5 Sheets--Sheet 1.

G. CROMPTON.

Shuttle-Box Mechanism.

No. 161,487. Patented March 30, 1875.

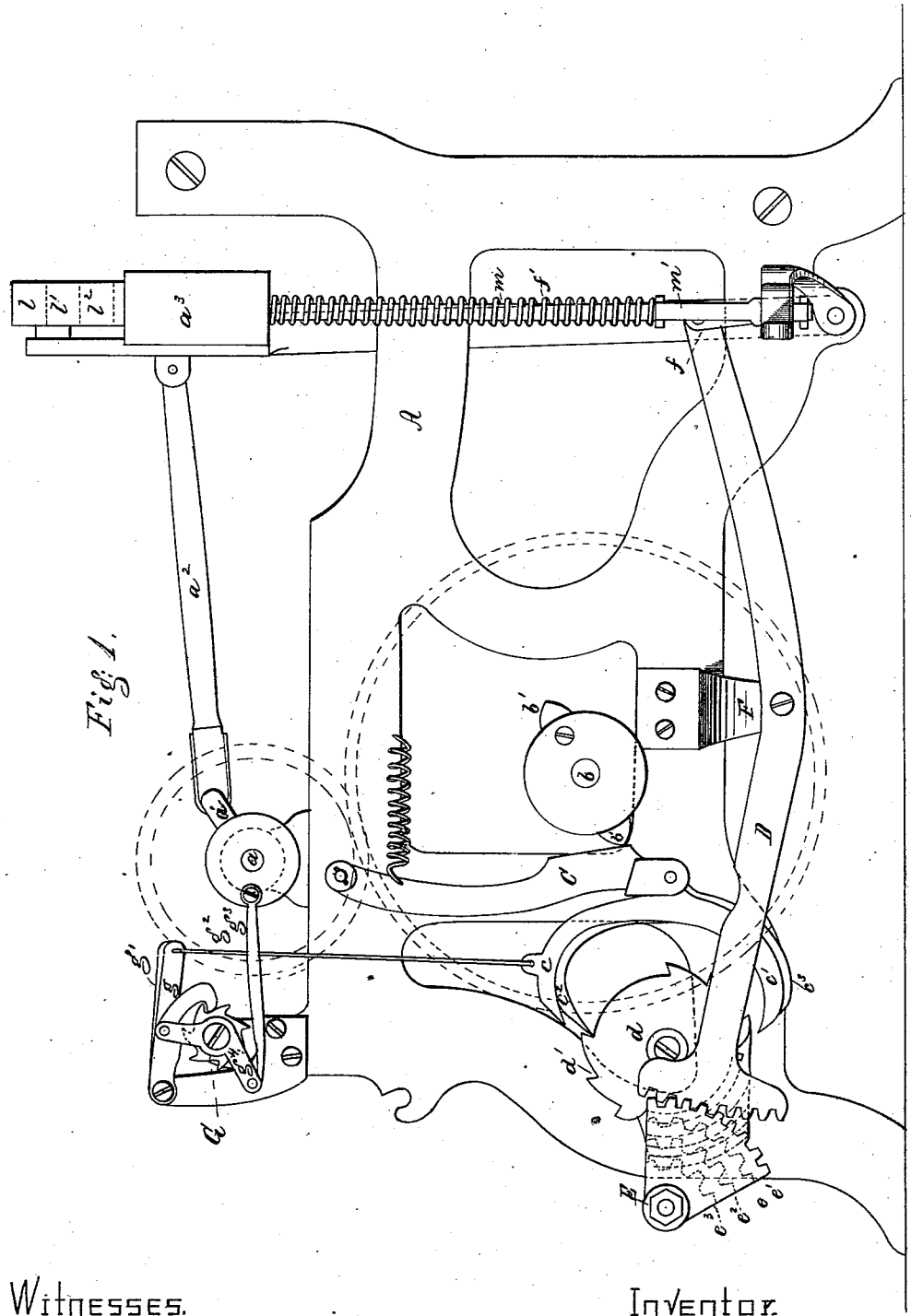

Fig. 1.

Witnesses.
S. B. Kidder
M. W. Frothingham

Inventor.
George Crompton
per Crosby & Gregory Atty's.

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G. CROMPTON.

Shuttle-Box Mechanism.

No. 161,487. Patented March 30, 1875.

