

L. J. KNOWLES.
Shuttle-Box Mechanism for Looms.

No. 227,694.

Patented May 18, 1880.

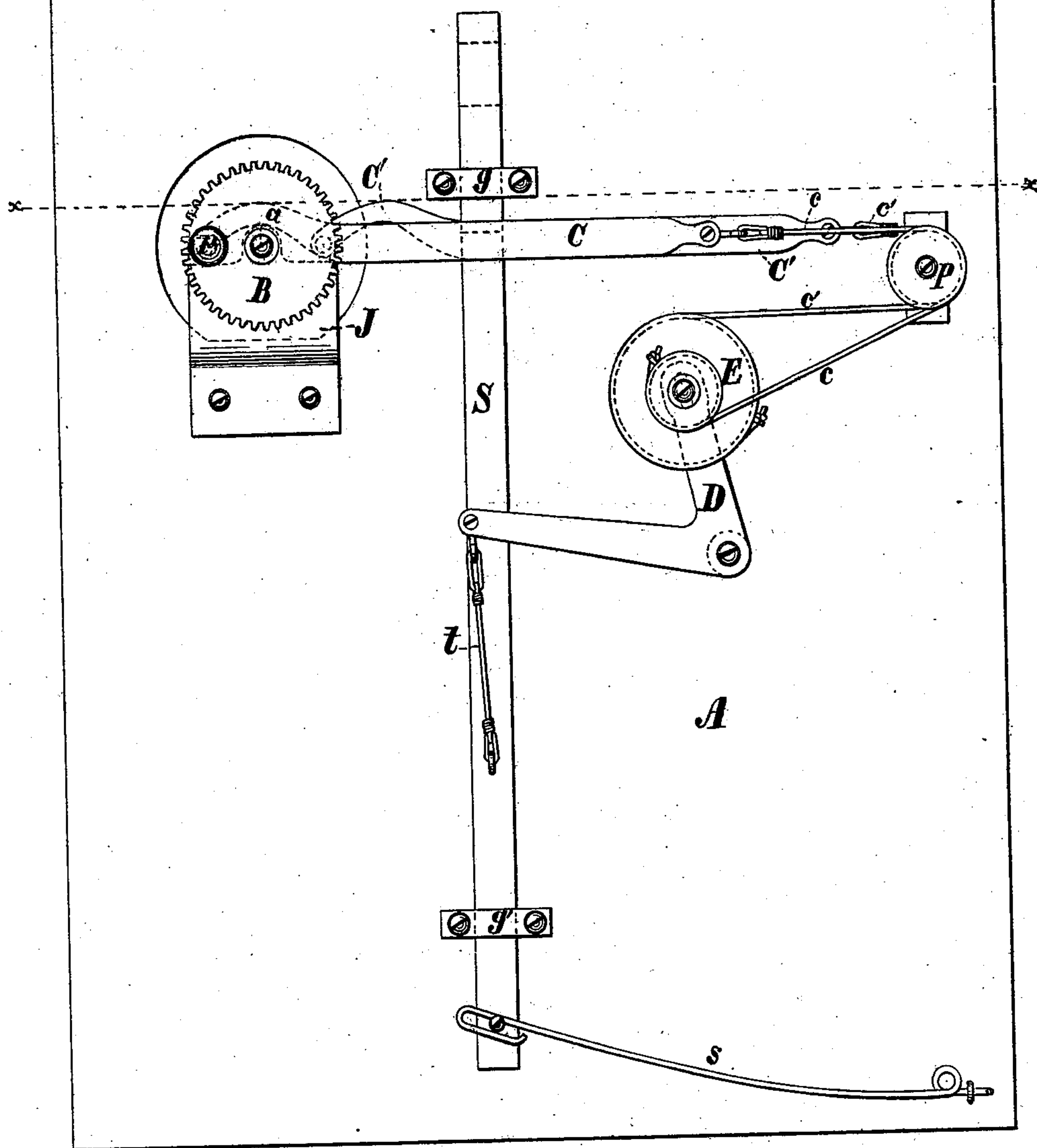


Fig. 1.

