No. 770,760. PATENTED SEPT. 27, 1904.

V. A. LEDOUX.

LOOM HARNESS MECHANISM.

APPLICATION FILED JUNE 15, 1904.

NO MODEL. 2 SHEETS—SHEET 1.

Fig. 1.

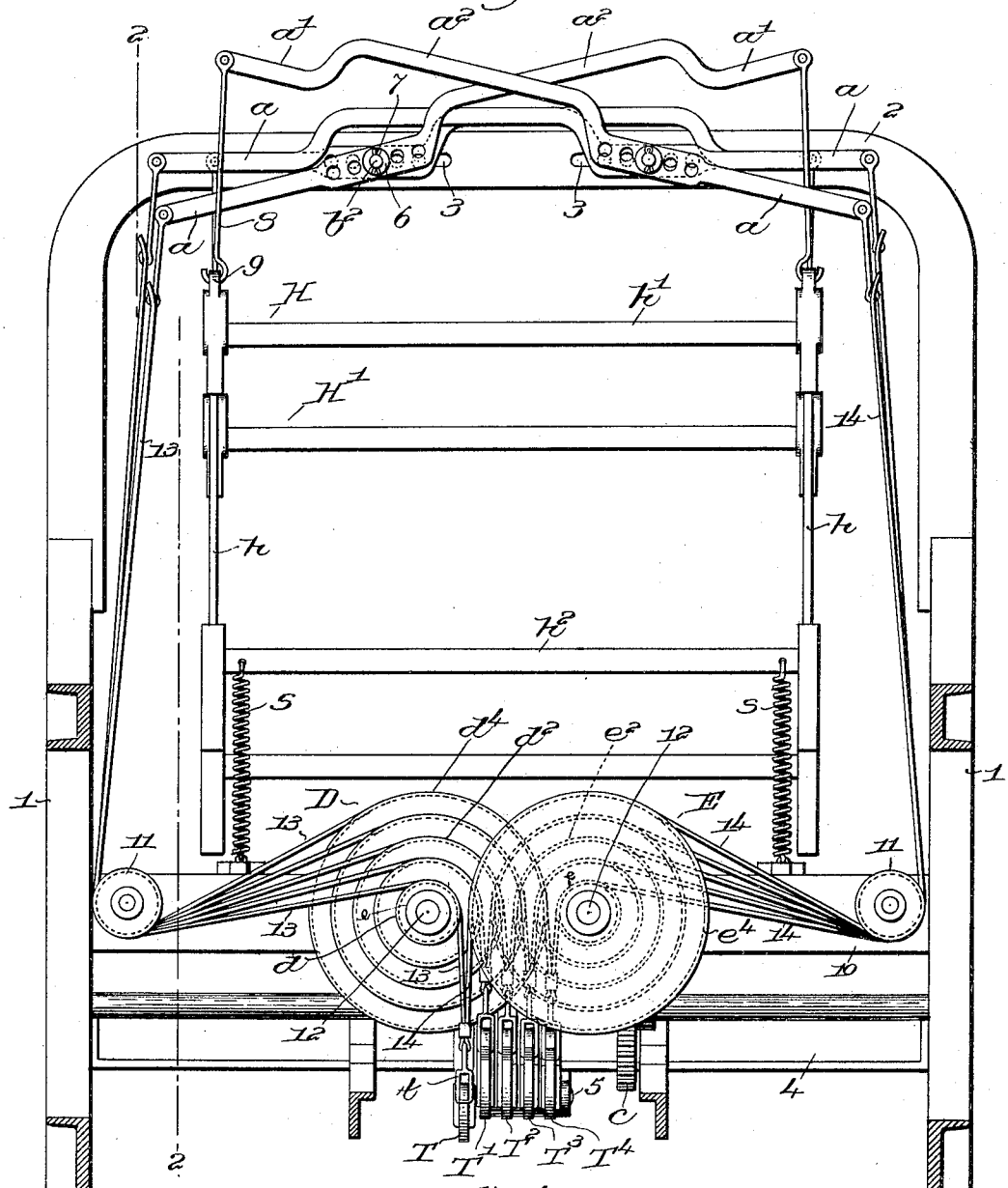
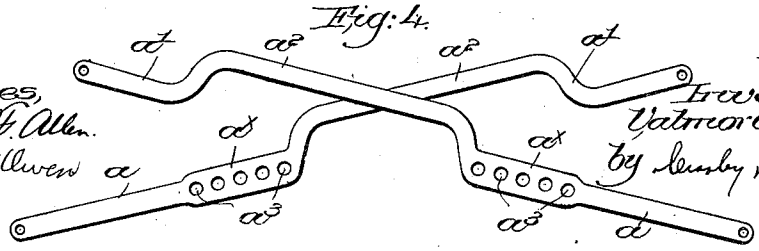


Fig. 4.