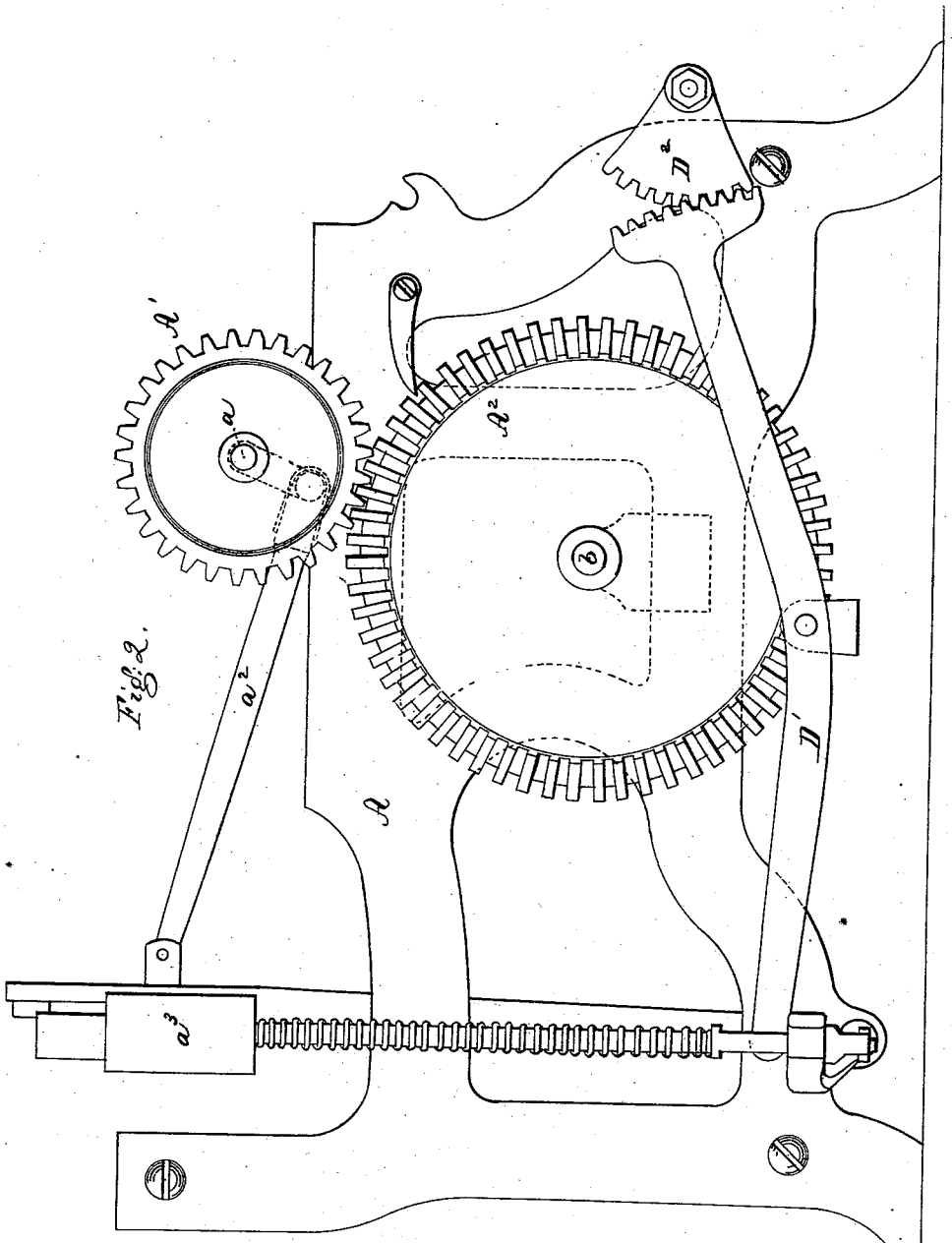

Fig. 2.

Witnesses.
S. B. Kidder
M. W. Frothingham.

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George Crompton
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Fig. 4.

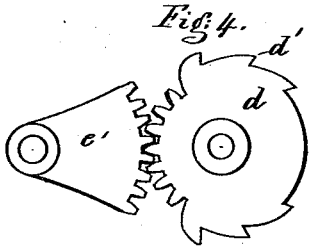


Fig. 5.

