L. J. KNOWLES.

Mechanism for Operating Drop-Shuttle Boxes for Looms.

No. 221,238. Patented Nov. 4, 1879.

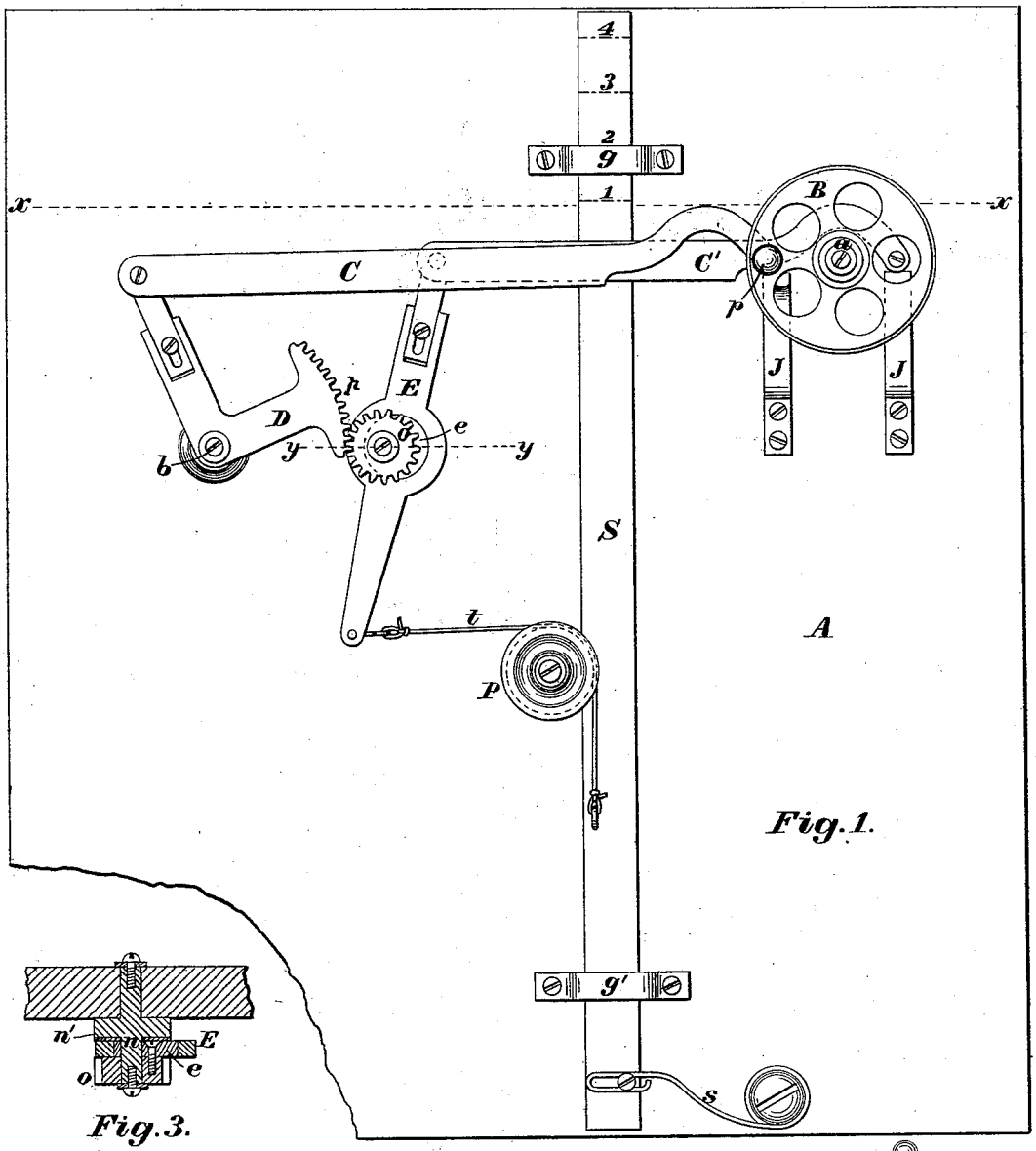

Fig. 1.

Fig. 3.

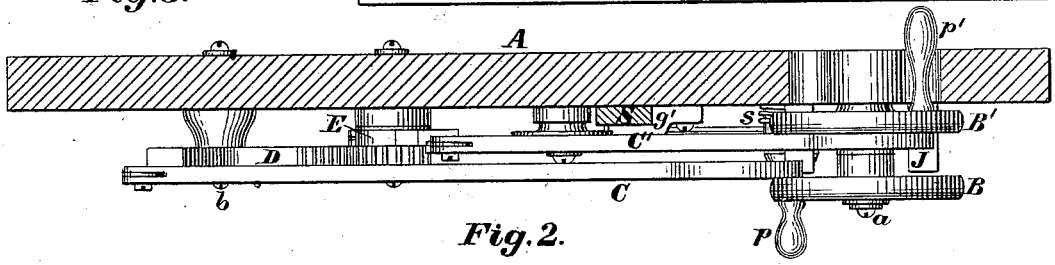

Fig. 2.

Witnesses:

W. W. Swan

H. G. Olmsted

Inventor:

Lucius J. Knowles

UNITED STATES PATENT OFFICE.

LUCIUS J. KNOWLES, OF WORCESTER, MASSACHUSETTS.

IMPROVEMENT IN MECHANISMS FOR OPERATING DROP SHUTTLE-BOXES FOR LOOMS.

Specification forming part of Letters Patent No. **221,238**, dated November 4, 1879; application filed May 19, 1879.

