No. 744,333. PATENTED NOV. 17, 1903.

G. GOODLINE.

SHUTTLE BOX OPERATING MECHANISM FOR LOOMS.

APPLICATION FILED DEC. 10, 1901.

NO MODEL. 2 SHEETS—SHEET 1.

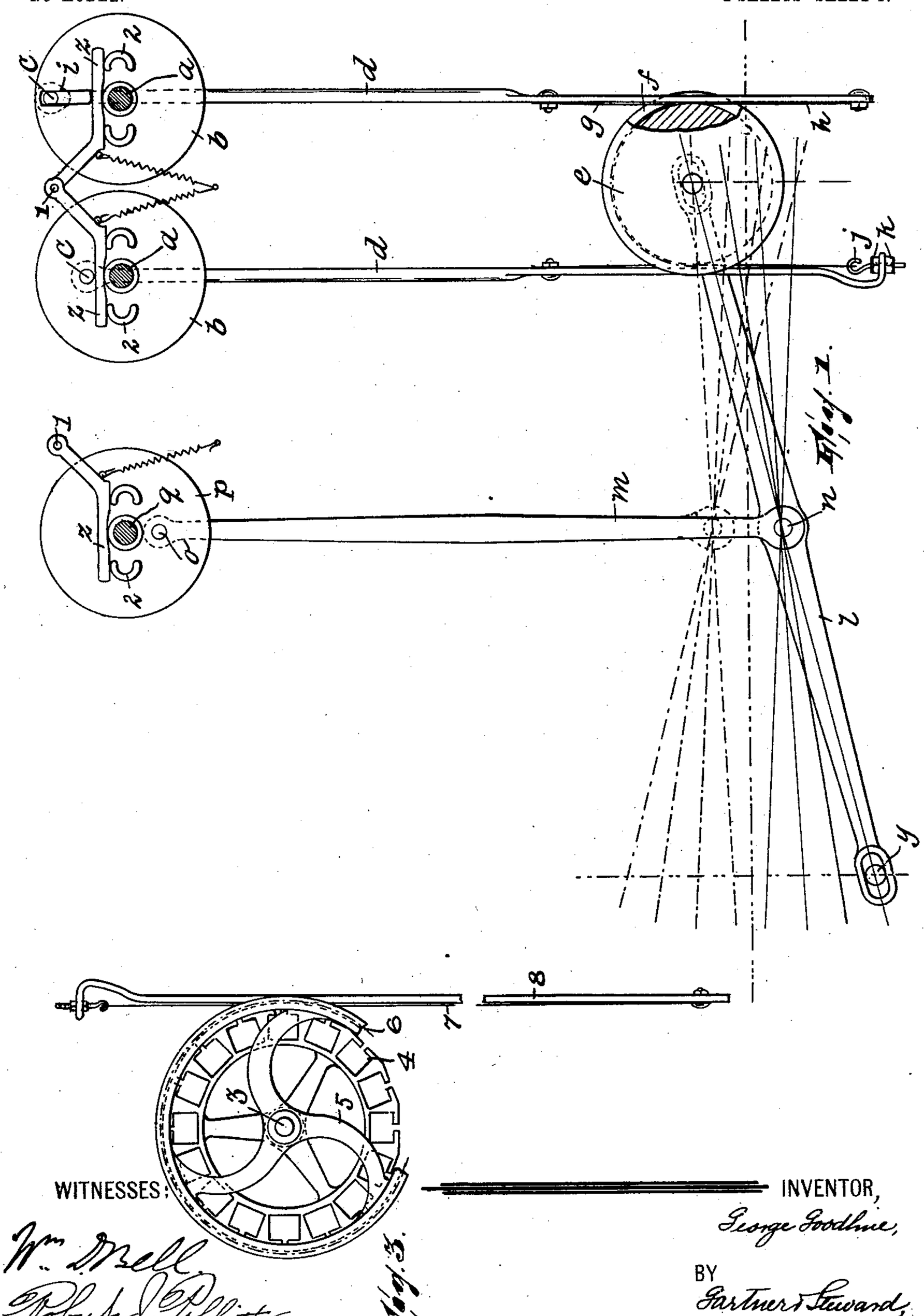

Fig. 1.

