformly support the heddles controlling the warp threads in the lower plane of the shed, and a stop-motion mechanism co-operating
70 with any heddle which is dropped by reason of the breakage of the thread which should sustain it, substantially as described.

3. A heddle-frame having a horizontal bar, a series of metallic heddles having elongated slots and strung thereon and having thread
80 holes, combined with a vibrator having notches to engage the edge of the heddle when dropped, and means to move said vibrator back and forth in the direction of the length
85 of the warp, and a notched guide, as *e*, to receive the edge of the dropped heddle, substantially as described.

4. A heddle frame having a transverse bar, a series of flat metallic heddles having elongated slots and strung loosely on said bar and adapted to be moved vertically thereon independently of the movement of said bar, a vibrator supported independently of said frame, and a shipper handle, combined with a controller lever, devices to connect said vibrator
90 with said controller lever, devices to actuate said controller lever, and a connection between said controller lever and said shipper handle, to operate, substantially as described.

5. In a loom the following instrumentalities, viz:—a shipper handle; a heddle frame having a transverse bar; a series of flat metallic heddles having elongated slots and mounted loosely on said bar and adapted to move
105 vertically thereon independently of the movement of the heddle frame; a series of guides, as *e*, for the lower edges of said heddles located below said heddle frame; a vibrator to engage the edge of said heddles when dropped; devices to move said vibrator back and forth in the direction of the length of the warp, combined with a controller lever; devices to actuate it; and a connection between said controller lever and said shipper handle, substantially as described.

6. In a loom the following instrumentalities, viz:—a heddle frame having a bar; a series of metallic heddles supported upon said bar and adapted to be moved vertically independently
120 of the position of said bar, combined with a vibrator supported independently of the heddle frame and adapted to engage the end of the heddle when dropped, and means to move said vibrator back and forth in the direction of the length of the warp, substantially as described.

7. In a loom, a harness frame having a cross-bar, a series of heddles having each a thread eye and an elongated slot near its end to embrace and be slid vertically on said bar, combined with a notched guide-bar to receive and guide the lower ends of the heddles controlling the warp threads moved into the lower
130

plane of the shed, and a feeler having its axis
of motion at right angles to the length of the
warp whereby it may be moved toward and
from the said guide-bar to contact with a
5 dropped heddle, the notches of the guide-bar
preventing lateral motion of the heddles on
the cross-bar when struck by the feeler, sub-
stantially as described.

8. The flat metallic pieces supported by the
10 warp threads, and a guide for the same below
the plane of the warp, combined with a vi-

brator having a notched edge, and with de-
vices to move said vibrator back and forth in
the direction of the length of the warp, sub-
stantially as described.

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

CHARLES F. ROPER.

Witnesses:

E. D. BANCROFT,

H. F. SEARLES.