To all whom it may concern:

Be it known that I, LUCIUS J. KNOWLES, of Worcester, in the State of Massachusetts, have invented a new and useful Improvement in Mechanisms for Operating Drop Shuttle-Boxes of Looms, of which the following is a specification.

The invention is one of a number of modifications which I have made of the mechanism formerly employed by me for raising and lowering drop shuttle-boxes in the well-known looms bearing my name. These several modifications, being independent each of the others, form the subject-matters of several applications which I am now making for Letters Patent. It is, however, unnecessary for me to here describe the general features of my looms, or of looms to which the present invention is applicable, since these looms are well known to those skilled in the art; and of much of the mechanism employed for raising and lowering the tier of shuttle-boxes in the loom to which the present invention is applied it is sufficient to say that I make use of a pattern-barrel, two vibrating levers, two vibrating gears, two cylinder-gears, all as in my well-known looms, and as shown in patents to me, among others the patent bearing date January 21, 1873.

In the drawings I have, for convenience, represented the vibrating gears as two wheels, having each an independent movement, although upon a common shaft, of about a half a revolution. These wheels and the mechanism operated by them, which embodies my present invention, are shown as mounted on a panel in place of the loom-frame.

Figure 1 is a side elevation of such panel and mechanism attached to it. Fig. 2 is a cross-section on line *x x* of Fig. 1. Fig. 3 is a section on line *y y* of Fig. 1.

The panel is marked A, and will hereinafter be referred to as the "loom-frame." B B′ are the two wheels taking the place of vibrating gears which, in the loom as actually constructed, correspond to the vibrating gears H in my Patent No. 134,992, January 21, 1873, and are to be operated by the means there shown and in the manner therein set forth. The wheels B B′ turn upon a common fixed axis, *a*, it being unnecessary for the purpose of illustrating this invention that their axes should be independent of each other and have shifting positions under the control of the pattern-barrel.

The wheels B B′ will hereinafter, in this specification, receive the name of the gears whose office they fill—viz., vibrating gears. They are turned by crank-pins *p p′*.

C C′ are two connecting-rods, or, as they are termed by persons using my looms, the "connectors." They are attached at one end to crank-pins in the vibrating gears B B′, and near these ends they are bent, that they may not interfere with the half-revolutions of the vibrating gears. The other ends of these connectors are pivoted—that of C to the bell-crank lever D, which in turn is pivoted to the frame at *b*, and that of C′ to a lever, E, which has for a fulcrum an eccentric, *e*, the lever being so shaped at its center as to form a strap for the eccentric. The eccentric is secured by a screw, as shown, to a gear-wheel, *o*, taking into the gear-sector *p*, with which the bell-crank lever D is provided, as shown, the gear-wheel *o* and the eccentric both turning on a shaft, *n*, projecting from the frame, as shown. A shoulder, *n′*, upon the shaft *n* sets the eccentric and lever E out a little distance from the frame.

J J are two stops, against which the inner ends of the connectors C C′ strike at the ends of their throws. They thus confine the vibrating gears B B′ to about half-revolutions.

S is the shuttle-box rod, carrying at its upper end a tier of four shuttle-boxes. It is connected with the lower end of the lever E by a cord or chain, *t*, passing over a pulley, P.

In a loom as actually constructed and operated, the shuttle-box rod, with its tier of shuttle-boxes, will fall by its own weight; but in the drawings I have represented that weight by a spring, *s*.

The path of the shuttle-box rod is shown as determined by two brackets, *g g′*, the upper surface of the bracket *g* being supposed to be at the level of the race.

In this contrivance the position of the lower end of the lever E, to which the cord is attached, determines the position of the shuttle-boxes, and it is obvious that the position of the lower end of the lever E may be changed in two ways—first, by moving the le-

ver on its fulcrum, and, secondly, by moving that fulcrum, which is the eccentric *e*.

Now, the proportions of the lever are such that, when its upper end is moved a distance equal to the throw of the connector C′, occasioned by a half-revolution of the vibrating gear B′, the lower end will move a distance sufficient to vary the position of the tier of shuttle-boxes two boxes. In like manner, a change in the position of the fulcrum of the lever E, brought about, as shown, through the bell-crank lever D, gear-sector *p*, and gear-wheel *o*, by the throw of the connector C, resulting from a half-revolution of the vibrating gear B′, will move the lower end of the lever E a distance sufficient to vary the position of the tier of shuttle-boxes one box.

Drawing the connectors in upon the vibrating gears raises the shuttle-boxes; throwing them forward from the gears allows the shuttle-boxes to fall by their own weight.

Any one of the four shuttle-boxes may be brought opposite the race. For example, the vibrating gears being in the positions shown in the drawings, shuttle-box No. 2, counting from the bottom, is at the level of the race. To raise No. 1 to that level, a variation of one box, throw the connector C back upon its vibrating gear B by turning that gear back; or, resuming the position shown in the drawings, to lower No. 3 to the level of the race, turn the vibrator-gear B back and the vibrator-gear B′ forward, thus, as it is called, "discounting." Turning B back alone would have brought No. 4 box to the level of the race. Moving the vibrating gears in the same direction makes a variation of three shuttle-boxes.

It is obvious that the mechanism above described may be duplicated for the tier of shuttle-boxes at the opposite end of the race.

I claim—

In combination with the two connectors C C′ and mechanism for operating the same in a loom, the bell-crank lever D, provided with the gear-sector *p*, gear-wheel *o*, eccentric *e*, and lever E, a tier of shuttle-boxes, and mechanism to connect the lever and shuttle-boxes, all substantially as described, for the purpose specified.

LUCIUS J. KNOWLES.

Witnesses:
W. W. SWAN,
H. G. OLMSTED.