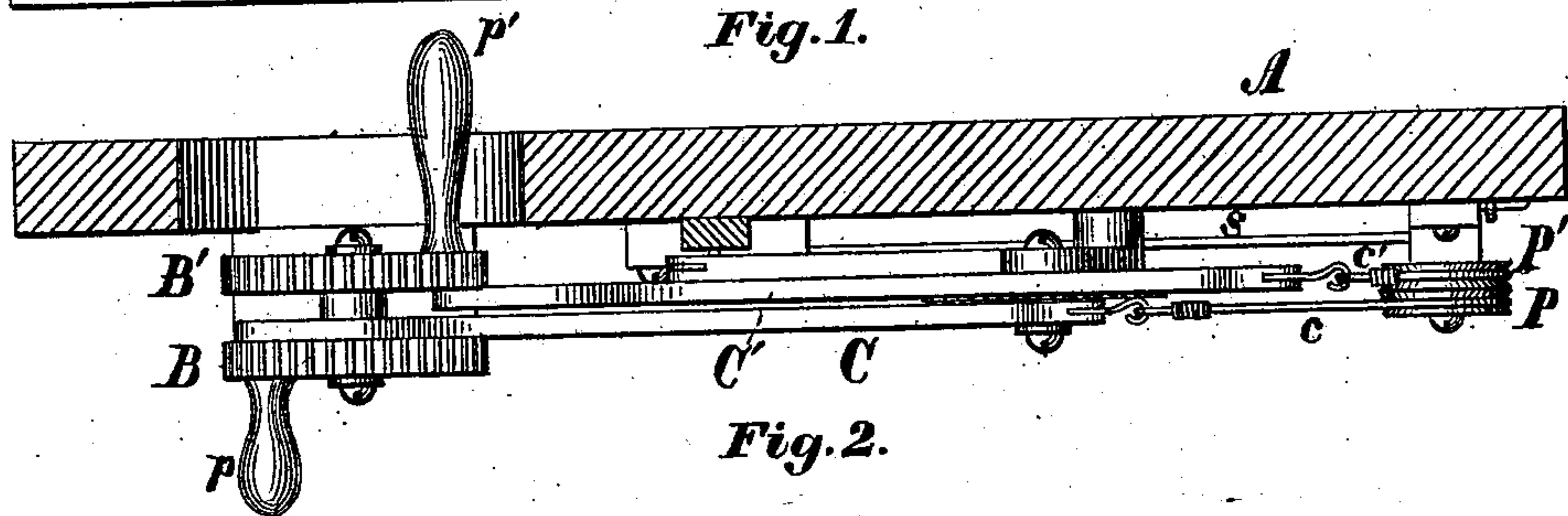


Fig. 2.

Witnesses:

W. P. Prohle Jr
H. W. Swan

Inventor:

Lucius J. Knowles

UNITED STATES PATENT OFFICE.

LUCIUS J. KNOWLES, OF WORCESTER, MASSACHUSETTS.

SHUTTLE-BOX MECHANISM FOR LOOMS.

SPECIFICATION forming part of Letters Patent No. 227,694, dated May 18, 1880.

Application filed October 31, 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 Shuttle-Box Mechanism for 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.

Applications for patents for some of these modifications have already been allowed, and other applications are pending. Each modification, however, is independent of the others, and forms, or will form, the subject-matter of a separate application for a patent.

It is 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 looms 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, and 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, shown the mechanism which illustrates my present invention as mounted on a panel in place of a 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 vibrating gears. In the loom as actually constructed these gears correspond to the vibrating gears H of my Patent No. 134,992, and are operated by the means there shown in the manner there described. They are represented as operated by crank-pins *p p'*, and as turning 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 vibrating gears have a movement of about half a revolution.