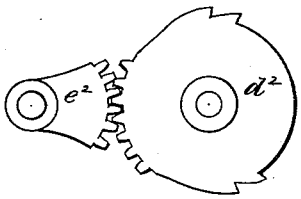


Fig. 9

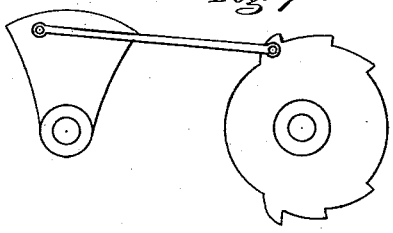


Fig. 8.

Fig. 6.

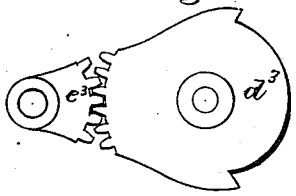
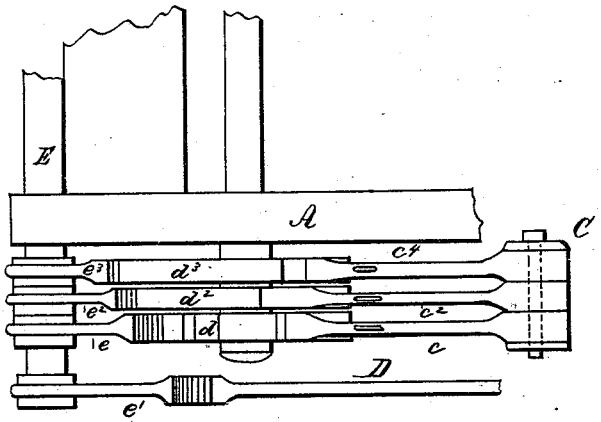


Fig. 7.

Fig. 3.



Witnesses.
S. B. Kidder.
M. W. Frothingham.

Inventor.
George Crompton.
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5 Sheets--Sheet 4.

G. CROMPTON.

Shuttle-Box Mechanism.

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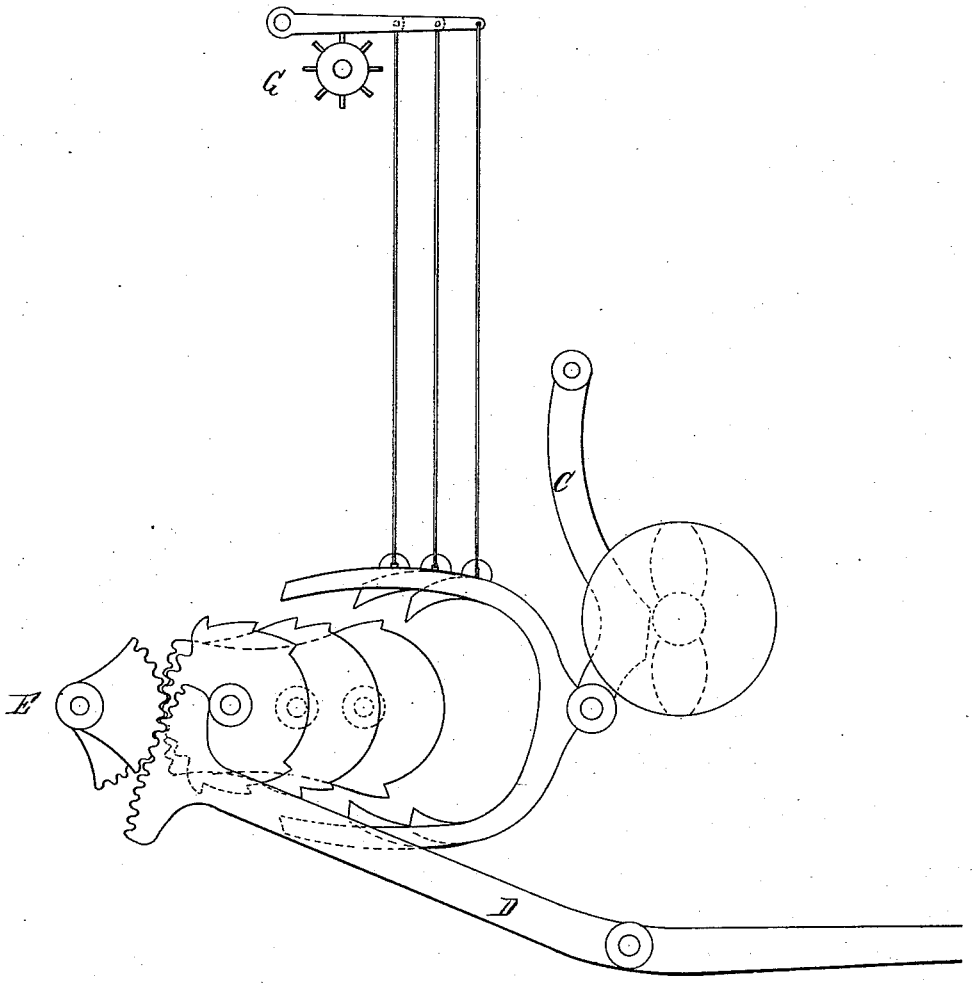
Fig 10.