Fig. 2.

Fig. 3.

WITNESSES;

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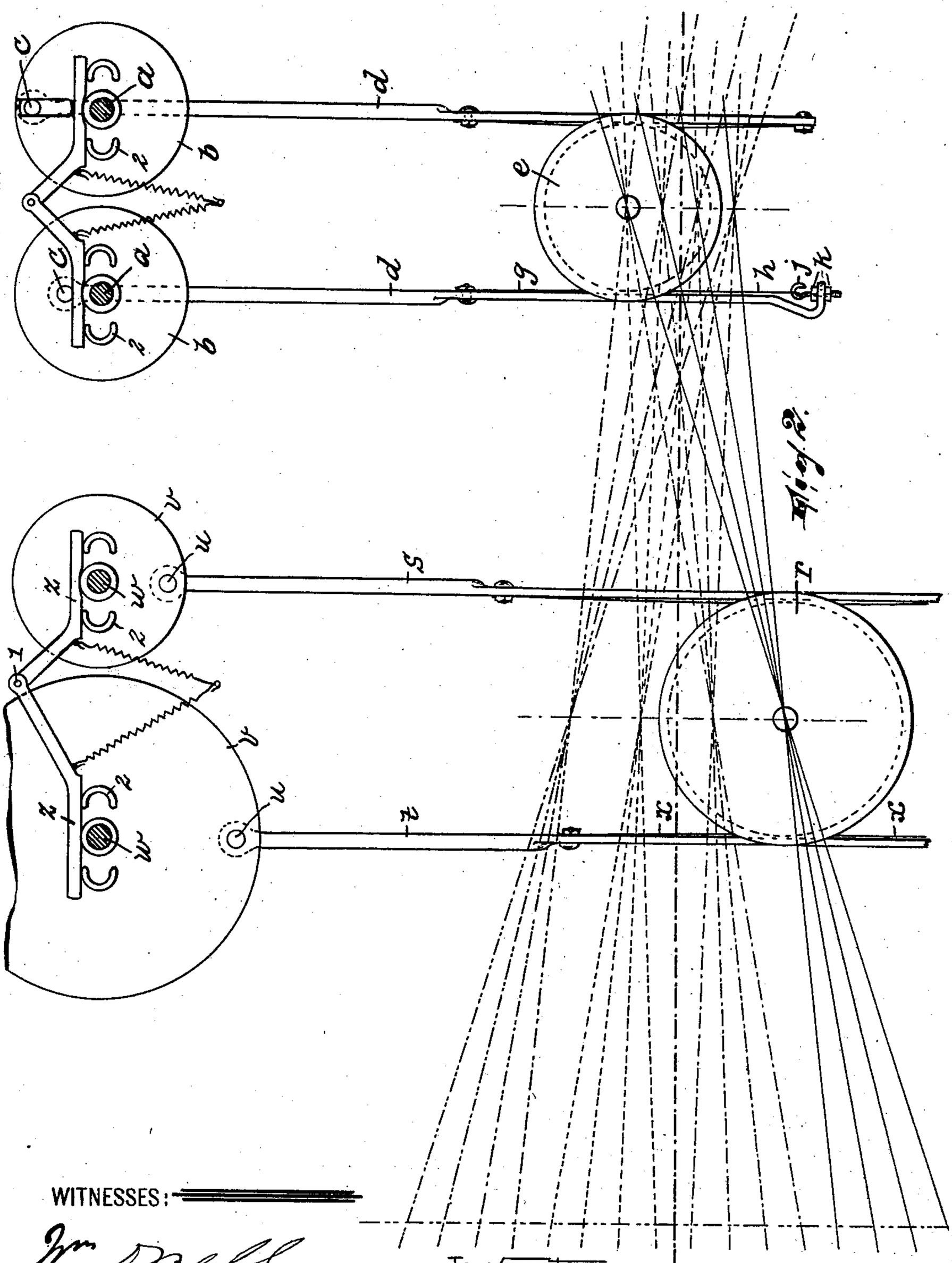

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UNITED STATES PATENT OFFICE.

