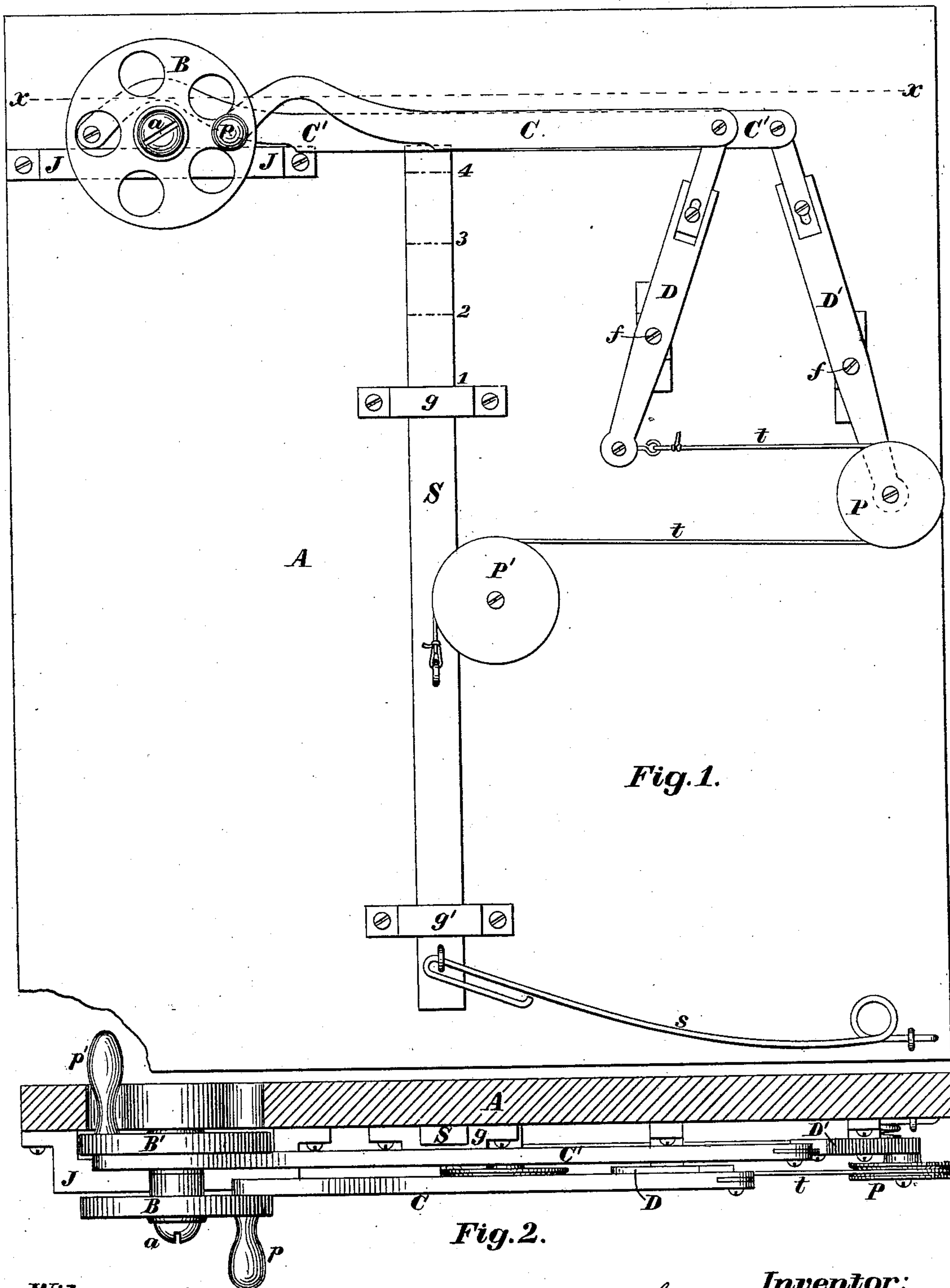


L. J. KNOWLES.
 Mechanism for Operating Drop-Shuttle Boxes for Looms.
 No. 221,240. Patented Nov. 4, 1879.



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

Specification forming part of Letters Patent No. **221,210**, 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 Mechanism 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 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 *xx* 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* of my said Patent No. 134,992, January 21, 1873, and are to be operated by the means there shown and in the manner there described. As there shown, however, the two wheels *B B'* turn upon a common axis, *a*, it being unnecessary, for the purpose of illustrating this inven-

tion, 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. The vibrating gears are here represented as turned by crank-pins *p p'*; but in actual construction they are operated by the cylinder-gears, as described in my said Patent No. 134,992.

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. These connectors differ from the connectors used in my ordinary looms only in being of unequal lengths, the connector *C* being shorter than the connector *C'*. Their further ends are pivoted respectively to two levers, *D D'*, which have independent fulcrums *f f*, as shown.

P is a pulley whose shaft is in the free end of the lever *D'*, as shown. *J* is a bracket, serving as a stop to limit the vibrations of the vibrating gears to about half-revolutions.

S is the shuttle-box rod, carrying a tier of four boxes. Its path is represented 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 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 shuttle-box rod is lifted by a chain, *t*, one end of which is secured to the rod, while the other is made fast to the free end of the lever *D*. This chain *t* passes around the pulley *P*, and also over a directing-pulley, *P'*. In the actual construction of looms other directing-pulleys will be required.

In this contrivance both connectors have the same throw, and the two levers, although for convenience in arrangement they are of slightly different lengths, are so fulcrumed each that a movement of either, as occasioned by a full throw of its connector, if directly attached to the lifting-chain, would vary the position of the shuttle-box rod one box. Accordingly

such a movement of the lever D does vary the position of the shuttle-box rod one box; but since the chain passes over the pulley P, instead of being attached directly to the lever D', it is evident that the effect of a movement of the lever D' upon the chain is doubled, and a movement of the lever D' to the extent allowed by its connector C' will vary the position of the shuttle-box rod two boxes.

It follows that by this contrivance any one of four boxes may be brought opposite the race. For example, the vibrating gears being in the positions shown in the drawings, No. 1 box is at the level of the race. To bring No. 2 to the level of the race, throw the connector C back upon its vibrating gear B by turning that gear back. From this new position, to bring No. 3 box to the level of the race, turn both vibrating gears forward, thus throwing forward both connectors and giving to the lever D a movement which would raise the shuttle-box rod one box, and to the lever D' a movement which would lower the shuttle-box rod two boxes. From this position, to resume the original position shown in the drawings, throw back the connector C'. From this original position, to bring No. 4 to the level of the race, throw back the connector C and at the same time throw forward the connector C'.

It will be observed that in this contrivance, to make a change of three shuttle-boxes—that is, from No. 1 to No. 4, or from No. 4 to No. 1—the connectors are thrown in opposite di-

rections, and that discounting takes place when they are thrown in the same direction.

The connector C is pushed forward to raise and pulled back to lower the shuttle-box rod. The connector C' lifts the rod when it is pulled back and allows the rod to drop when it is pushed forward.

The lever D might be so fulcrumed as to become a lever of the second class without departing from the present invention. In some instances such a construction would be preferable, since both connectors would act to lift the shuttle-box rod when pulled back upon their vibrating gears, instead of lifting one when pulled back and the other when pushed forward.

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 connectors C C' and mechanism for operating the same in a loom, the levers D and D', having independent fulcrums, and the latter provided with the pulley P, a tier of shuttle-boxes, and the chain t, made fast to the lever D and passing over pulley P, with suitable connecting devices between said chain and shuttle-boxes, substantially as described, for the purpose specified.

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