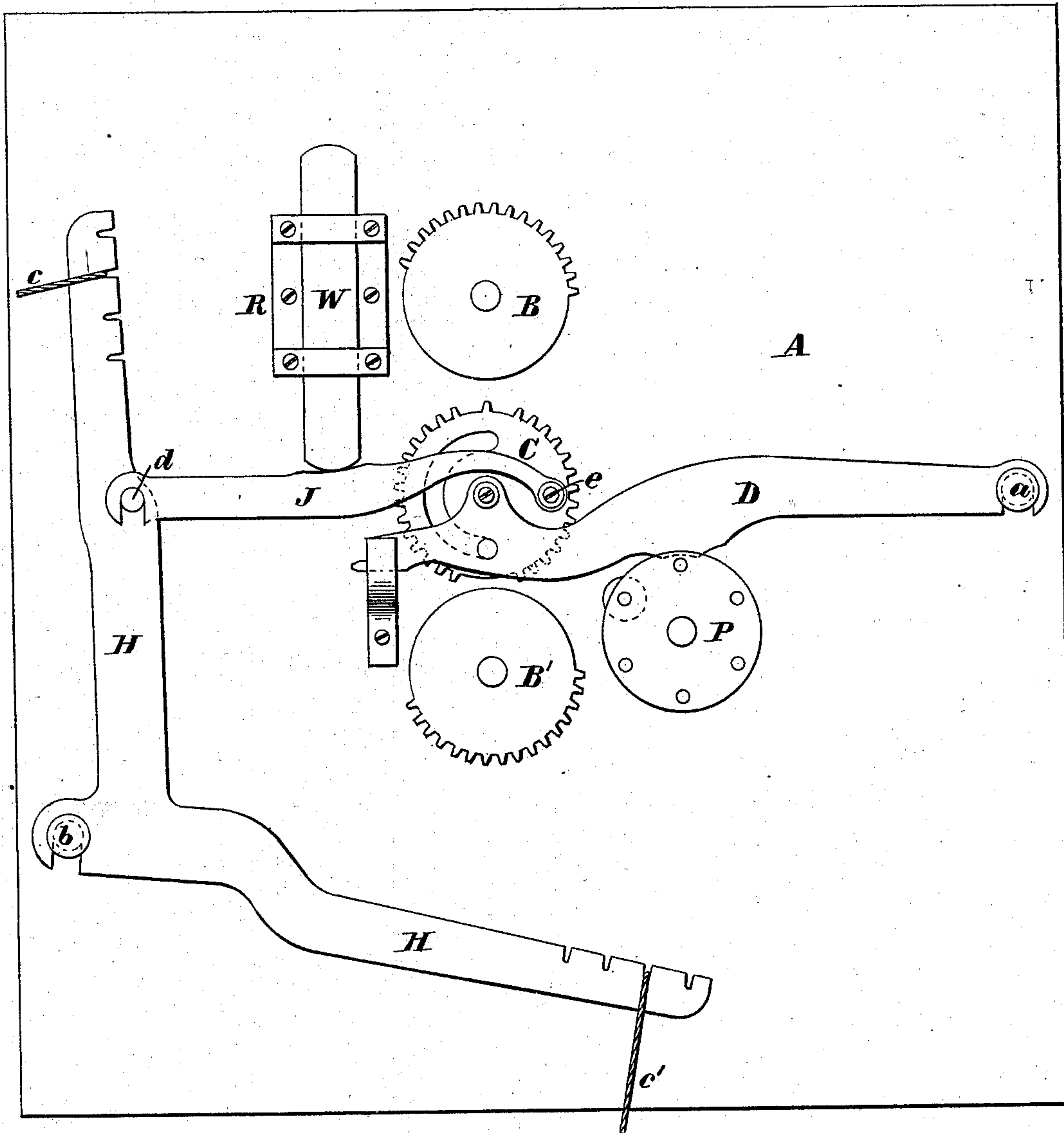


(No Model.)

L. J. KNOWLES.  
Loom.

No. 237,549.

Patented Feb. 8, 1881.



Witnesses:

*Samuel Bates*  
*H. J. Olmsted*

Inventor:

*Lucius J. Knowles*  
*by W. W. Swan*  
*his atty.*

# UNITED STATES PATENT OFFICE.

LUCIUS J. KNOWLES, OF WORCESTER, MASSACHUSETTS.

## LOOM.

SPECIFICATION forming part of Letters Patent No. 237,549, dated February 8, 1881.

Application filed August 25, 1880. (No model.)

*To all whom it may concern:*

Be it known that I, LUCIUS J. KNOWLES, of Worcester, in the State of Massachusetts, have invented an Improvement in Looms, of which  
5 the following is a specification.

The invention is an improvement upon the loom described and shown in Letters Patent to me, No. 134,992, dated January 21, 1873, and relates to devices which in that patent are  
10 shown and described as common to the heddle and drop-shuttle-box mechanisms.

It consists in weighting, by a separate and independent weight, each connecting-rod by which motion is communicated from a vibrat-  
15 ing gear to a heddle-lever or from a vibrating gear to one of the arms of the compound lever operating a tier of shuttle-boxes.