Witnesses.
S. B. Kidder
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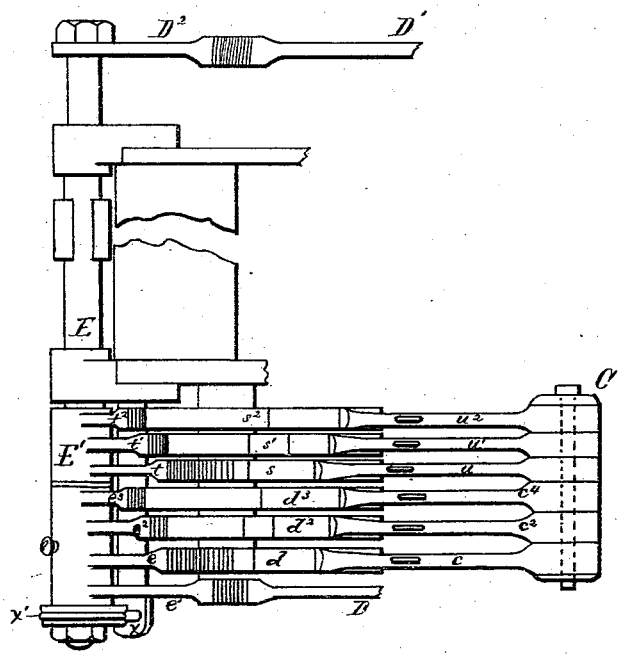
Fig 11



Witnesses.
L. B. Kidder
M. W. Fothingham

Inventor.
George Crompton
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UNITED STATES PATENT OFFICE.

GEORGE CROMPTON, OF WORCESTER, MASSACHUSETTS.

IMPROVEMENT IN SHUTTLE-BOX MECHANISMS.

Specification forming part of Letters Patent No. **161,487**, dated March 30, 1875; application filed January 18, 1875.

CASE A.

To all whom it may concern:

Be it known that I, GEORGE CROMPTON, of Worcester, in the county of Worcester and State of Massachusetts, have invented an Inprovement in Shuttle-Box Mechanism, of which the following is a specification:

My invention relates to mechanism for operating the shuttle-boxes of looms, so as to place any shuttle-box of a series opposite the race. One arm of a rocking lever, moved a greater or less distance by means of pawls through the agency of toothed sectors or equivalents, is connected with a box-operating lever, so as to move the shuttle-box rod and boxes the desired distance.

My invention consists in the combination, with a rocking lever moved through different degrees of oscillation by mechanism engaging it at different distances from its center of motion, of a series of shuttle-boxes, and with such parts also a secondary or shuttle box lever; also, in the combination, with a rocking lever working through different degrees of oscillation, of a series of cogged sectors, and, in combination with these, pawls, and also a pattern mechanism; and also in other combinations, as hereinafter specified and claimed.

Figure 1 is a side elevation of a loom, showing my improvements. Fig. 2 is an opposite side elevation of the loom. Fig. 3 is a top view of the rocking lever, sectors, and pawls. Figs. 4, 5, and 6 are views of the sectors and other parts detached; and Fig. 7 is a section of the shaft of the rocking lever when adapted to receive within it a second shaft, so as to operate shuttle-boxes at both sides of the loom independently.