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NO MODEL. 2 SHEETS—SHEET 2.

Fig. 3.

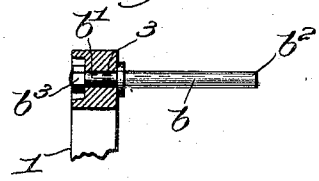

Fig. 2.

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No. 770,760. Patented September 27, 1904.

UNITED STATES PATENT OFFICE.

VALMOR A. LEDOUX, OF WORCESTER, MASSACHUSETTS, ASSIGNOR TO DRAPER COMPANY, OF HOPEDALE, MASSACHUSETTS, A CORPORATION OF MAINE.

LOOM HARNESS MECHANISM.

SPECIFICATION forming part of Letters Patent No. 770,760, dated September 27, 1904.

Application filed June 15, 1904. Serial No. 212,673. (No model.)

To all whom it may concern:

Be it known that I, VALMOR A. LEDOUX, a citizen of the United States, and a resident of Worcester, county of Worcester, State of Massachusetts, have invented an Improvement in Loom Harness Mechanism, of which the following description, in connection with the accompanying drawings, is a specification, like characters on the drawings representing like parts.

This invention has for its object the production of a novel mechanism for controlling the movement of the harness-frames in a loom, whereby they are positively moved in one direction in a smooth, even, and simple manner, a novel form of transmitting means between each harness-frame and the actuator permitting the use of easily-operating harness-cams of moderate throw.

My invention is particularly well adapted for use in connection with multiple-harness motions, inasmuch as each harness-frame is independently controlled and operated.

The various novel features of my invention will be fully described in the subjoined specification and particularly pointed out in the following claims.

Figure 1 is a longitudinal section of a sufficient portion of the harness mechanism of a loom to be understood, with one form of my invention embodied therein, the section being taken on the line 1 1 of Fig. 2. Fig. 2 is a transverse section thereof on the line 2 2, Fig. 1, looking toward the right. Fig. 3 is a detail of one of the fulcrum members for the rocking harness-levers to be described, and Fig. 4 is a front elevation of a coöperating pair of harness-levers detached.

I have herein shown a five-harness motion; but, as will appear hereinafter, a greater or less number of harnesses may be used, so far as concerns the applicability of my invention thereto.

The loom sides 1, of proper shape to sustain the operating parts, are connected by an arch 2, having at its top two horizontal elongated slots 3, Fig. 1, for a purpose to be described, and on hangers secured to a cross-girth 4 at the back of the loom are fulcrumed at 5, side by side, a series of actuators, (shown as treadles T T', &c.,) each having a roll $t^{\times}$, Fig. 2, to coöperate with its appropriate operating-cam, as C C', &c. The several cams are mounted on a shaft $C^{\times}$, provided with a gear c in mesh with an intermediate gear c', driven by a gear c^2, fast on a shaft C^{10}, which corresponds, generally speaking, to the usual cam-shaft of a loom, all as shown in Fig. 2.

The several harness-frames governed by the respective treadles T T', &c., Fig. 2, are indicated at H H' H^2, &c., and may be of any suitable construction, each frame, as herein shown, having upright side bars h, rigidly connected by upper and lower cross-bars h' h^2, the former being adapted to sustain the heddles, omitted for the sake of clearness. As I claim no invention in the harness-frames and they are all constructed substantially alike, further description thereof is deemed unnecessary.

In the present embodiment of my invention the lifting movement of the harness-frames is effected positively and individually, the several lifting devices being alike and operating in the same manner, so only one will be described in detail.