C C' are two connecting-rods, or, as they are termed by persons using my looms, "the connectors." They are attached at their outer ends to crank-pins in the vibrating gears B B', as shown, and near their outer ends they are bent, so that they may not interfere with the half-revolutions of the vibrating gears. The inner end of the connector C is attached to one end of a cord, *c*, which passes over a pulley, P, and is made fast at its other end to the smaller section of the cone-pulley E on one arm of a bell-crank lever, D, which is pivoted to the frame, as shown. In like manner the inner end of the connector C' is attached to one end of a cord, *c'*, which passes over a pulley, P', and is made fast at the other end to the larger section of the cone-pulley E.

The cord *c* passes under the cone-pulley E before being made fast to its periphery, and the cord *c'* passes over it; and consequently these two cords pull upon the pulley in opposite directions, one winding up when the other unwinds. For the purposes of adjustment a screw and slot are used to secure the axis of the cone-pulley E to the short arm of the bell-crank lever D. The pulleys P and P' are independent pulleys, although running on a common shaft which projects from a bracket on the frame, as shown.

J is a bracket furnishing a bearing for the axis *a*, and also 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 shuttle-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 the cord *t*, one end of which, as shown, is secured to the rod, while the other end is secured to one end of the bell-crank lever D.

In the drawings the connection between the bell-crank lever D and the shuttle-box rod S is represented as made by the cord *t* direct; but in the actual construction and operation of looms the cord *t* will be made to pass over several directing-pulleys.

It is evident that the cone-pulley E is a mov-

able pulley, and that in its movement in one direction, occasioned by pulling one of the cords *c c'*, it carries with it the end of that arm of the bell-crank lever D which is attached 5 to its axis, and that in its movement in the other direction, occasioned by the weight of the tier of shuttle-boxes, when one of the cords *c c'* is slackened, it merely follows the movement of the same arm—that is, the two unequal radii of the cone-pulley, at the ends of 10 which, at any instant, the cords *c c'* exert their force, form a lever of the second order, the power being in the pulling-cord and applied at the junction of the cord with one 15 radius, the fulcrum being at the junction of the opposite radius and the other cord, and the weight being at the axis of the pulley. It is immaterial that the radii are constantly changing, or whether they are exactly opposite each other. Pulling upon either cord lifts 20 the weight, and letting out either cord lets the weight drop. It is evident, also, that power exerted upon the end of a shorter radius will move the weight a greater distance than power 25 exerted upon the end of a larger radius. Now, as a matter of construction, the parts of the operating mechanism are so proportioned that pulling upon the smaller set of radii or the smaller section of the cone-pulley by the 30 cord *c* to the full length of the throw of the connector C will raise the weight a distance of two shuttle-boxes—that is, will pull the bell-crank lever D a distance sufficient to raise the shuttle-box rod two boxes, while a pull 35 upon the larger section of the cone-pulley by the cord *c'* to the full length of the throw of

the connector C' will raise the shuttle-box rod one box. In like manner slackening the cords *c* and *c'* to the full length of the throws of their connectors will let the shuttle-box rod 40 drop two boxes and one box, respectively.

The weight of the tier of shuttle-boxes is sufficient to keep all the cords *t, c,* and *c'* at all times taut; and it is therefore easily understood that the two connectors can be oper- 45 ated separately or together and in the same or in opposite directions. It follows that any one of the four shuttle-boxes in the tier may be brought to the level of the race.

It is obvious that, without departing from 50 my invention, a simple pulley of proper diameter might be substituted for the cone-pulley E upon the bell-crank lever D, the cords *c c'* being made fast to its circumference, so as to wind upon it in opposite directions, provided 55 the location of the crank-pin by which one of the connectors C or C' is attached to its vibrating gear B or B' is so changed that one connector shall have double the throw of the other. 60

I claim—

The connectors C C' and mechanism for operating the same, in combination with the pulleys P P', cords *c c'*, bell-crank lever D, provided with pulley E, a tier of shuttle-boxes, 65 and connecting mechanism, substantially as described, for the purpose specified.

LUCIUS J. KNOWLES.

Witnesses:

W. P. PREBLE, Jr.,
W. W. SWAN.