In the drawing, A represents the frame of the loom, of any suitable construction. *a* is the crank or lay shaft; a^1, its crank; a^2, the connecting-link, and a^3 the lay, all operating in the usual manner. A series of shuttle-boxes, l l^1 l^2, (the fourth box being hidden by the end of the lay,) is mounted on and moves with the lay. These shuttle-boxes are fitted in any well-known way to slide up and down as the lay is moved. In this instance they are carried by a rod, *m*, connected through a yielding connection, *m'*, with a link, *f*, attached to the shuttle-box lever D, pivoted at the side of the loom-frame at F. A spring, *f'*, surrounds the rod *m*, and rests against the bottom of the end of the lay, and against the connection *m'*. This construction allows the shuttle-box lever to move should the shuttle-boxes be caught or impeded in their movement. The pattern-cylinder G is supported on the loom-frame. In this instance it is a roller with protuberances or pins, as shown in Fig. 8; but instead of this roller I may employ any other well-known kind of pattern-cylinder chain or cord, and such devices may be moved in any well-known way. The cylinder G is moved from a crank on the crank-shaft through a link, g^3, and a lever, g^4, provided with a pawl, that engages a toothed-wheel on the pattern-cylinder. Pivoted to the loom-frame is a radius-bar or pawl-carrier, C, provided with a series of double pawls, c c^1 c^2 c^3 c^4, &c., and these pawls are raised or lowered, or held in a central or inoperative position, by means of cords, wires, or other connections extending from said pawls to levers or equivalents resting on or actuated by the pins, or protuberances, or equivalents on the pattern-cylinder or chain. This radius-bar or pawl-carrier C is moved in one direction by means of tappets *b'* on the shaft *b*, or other moving part of the loom, and in the other direction by a spring. The pawls make one complete movement with each complete movement of the lay, and so as, through the sectors or connections for moving the shuttle-boxes, to move the shuttle-boxes after a shuttle has been shot or boxed. The shuttle-boxes are to be provided with any well-known protectors or stop-motions, and the lay may also be provided with stop-motions, controlled by the weft-thread.

The rocking lever E, for imparting motion to the shuttle-boxes, is, in this instance, shown as a shaft suitably mounted on the loom-frame, (preferably at the lower portion of the frame,) and its arms e e^1 e^2 e^3 project therefrom to different distances from its center. These arms are, in this instance, provided with teeth to be engaged by corresponding teeth or notched sectors d d^2 d^3, mounted on a suitable journal, and actuated (they being free to be moved in either direction) by the pawls carried by the pawl-carrier C, and placed in position by the

pattern device. These notched sectors (see Figs. 4, 5, and 6) have their gear-teeth, that engage the arms of the rocking lever, at different distances from the center on which the sectors move or are supported, and they have a greater or less number of notches to receive the pawls, according to the distances they are called on to move the shuttle-boxes. The gear-teeth of the notched sectors *d* are nearer the axis on which it moves than are the gear-teeth of the other sectors, and this notched sector engages the teeth of the arm *e* of the lever E, such arm being longer than are the arms e^2 e^3 of the lever E, that are engaged by the other toothed sectors. The sector *d* has three notches at bottom and three at top. A single reciprocation of the pawl *c* c^1, arranged to operate that sector, will move the sector, if permitted so to do by the pattern-cylinder, a distance corresponding with the length of a notch, d^1, and this sector, through its teeth engaging the arm *e*, will rock the lever E, and cause its arm e^1 (also preferably toothed) to engage the end of the secondary or shuttle-box lever D, and move the boxes one step, or from one to the next box of the series. This movement of the notched sector may take place in either direction, according as it is desired to raise or lower the boxes one step. The toothed sector d^2 has its gear-teeth farther removed from its center than are the gear-teeth of notched sector *d*, and so as to engage the teeth of the arm e^2 of the lever E. This notched sector d^2 has two notches at bottom and top, so as to be turned in either direction by its pawl c^2 c^3, and it will turn the lever E, and move the shuttle-boxes two steps up or down. Notched sector d^3 has its gear-teeth yet farther from its center than are the gear-teeth on notched sector d^2, and it engages the arm e^3 of the lever E, and moves the said lever a greater distance than either of the other notched sectors, and to a distance corresponding with three shuttle-boxes. The ends of arms *e* e^2 e^3 project to different distances from the center of the rocking lever E, and, through the intervening connections, (in this instance shown as notched sectors,) the rocking lever is moved more or less about its center, so as to move the shuttle-boxes the desired distance by means of a pawl or series of pawls, always moving the same distance, and once for each complete motion of the lay. Any desired number of these arms may project from the rocking lever, and a corresponding number of notched sectors or connections may be used, according to the number of shuttle-boxes in the series, each connection or sector being toothed and otherwise proportioned to move the rocking lever in a greater or less arc, so as to move the secondary or shuttle-box lever the desired distance, in order to reach the desired shuttle-box. The position of the pawls for actuating the notched sectors is governed by the pattern-cylinder or chain in any well-known way, and so that any pawl may be made to engage its notched sector at bottom or top to turn it in one or the other direction, to raise or lower the boxes; or the pawl may be held in a central position, where it will not operate. When one pawl is in operation the others are held out of action.