GEORGE GOODLINE, OF PATERSON, NEW JERSEY.

SHUTTLE-BOX-OPERATING MECHANISM FOR LOOMS.

SPECIFICATION forming part of Letters Patent No. 744,333, dated November 17, 1903.

Application filed December 10, 1901. Serial No. 85,306. (No model.)

To all whom it may concern:

Be it known that I, GEORGE GOODLINE, a citizen of the United States, residing in Paterson, in the county of Passaic and State of New Jersey, have invented certain new and useful Improvements in Shuttle-Box-Operating Mechanism for Looms; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, and to characters of reference marked thereon, which form a part of this specification.

This invention relates to mechanical movements, and it has reference particularly to a mechanism of the nature of that required in looms for transmitting power to the shuttle-boxes from their prime actuating means.

As adapted particularly for transmitting power to the shuttle-boxes of looms my invention has for its object to render it possible to control a set of boxes corresponding to the extreme number of shuttles which it would be practicable to have in actual operation in the loom and to make the mechanism even convertible, if necessary, from one controlling a given number of boxes to one controlling more or less boxes; to eliminate lost motion and make the movement of the parts perfectly positive and exactly timed, whatever its extent, so that no matter how widely may be spaced the boxes corresponding to any two succeeding calls from the pattern, said boxes will be immediately responsive in assuming a position where their shuttles may be properly discharged onto the batten, and so that while in that position said boxes may stand perfectly stationary, and to make the motion of the parts such that their tendency—as, for instance, that of the shuttle-box structure, which is usually heavy—to produce vibration will be counteracted.

My invention will be found fully illustrated in the accompanying drawings, wherein—

Figure 1 is a view in front elevation, showing the parts of one form of my mechanical movement. Fig. 2 is a similar view of a modified form of my invention; and Fig. 3 is a detail view, in front elevation, of an improved form of shuttle-box structure which may be used with my mechanical movement.

a designates two rotary shafts on which are fixed so as to rotate therewith parts *b*, shown in the drawings as disks. On the disks *b* are pivots *c*.

To the pivots *c* are connected rods *d*, which, as shown in the drawings, are suspended from said pivots. Between the rods *d* is disposed a floating or bodily-movable wheel or pulley *e*, having a peripheral groove *f*. The groove of this pulley receives straps or bands *g h*, the latter of which extends over the pulley, while the former extends under it, their ends being secured one to one rod *d* and the other to the other rod *d*, as shown in the drawings. In order to render the throw of one of the rods *d* variable, the pivot *c* thereof is arranged in a slot *i* of the corresponding disk *b*, and in order to adjust the bands *g* and *h* one end of the band *h*, say, is connected to one of the rods *d* by means of a threaded hook *j*, secured to said rod by nuts *k*. The groove in the pulley also receives each rod and so guides it.

l denotes a lever which corresponds to the box-rod lever of a loom, the same being fulcrumed in that adaptation of my invention shown in Fig. 1 of the drawings on the lower end of a rod *m*, as at *n*. This rod is suspended from an eccentric pivot *o* on a disk *p*, which is carried by another rotary shaft *q*.

In the modified form of the invention shown in Fig. 2 lever *l* has its fulcrum centrally of another grooved pulley *r*, which is disposed between two rods *s* and *t*, suspended from eccentric pivots *u* on disks *v*, secured on rotary shafts *w*. Disk *r* and rods *s* and *t* are operatively connected by straps or bands *x* in the same manner that disk *e* and rods *d* are connected.

At *y* the means for connecting the box-rod with the lever *l* is secured to said lever.

The shafts *a a* and *q* (and *a a* and *w*, as in Fig. 2) are adapted to be rotated either separately or together in semirevolutions. Any suitable means may be provided for effecting this.

