

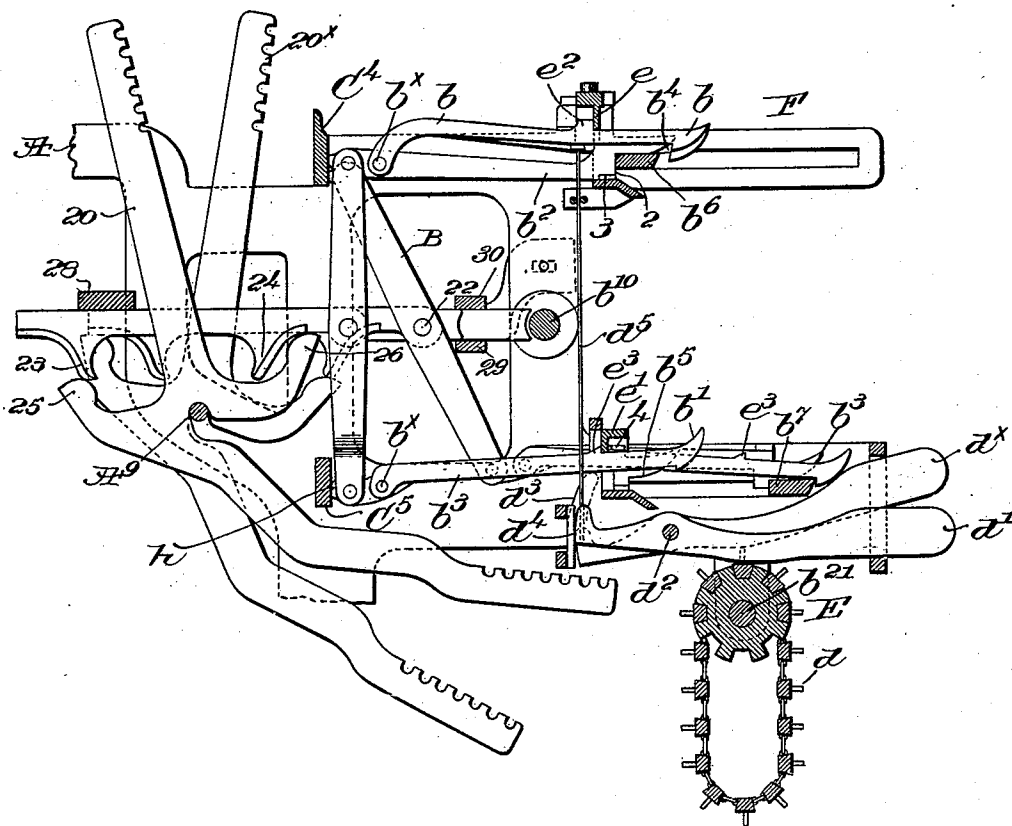
No. 666,728.

Patented Jan. 29, 1901.

H. WYMAN & A. A. GORDON, JR.  
SHED FORMING MECHANISM FOR LOOMS.

(Application filed Feb. 27, 1900.)

(No Model.)



Witnesses:

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# UNITED STATES PATENT OFFICE.

HORACE WYMAN AND ALBERT A. GORDON, JR., OF WORCESTER, MASSACHUSETTS, ASSIGNORS TO THE CROMPTON & KNOWLES LOOM WORKS, OF SAME PLACE.

## SHED-FORMING MECHANISM FOR LOOMS.

SPECIFICATION forming part of Letters Patent No. 666,728, dated January 29, 1901.

Application filed February 27, 1900. Serial No. 6,668. (No model.)

*To all whom it may concern:*

Be it known that we, HORACE WYMAN and ALBERT A. GORDON, Jr., citizens of the United States, residing at Worcester, in the county of Worcester and State of Massachusetts, have invented an Improvement in Shed-Forming Mechanism for Looms, of which the following description, in connection with the accompanying drawing, is a specification, like characters on the drawing representing like parts.