All the notched sectors are loose on their support, and they are shown as mounted on a common support; but they might be mounted on separate supports, located at different distances from the center of the rocking lever E, and then the gear-teeth of the notched sectors might be made at the same distance from the centers on which they are sustained, and the pawls must then be adapted to properly operate them.

It will be noticed that the pawls move always through the same distance, and each, through its sector or connection, acts on lever-arms of differing lengths. Therefore each pawl, when moving, will rock the lever through different degrees of oscillation, and will move the shuttle-box more or less. This action would be the same if arms of the rocking lever and the notched sectors were connected by links instead of by gear-teeth, and I sometimes so propose to connect the parts, as shown in Fig. 9. One pawl rocks the lever E through its notched sector a given distance, corresponding with the one-box movement; another pawl rocks the lever twice the distance, another three times the distance, and another, if desired, four times the distance, and so on for any number of boxes.

The arm e^1 of the rocking lever E is connected, by means of gear-teeth, with the secondary or shuttle-box lever D, and as the lever E is moved it moves the secondary lever and shuttle-boxes; but this connection may be variously modified, or a link may be used instead of teeth, or any well-known connection may be used. There should be at least two notches on the sector which is active in moving the series of boxes through the longest distance, four notches on the next sector, and six on the third, which moves the series from box to box, when a series of four boxes are employed; and should more boxes be employed a sector should be added for each additional box, and the notches on the sector active in moving the boxes one step, or from one to the next box, should be double the number of boxes, less one box, one-half above and one-half below; or for a series of four boxes six notches, three above and three below, and then, in the ratio shown in the drawing, should be notches in the successive sectors.

The secondary or shuttle-box lever D^1 at the opposite side of the loom is moved by the arm D^2, projecting from the rocking lever at that side, and in this way the shuttle-boxes at both sides of the loom are worked in unison. If it be desired the axis of the rocking lever E, which is elongated as a shaft, may be hollow and contain a second shaft, as in Fig. 7, by which arrangement shuttle-boxes at each side of the loom may be actuated independently.

Instead of placing two tappets, b', on the shaft b, I may use one to operate at every other pick, and it is sometimes desirable to do so to save chain. These cams may be attached by screws, and one may be removed. Instead of having the lever-arms all of different lengths, as heretofore described, they might be of the same length, and be acted on by a series of notched sectors of varying diameter, as shown in Fig. 10, where all the sectors are on different shafts, and the pawls are of different lengths.

In Fig. 11 I show how the boxes on both sides the loom may be operated by means of the toothed sectors and rocking levers, the pattern mechanism and sectors being on the same side of the loom. In such figure the parts c c^2 c^4 d d^2 d^3 E e^1 D D^1 D^2 C are substantially the same as in Figs. 1 and 3. This Fig. 11 shows an additional set of arms, t t^1 t^2, like those e e^2 e^3, an additional set of notched and toothed sectors, s s^1 s^2, and pawls for moving them, all carried, preferably, by the radius-bar, C. One of these sets of arms is secured to the shaft E positively, and its movement rocks the shaft, and the other set turns on the shaft independently, and moves a shuttle-box connection on the side at which it is placed.

Having described my invention, I claim—

1. The combination of a rocking lever, connected with and operating a shuttle-box rod, with toothed or notched sectors, adapted to engage with and actuate the rocking lever through different degrees of oscillation, substantially as described.

2. In combination, a rocking lever, connected with and operating a shuttle-box rod, toothed or notched sectors, adapted to engage with the rocking lever, and a pattern-cylinder, adapted to select the sector to be moved, and to govern the extent of movement of the rocking lever, substantially as described.

3. In combination, a rocking lever and toothed or notched sectors, adapted to engage with the lever, and to move the levers through different degrees of oscillation, substantially as set forth.

4. In combination, the rocking lever, a series of notched and toothed sectors, adapted to engage therewith, and pawls governed by pattern mechanism, and adapted to turn the lever through different degrees of oscillation, substantially as described.

5. The combination of the rocking lever and toothed sectors, adapted to engage with and move it through different degrees of oscillation, with the shuttle-box lever and shuttle-box rod and boxes, substantially as described.

6. A rocking lever and toothed sectors engaged with it, and adapted to move the lever through different degrees of oscillation, in combination and connected with shuttle-box-carrying rods at opposite sides of the loom, to move a double series of shuttle-boxes, substantially as described.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

GEO. CROMPTON.

Witnesses:
J. A. WARE,
J. B. SYME.