Referring in describing the operation to the mechanism as shown in Fig. 1 and assuming, first, that the shaft *q* is stationary

shafts a are capable of moving lever l to either three or four positions, according as the adjustable pivot c is or is not the same distance from the center of rotation in the corresponding shaft a that the other or stationary pivot c is from the center of its corresponding shaft a. If pivots c are both the same distance from their shafts a, then pulley e can be made to assume either of three positions—*i. e.*, (1) its uppermost position, where both pivots c are above the shafts, (2) its lowermost position, where both pivots c are below the shafts a, and (3) its intermediate position, where one pivot c is below its shaft a, while the other pivot c is above its shaft a. If the adjustable pivot c is arranged so that it is farther from the shaft a than the other pivot c is from its shaft a, then the pulley may be made to assume four positions—first, the uppermost one, where the two rods are in their extreme elevated positions; second, where the right-hand rod remains up while the left-hand rod is down; third, where the right-hand rod is down while the left-hand rod remains up, the position which this movement imparts to the pulley being different from the previous one, because since the pivots c of the rods are differently disposed in their respective disk b the one has a greater throw than the other, and, fourth, where both rods are down. Of course as the pulley is moved so it imparts its movements to the lever l, which in turn transmits the motion to the shuttle-boxes.

By imparting semirotations to shaft q a higher number of positions than four may be assumed by the pulley e. The movements of the pivot o about shaft q now cause the fulcrum of the lever l to assume either of two positions, as illustrated in Fig. 1. For then as the pulley e is moved to any of its four positions by its rod d the lever will stand when its fulcrum is at one of its positions at angles which are all different from the corresponding angles which the pulleys impart to the lever when the lever is in its other positions. The result is that the end of the lever which is connected to the shuttle-boxes is capable of assuming eight different points. To carry out this principle of operation still further the mechanism for moving the fulcrum of lever l has only to be modified into that form thereof shown in Fig. 2, so that the fulcrum of the lever is capable of assuming more than two positions in the same manner that the parts a, b, d, e, g, and h in Fig. 1 cause the lever to move about its fulcrum to more than two positions.

It should be remarked that during the intervals in which any particular shaft a (or q or w) is idle (and these intervals are variable in order to effect the movement of the shuttle-boxes from any one to any other position) they are preferably secured against movement by spring-controlled stop-levers z, pivoted at 1 and bearing against diametrically-opposed projections 2 on the disks b, (p and v.)

Inasmuch as it would be impractical to operate too high a number of shuttle-boxes in the ordinary form vertically, because a body so large and ponderous as the shuttle-boxes would then form would cause undue vibration and jar, I prefer to dispose the boxes in circular or cylindrical arrangement. Therefore, referring to Fig. 3, 3 is a shaft which is supported in any suitable manner and which carries a rotary series of cylindrically-arranged shuttle-boxes 4, having a pulley 5, around which and to which is secured the loop 6 of a strap 7, the ends of which extend up and down tangentially from the pulley and are secured to the box-rod 8. This box-rod is the part which is connected through any suitable means at y with the lever l.

The construction and arrangement of the parts of my mechanism are such that I am able from several considerations to effect a great economy of power and to reduce lost motion and vibration in the loom practically to a minimum. For instance, it does not take so much power to operate the lever l and the boxes through the pulley e as it would if the power were applied directly to the end of the lever, and, moreover, since the power is always acting tangentially of the pulley it constantly acts uniformly thereon. The boxes may be counterbalanced by the weight of the pulley and the rods d, which reduces vibration, and lost motion may be practically eliminated by tightening up the bands g and h. It will be observed that the bands when taut hold the rods positively in the groove of the pulley. Again, the normal or idle positions of either of the rods d being on dead-centers the work which the power has to perform in each turn of the parts which control said rods d is not thrown upon it suddenly, but gradually.

Having thus fully described my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. In a mechanical movement, the combination of a part to be moved to different positions, other parts each of which is reciprocatory relatively to the other, a rotary part interposed between and having a rolling engagement with said reciprocatory parts, said first-named part being operatively connected with the rotary part, substantially as described.