This invention has for its object the production of a novel shed-forming mechanism of the kind applicable to so-called "dobby-loom," the invention herein contained being an improvement on that described in United States Patent No. 459,474, dated September 15, 1891.

Herein we have provided harness-levers of novel shape and have combined with them horizontally-movable cam-slides for actuating said levers positively, said slides also serving the additional purpose of locking the levers in their extreme positions. The slides are herein represented as movable in a substantially horizontal line, and they derive their movement in one and then in the opposite direction, as herein represented, by or through connections provided at their opposite ends each with two jacks, one acting to put a harness-frame connected with a harness-lever in the upper plane of the shed and the other in the lower plane of the shed, the jacks at the opposite ends of said connections being engaged to put the harness-frames in the upper plane of the shed when certain shed-forming knives are moved outwardly, one of the shed-forming knives being moved outwardly at each pick, said knives being moved alternately.

The drawing represents a sufficient portion of a loom of well-known construction with our improvements added to illustrate our invention in the best form now known to us.

Referring to the drawing, A represents a portion of the framework supporting the shed-forming mechanism, said framework having extended from it suitable guideways, as F, slotted for the reception of the shed-forming knives  $b^6$  and  $b^7$ , said knives deriving their

movement of reciprocation alternately from a lever, as  $b^9$ , (represented by dotted lines,) fast upon the rock-shaft  $b^{10}$ , said rock-shaft and lever being common to said patent. The connections B have attached to their opposite ends, respectively, a pair of jacks, the jacks connected with the upper end of each connection being designated by the letters  $b$  and  $b^2$ , the jacks connected with the lower ends of the connection being represented by the letters  $b'$  and  $b^3$ . The shed-forming knives  $b^6$  and  $b^7$  engage the hooks of the jacks  $b$  and  $b^3$  only in the outward movement of the jacks, one of said jacks being moved at one pick or shed and the other at another pick or shed, each shed-forming knife in its outward movement in the manner in which we have herein chosen to illustrate our invention turning a harness-lever 20, novel in construction and to be hereinafter described, to put a harness-frame connected therewith in usual manner in the upper plane of the shed, the opposite movement of the shed-forming knives or their movement toward the rests  $C^4$  and  $C^5$  turning the harness-levers referred to in a direction to put the harness-frames connected therewith in the lower plane of the shed. The jacks  $b$  and  $b^3$  are distributed at the proper time by or through the fingers  $d^x$   $d'$ , arranged in pairs and operated by suitable pins or projections, as  $d$ , of a pattern surface or chain E, deriving its movement intermittently, it may be, from a shaft  $b^{21}$ , actuated from any moving shaft of the loom. The jacks  $b^2$  and  $b^3$  rest upon suitable cross-bars  $w$ , presenting inclines.

The parts so far described, with the exception of the harness-levers, are and may be as fully described in said patent, wherein they are designated by like letters.

The mechanism herein shown constitutes one good and preferred way of moving the connections B; but this invention is not in all instances limited to the employment of exactly the form of jacks referred to for imparting movement to the opposite ends of the connections, and instead of the particular jacks shown we may employ any other usual or suitable jacks and operative means there-

for which are commonly used in connection with dobby-looms.

We will now particularly set forth the features in which our present invention consists.

Upon the usual cross-rod A<sup>9</sup>, common to said patent, we have mounted a series of harness-levers 20, represented as notched at their opposite ends for the connection therewith of suitable cording led in a suitable manner over suitable sheaves and connected with the upper and lower pairs of harness-frames controlling the heddle employed in the formation of the shed.

The harness-levers are mounted on the fulcrum A<sup>9</sup> and present upper and lower ends, the free upper ends of said levers in their movement sweeping back and forth past a line vertical to said fulcrum, the upper end of the lever occupying a position at one side of said vertical line when the harness-frame connected with it is depressed into the lower plane of the shed and at the opposite side of said vertical line when the harness-frame is lifted to put the warp contained in it in the upper plane of the shed.