Upon the arch 1 a series of pairs of crossed and rocking levers are mounted on fulcra adjustable laterally in the slots 3 of said arch, each lever having a widened and thickened fulcrum portion $a^{\times}$, a straight shorter arm a, extended from one end thereof, and a longer arm a' oppositely extended from the other end, the longer arm having an upward bend a^2 for a purpose to be described. A series of holes a^3 are made in the fulcrum portion, any of which is adapted to receive a fulcrum-stud b, reduced at its ends at b' b^2, (see Fig. 3,) the end b' passing through one of the slots 3 in the arch and being clamped in position by a nut b^3, the stud projecting forward at right angles to the arch above the harness-frames. A pair of levers is provided for each frame, and in the present instance each stud b will support five levers, there being five harness-frames, suitable collars being interposed be-

tween adjacent levers, if necessary, to properly space them on the studs. A washer 6 and cotter-pin 7 on the outer end b^2 of each stud retains the levers thereon. Referring to Fig. 1, it will be seen that the longer arms of each pair of levers cross each other, and links 8, pivotally connected with the free ends of the arms a', are connected with the harness-frame at or near the adjacent sides thereof, and herein the links are shown as hooked into eyes 9 on the upper ends of the side bars h. The upturned bend a^2 of one lever is long enough to clear the fulcrum-stud of its fellow lever, as will be manifest from Fig. 1, when the harness-frame is lowered.

A cross-girth 10, connecting the loom sides below the harness-frames, supports guide-sheaves 11 at each side of the loom, and said cross-girth also supports two parallel horizontal studs 12, on which are mounted two like and annularly-stepped conical drums D E, but oppositely placed, the smaller end of one drum being opposite the larger end of the other drum, the drums being located above the free ends of the treadles or actuators T T', &c.

Referring to Fig. 1, a band, strap, or other flexible connection 13 is attached at one end to the shorter arm a of one of the rocking levers—for illustration, that lever fulcrumed on the left-hand stud—and a similar flexible connection 14 is connected with the shorter arm of the other lever of the pair at the right-hand side of the loom. The connection 13 is led down around one of the sheaves 11 at the left and passes thence over and around the smallest annular step d of the drum D and down to a stirrup t, connecting it with the end of the treadle T. Connection 14 passes down around one of the right-hand sheaves 11 and thence around the largest step e^4 of the drum E and down to the stirrup t.

As shown, the front harness-frame H is raised, and consequently the shorter arms a of its levers are depressed, as is the treadle T, which controls said levers, the actuators or treadles being depressed to raise their frames and rising when the frames descend. It will be seen that owing to the difference in the lever-arms the stroke of the harness-frame is effected with a much smaller stroke of the actuating-treadle, requiring smaller cams and permitting an easy cam motion. As the several treadles are located side by side, means must be provided to compensate for the lateral offset of some of the treadles from a point directly beneath the center of the arch in order that the flexible connections between each pair of levers and their respective treadles may be so guided that the ends of such connections will be as nearly as possible parallel to the direction of motion of the treadles, to thereby avoid leading the connections off at various angles. This is effected by the two oppositely-directed conical drums D and E, for from Fig. 1 it will be plain that the treadle T is considerably offset from the center of the arch. By passing the connection 13 around the small step d of one drum and the connection 14 around the large step e^4 of the other drum the ends of said connections leading to the treadle will be substantially parallel to the path of movement of the treadle T, preventing any tendency to twist or move the treadle laterally. The right-hand treadle T^4 has its connections reversely arranged, the connection 14 passing around the smallest step e, while connection 13 passes around the largest step d^4, with a corresponding result. As the treadle T^2 is central, its connections 13 and 14 pass around steps d^2 and e^2 of the same diameter, while the treadles T' and T^3 are arranged to have their connections operate similarly to those of treadles T and T^4. It will be understood that each pair of connections is attached to its proper treadle by a stirrup t or by some other suitable device.

The harness-frames may be made to descend by gravity if they are heavy enough, as will be the case frequently in practice; but herein I have shown springs s attached to the lower cross-bars h^2 and secured to the cross-girth 10 to depress the frames.

If it is desired to increase the stroke of the harness-frames, the fulcrum-studs b are inserted in holes a^3 nearer the outer ends of the short arms of the levers, the studs being moved outward in the slots 3 of the arch to avoid disarranging the operation of the levers and their actuating means. To decrease the stroke of the frames, the studs are inserted in holes in the levers nearer their longer arms and the studs are moved inward in the slots 3 and clamped in position. When a frame descends, the levers thereof assume a nearly horizontal position, as shown in Fig. 1, and the bends a^2 in the longer arms clear the fulcrum-studs, as shown in Fig. 1.