2. In a mechanical movement, the combination of a part to be moved to different positions, other parts each of which is reciprocatory relatively to the other, a rotary part interposed between and having a rolling engagement with said reciprocatory parts, said first-named part being operatively connected with the rotary part, and means for locking said rotary part to the reciprocatory parts against a non-rolling movement, substantially as described.

3. In a mechanical movement, the combination of a part to be moved to different positions, other parts each of which is reciprocatory relatively to the other, a rotary part in-

terposed between and having a rolling engagement with said reciprocatory parts, said first-named part being operatively connected with the rotary part, and means for locking said rotary part to said reciprocatory parts against a non-rolling movement, substantially as described.

4. In a loom, the combination, with a series of shuttle-boxes, of parts, one of which is reciprocatory relatively to the other, a rotary part interposed between and having a rolling engagement with said first-named parts, said boxes being operatively connected with the rotary part, and means for locking said rotary part to said first-named parts against a non-rolling movement, substantially as described.

5. In a loom, the combination, with a series of shuttle-boxes, of parts each of which is reciprocatory relatively to the other, a rotary part interposed between and having a rolling engagement with said reciprocatory parts, means for operatively connecting said boxes to the rotary part, means for locking said rotary part to said reciprocatory parts against a non-rolling movement, and means for moving each reciprocatory part independently of the other, substantially as described.

6. In a loom, the combination, with a series of shuttle-boxes, of rods each of which is reciprocatory relatively to the other, a rotary part interposed between and having a rolling engagement with said rods, means for operatively connecting said boxes with said rotary part, means for interlocking said rotary part with said rods against a non-rolling movement, and other rotating parts, said rods being connected to said last-named parts at relatively different distances from the centers thereof, substantially as described.

7. In a mechanical movement, the combination of parts each of which is reciprocatory relatively to the other and together therewith, another part interposed between said first-named parts and connected with each of them for movement therewith, and means for imparting a greater throw to one of said reciprocating parts than to the other, substantially as described.

8. In a mechanical movement, the combination of a part to be moved into different positions, other parts each of which is reciprocatory relatively to the other and together therewith, and a third part movable bodily into different spheres of action, interposed between said other parts and connected with each of them for movement therewith, and operative connecting means between the part to be moved and said third part, substantially as described.

9. In a box-motion mechanism for looms, the combination, with the boxes, of parts each of which is reciprocatory relatively to the other and together therewith, means for shifting each of said parts between intervals of varying lengths, another part interposed between said first-named parts and connected to each of them for movement therewith, a lever connected with the intermediate portion of said last-named part, means for moving said lever bodily, and operative connection between said lever and the boxes, substantially as described.

10. In a box-motion mechanism for looms, the combination, with the boxes, of pairs of parts, each part in each pair being reciprocatory relatively to the other and together therewith, means for shifting each of said parts between intervals of varying lengths, another part interposed between the parts in each pair and connected to each of them for movement therewith, a lever connecting the intermediate portions of said last-named parts, and operative connecting means between said lever and the boxes, substantially as described.

11. In a mechanical movement, the combination of a pulley movable bodily into different spheres of action, a part to be moved into different positions operatively connected to said pulley, reciprocatory rods, and looped bands encircling said pulley, extending in opposite directions, and having their ends secured to said rods, substantially as described.

12. In a mechanical movement, the combination of a plurality of crank-disks, rods connected at their ends with said crank-disks eccentrically thereof, a movable pulley, bands encircling said pulley, extending in opposite directions, and having their ends secured to said rods, and a part to be moved by said pulley operatively connected therewith, substantially as described.

13. In a mechanical movement, the combination of a part to be moved to different positions, other parts each of which is reciprocatory relatively to the other, a rotary part interposed between and having a rolling engagement with said reciprocatory parts, said first-named part being operatively connected with the rotary part, and a pair of bands each connecting said reciprocatory parts and engaging said rotary part the one on one side and the other on the other side thereof, substantially as described.

In testimony that I claim the foregoing I have hereunto set my hand this 7th day of December, 1901.

GEORGE GOODLINE.

Witnesses:
JOHN W. STEWARD,
ROBERT J. POLLITT.