One of the chief peculiarities of construction of the harness-lever is that it has projecting from it between its ends and oppositely with relation to a line drawn from the upper end of said lever and intersecting the center of said fulcrum two cam-shaped horns 25 26, the ends of which when the upper ends of the harness-levers stand substantially upright occupy a position in substantially the same horizontal plane.

The harness-lever is rocked or turned about the fulcrum A<sup>9</sup> through a suitable actuator, represented as a horizontally-moving cam-slide having toes, which in the movement of the actuator to and fro in a substantially horizontal plane causes the toes to meet the horn and put the harness-frames into the upper and lower planes of the shed.

The actuators D are guided in their to-and-fro movement by the cross-bars 28, 29, and 30, and each actuator is joined by a pivot 22 with its own connection B, whereby the movement of said pivot and actuator is in a plane substantially parallel with the movement of the shed-forming knives instead of, as heretofore, in the arc of a circle, said actuators being moved to the right whenever either shed-forming knife b<sup>6</sup> or b<sup>7</sup> engages either jack b<sup>6</sup> or b<sup>8</sup>, the said actuators being moved to the left whenever the shed-forming knife b<sup>6</sup> or b<sup>7</sup> is moved to the left, as herein represented, it at such time acting through one or the other of the jacks b<sup>2</sup> or b<sup>3</sup> to place the end of the connection against one or the other of the rests C<sup>4</sup> or C<sup>5</sup>, said connection when it stands in a substantially vertical position, as represented by one of the connections in the drawing, occupying what may be designated as its "normal position," and in such position the harness-lever controlled by said actuator occupies a position to put the har-

ness-frame connected with said lever in the lower plane of the shed, and at such time one of the horns of the jack is acted upon by one of the toes of the actuator locking the harness-lever in that position.

Each actuator has, as herein represented, two toes 23 and 24, one of said toes, as 23, serving when the actuator is moved, say, to the left in the drawing to meet the rounded portion of the horn 23, extending from the lever 20, to not only turn the lever about its fulcrum, but also to lock the lever in its extreme position, the toe 24 at such time retiring from contact with the upper end of the horn 26 and turning the lever in a direction to put the harness-frame connected with it in the upper plane of the shed, the toe 23 at such time retiring from the horn 25, the toe 24 eventually coming in such position, as represented partially by dotted lines in the figure, to lock the harness-lever in the position described or in the position of the harness-lever, (represented by 22<sup>x</sup> in the drawing.) That the toes may act positively and unyieldingly upon the horns of the jacks we have provided suitable means for guiding the actuators in their reciprocating movement, said means being herein represented as cross-bars 28, 29, and 30, which are located at opposite ends of the actuator. By referring to the drawing it will be seen that the outer end of the actuator, or that end which engages the harness-lever, rests upon or is supported by the said harness-lever, in consequence of which the toes of the actuator have a constant contact with the horns of the harness-lever. To preserve this constant contact the cross-bar 28, situated at the said outer end of the actuator, is placed above the same, so as to prevent the actuator from rising, and thus breaking the constant contact of the toes with the horns of the harness-lever. The inner end of the actuator, or that end to which the connection B is pivoted, plays between the cross-bars 29 and 30, which cross-bars or guides operate to preserve the right-line movement of the said actuator. With this construction the actuator is supported largely by the harness-lever, and the weight of the actuator therefore serves to assist in maintaining the constant contact between the toes and horns, the actuators in moving the harness-levers holding onto horns thereof continuously at some point, thereby insuring a positive movement to the harness-levers in either direction, the jacks b<sup>4</sup> also constituting additional locking means to positively hold the harness-levers in their extreme positions while a pick is being inserted through the shed, such locking of the harness-levers being an essential feature of this invention, as thereby the planes of the shed are positively and accurately defined, so that a shuttle in passing through the shed may not find in its way any warp to interfere with its passage. By imparting to the actuators a right-line or horizontal movement parallel with the plane of movement of the