Each harness-frame is moved and controlled entirely independently of its fellows and is raised with a powerful, even, and smooth movement and prevented from cocking either in its rise or its descent.

The variation in the stroke of the harness-frame can be effected by the construction described without changing the harness-cam, and by grouping the actuating-treadles at the center of the loom and providing compensating means between them and the harness-levers overhead to direct and guide the intervening connections, as described, a powerful and positive lifting movement for the frames is attained.

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

1. In loom harness mechanism, a reciprocating harness-frame, two levers mounted to rock on fixed fulcra above it and having their longer arms crossed, a connection between the longer

arm of each lever and the harness-frame at or near the adjacent side of the latter, a common actuator, and separate connections between it and the other, shorter arms of said levers, to rock the same oppositely and thereby positively move the harness-frame in one direction.

2. In loom harness mechanism, a reciprocating harness-frame, two levers mounted to rock on fixed fulcra above it, an arm of each lever being connected with the harness-frame at or near the adjacent side thereof, an actuating-treadle below said harness-frame, separate flexible connections between it and the other arms of the levers, and means to guide said connections, and prevent lateral pull on the actuating-treadle, whereby oscillation of the treadle will cause the levers to be rocked oppositely to effect the movement of the harness-frame.

3. In loom harness mechanism, a reciprocating harness-frame, two levers mounted to rock on fixed fulcra above it and having their longer arms crossed, a common actuator for said levers, a connection between it and the shorter arm of each lever, the longer arm of each lever being operatively connected with the harness-frame at the adjacent side of the loom, and means to act upon the connections between the actuator and said levers to bring the ends of the connections adjacent the actuator into substantial parallelism with the path of movement of the actuator.

4. In loom harness mechanism, a reciprocating harness-frame, two overhead, crossed levers mounted to rock on fixed fulcra, means to change the fulcrum-points of said levers, to vary the effective stroke thereof, a connection between one arm of each lever and the harness-frame, a connection between the other arm of each lever and a common actuator, and a common actuator for said levers.

5. In loom harness mechanism, a plurality of independently-reciprocating harness-frames, separate means to move each frame in one direction, devices to move the frames in the opposite direction, each device comprising two overhead, crossed levers mounted to rock on fixed fulcra, a connection between the longer arm of each lever and its harness-frame at the adjacent side thereof, a common actuator for each pair of levers, said actuators being located side by side below the harness-frames, a connection between the shorter arm of each pair of levers and their actuator, and compensating means to act upon such connections and bring the ends thereof adjacent the actuator into substantial parallelism with the path of movement of the actuator.

6. In loom harness mechanism, a plurality of independently-reciprocating harness-frames, separate means to move each frame in one direction, devices to move the frames in the opposite direction, each device comprising two overhead, crossed levers mounted to rock on fixed fulcra, a connection between the longer arm of each lever and its harness-frame at the adjacent side thereof, an oscillating actuating-treadle for each pair of levers, said treadles being located side by side below the harness-frames, flexible connections between a treadle and the shorter arms of its pair of rocking levers, and means to guide said flexible connections and bring their ends adjacent the corresponding treadle into substantial parallelism with the path of movement of said treadle.

7. In loom harness mechanism, a reciprocating harness-frame, two overhead levers mounted to rock on fixed fulcra, each lever having a long arm operatively connected with the harness-frame at one side thereof, and a short arm oppositely extended and having a flexible connection attached to it at the other side of the harness-frame, an oscillating actuator movable in a plane substantially at right angles to the planes of said levers, a cam to control the oscillation of said actuator, and the flexible connections, leading from the short arms of the levers to the actuator and attached thereto.

8. In loom harness mechanism, a reciprocating harness-frame, two overhead levers mounted to rock on fixed fulcra, each lever having a long arm operatively connected with the harness-frame at one side thereof, and a short arm oppositely extended and having a flexible connection attached to it at the other side of the harness-frame, an oscillating actuator movable in a plane substantially at right angles to the planes of said levers, a cam to control the oscillation of said actuator, the said flexible connections, leading from the short arms of the levers to the actuator, and compensating means, including two annularly-stepped, conical and oppositely-placed drums, to coöperate with said flexible connections and bring the ends thereof adjacent the corresponding actuator into substantial parallelism with the path of movement of such actuator.

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

VALMOR A. LEDOUX.

Witnesses:
LOUIS ST. MARTIN,
WALTER W. CLARK.