In the drawing I have shown only such parts of the loom as are necessary to illustrate the present invention, for of the rest of the loom it is sufficient to say that such parts as are not herein especially described and shown are constructed and operated precisely as in the loom described and shown in the said Letters Pat-  
20 ent No. 134,992. Moreover, since the improved device is applied to the drop-shuttle-box mechanism in precisely the same manner as to heddle mechanism, I have in the drawing shown it in combination with the heddle mechanism  
30 alone; and, again, since in the loom described and shown in the said Letters Patent No. 134,992 each heddle-lever is provided with the same independent train of mechanism by which it derives its reciprocating motion from the  
35 constantly-rotating parts of the loom, I have in the drawing shown but a single heddle-lever in illustrating the application of my present improvement.

The parts shown in the drawing are, for convenience, represented as mounted upon a panel  
40 in place of the loom-frame. The panel is marked A, and will hereinafter be referred to as the "frame."

B B' are the cylinder-gears, having teeth  
45 over about half of their peripheries, journaled in the frame, and constantly rotating in opposite directions, all as and by the means described and shown in my said Patent No. 134,992.

50 C is a vibrating gear, loosely riveted to the

vibrating arm D, which is pivoted to the frame at a.

H is a heddle-lever, pivoted to the frame at b, and connected by cords c c' with its heddle-  
leaf. (Not shown.)

J is a connecting-rod, or, as it is called by persons using my looms, a "connector," hav-  
55 ing one end pivoted, as shown, to a pin, d, upon the heddle-lever H, and the other end pivoted to a crank-pin, e, upon the vibrating gear C. 60

P is the pattern-cylinder, having its axis in the frame, and operated as and by the means described in my said Patent No. 134,992.

R is a rack, secured to the loom-frame above the connectors, and serving as a guide to a  
65 series of sliding weights, W, one of which rests upon each connector. But one weight is shown, it being only necessary to say that each weight is a bar of metal, has a free up-and-  
70 down motion in the rack, and is of the same thickness as the connector, in order that there may be a separate and independent weight resting upon each connector.

The operation is as follows: By the action of the constantly-revolving pattern-cylinder P  
75 the arm D is independently raised or permitted to fall, and thus at one time causes the vibrating gear C to engage with the upper constantly-rotating cylinder-gear B, and at an-  
80 other time causes the vibrating gear C to engage with the lower constantly-rotating cylinder-gear, B'. When, by the action of the pattern-cylinder P, either of the vibrating arms D is raised, its vibrating gear C is turned back-  
85 ward by the engagement of its teeth with the upper constantly-rotating cylinder-gear, B, thereby drawing back its connector J and pulling outward the upright arm of the particular  
90 heddle-lever H to which the connector is attached, and thus lifting one of the heddle-leaves by the cord c. When, by the continued rotation of the pattern-cylinder P, the same vibrating arm D is permitted to fall, the teeth  
95 of its vibrating gear C are brought into position, or are intended to be brought into position, to be engaged with the teeth of the lower constantly-rotating cylinder-gear, B', in order that the vibrating gear C may be rotated in the  
100 opposite direction, thereby throwing forward its connector J and pushing the same heddle-



lever H inward toward the center of the machine, and by a resulting pull upon the cord *c'* lowering the heddle-leaf which had previously been raised. It frequently happens, however, especially in a loom embodying a large number of harnesses in its construction, that the vibrating arm D, with its vibrating gear C and connector J, does not fall or follow the pattern-chain, when the roll of the pattern-cylinder is turned from under it, with sufficient promptness; and it also frequently happens that, even when the vibrating arm D does follow the pattern-cylinder down as required, the vibrating gear C sticks and turns back more or less upon the point where it sticks, as a pivot, thereby causing the harness to drop more or less before the proper time, and also throwing the teeth of the vibrating gear C out of their proper position relatively to the teeth of the lower constantly-rotating cylinder-gear, B'. The weight W overcomes this difficulty, for when the pattern-cylinder P lifts a particular vibrating arm, D, to cause its vibrating gear C to engage with the upper revolving cylinder-gear, B, it at the same time lifts the connector J upon the pin *d* as a pivot, and also lifts the weight W, and it follows that when, by the revolution of the pattern-cylinder P, the vibrating arm D is permitted to fall, in order that the vibrating gear C may engage with the cylinder-gear B', the weight W, bearing upon the connector J, will operate to prevent the connector J from lagging behind the vi-

brating gear C in its fall, or from pulling upon the crank-pin *e*, and will likewise operate to prevent the vibrating gear C from lagging behind the vibrating arm D in its fall.

No further description of the operation is required when one of the arms of the compound lever employed in the drop-shuttle-box mechanism of my said Patent No. 134,992 is substituted for the heddle-lever H.

This application of a separate weight to each connector J is also of great assistance in overcoming the drag of the heddle-leaf or of a tier of shuttle-boxes when the connectors are drawn back; and since this drag varies in the heddle mechanism according to the nature of the warp carried, and otherwise, and in the shuttle-box mechanism according to the nature of the work to be done by the particular arm of the compound lever to which the connector is attached, I place above each connector a greater or a less weight, as may be required in each instance.

I claim—

The combination, with the cylinder-gears, pattern and vibrating gear, and its supporting-arm, of the connector, the lever connected therewith, and the weight resting upon the connector, substantially as described.

LUCIUS J. KNOWLES.

Witnesses:

WM. M. BATES,  
 L. P. ROBERTS.