knives the toes of the actuator will maintain their operative contact with the horns of the lever during the changing position of the lever, so that by such substantially constant  
 5 contact of toes and horns the lever is moved positively and has no opportunity to spring or dwell to in any way disturb or interrupt the proper continuous movement of the harness-frames when moving from one into the  
 10 other plane of the shed. The movements of the pivots of the connections *b* are, it will be seen, in a plane substantially parallel with the movement of the shed-forming knives instead of in an arc of a circle, as heretofore  
 15 in looms of this class, and this right-line movement of the pivots of the connections obviates to a great extent the up-and-down movement of the ends of said connections due to the said connections swinging on pivots  
 20 which move in the arc of a circle, and consequently the ends of the jacks which are attached to the connections are moved up and down but slightly when said jacks are moved horizontally by the shed-forming knives, this  
 25 operation insuring greater precision in the movement of the parts.

From the foregoing description it will be noticed that each harness-lever has projecting from it between its ends oppositely with  
 30 relation to a line drawn from the upper end of said lever to intersect the center of said fulcrum two cam-shaped horns and that the toes of the actuator in the sliding movement of the actuator play back and forth between the horns and that each toe acts upon one  
 35 and the same horn, and the toes and horns are so shaped that when the actuator occupies its extreme position in either direction the actuator also serves to lock the harness-lever, thus maintaining the usual harness-frame  
 40 connected with each lever in the upper or lower plane of the shed. Further, the weight or gravity of the actuator is utilized to insure the proper contact of its toes with the  
 45 heels of the lever.

Having described our invention, what we claim as new, and desire to secure by Letters Patent, is—

1. In a loom, harness-levers, pivotally-mounted connections operatively connected to said harness-levers, each of said connections having a pair of jacks secured to each of its ends, knives for operating the jacks, and means for maintaining the fulcrum of said  
 50 connections in a line parallel with the path of movement of the knives.

2. In a loom, a pivotally-mounted harness-lever, an actuator therefor, said actuator being supported by the harness-lever and hav-

ing a sliding engagement therewith, a con- 60  
 nection pivoted to the actuator, said connection having jacks secured to its ends, knives for operating the jacks, and guiding means for the actuator operating to maintain the  
 65 pivotal point of the connection with the actuator in a line parallel with the movements of the knives.

3. In a loom, a fulcrum, a harness-lever pivoted thereon, and having extended oppositely from its edges two horns, an actuator 70  
 having toes for engaging the horns, a connection pivoted to the actuator, jacks attached to the ends of the connection, knives to operate the jacks, and means to guide the actuator in a line parallel with the movements of  
 75 the knives whereby the pivot of the connection travels in a straight line.

4. In a loom, a pivotally-mounted harness-lever having cam-surfaces, an actuator therefor having coöperating cam-surfaces, said actuator being supported by the harness-lever, 80  
 a connection pivoted to said actuator, jacks attached to the connection, knives to operate the jacks, and guiding means for the actuator operating to maintain the pivotal point  
 85 of the connection with the actuator in a line parallel with the movements of the knives.

5. In a loom, a pivotally-mounted harness-lever having extended oppositely from its edges two horns, an actuator for said harness- 90  
 lever, said actuator having toes for engaging the horns, means to move the actuator in a straight line to thereby rock said harness-lever, and guiding means for the actuator, said  
 95 guiding means operating to preserve the constant contact of the toes with the horns and the horns forming supporting means for the actuator.

6. In a loom, a pivotally-mounted harness-lever having extended oppositely from its 100  
 edges two horns, an actuator for the harness-lever, said actuator having toes for engaging the horns of the said harness-lever, means to move the actuator horizontally, a guide for the upper side of the actuator to prevent the  
 105 said actuator from separating from the harness-lever, the weight of the said actuator assisting in maintaining the contact of the toes with the horns.

In testimony whereof we have signed our 110  
 names to this specification in the presence of two subscribing witnesses.

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Witnesses:

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 SAMUEL B. SCHOFIELD.