No. 685,420. Patented Oct. 29, 1901.

G. GOODLINE.

MECHANICAL MOVEMENT.

(Application filed Dec. 17, 1900.)

(Model.)

4 Sheets—Sheet 1.

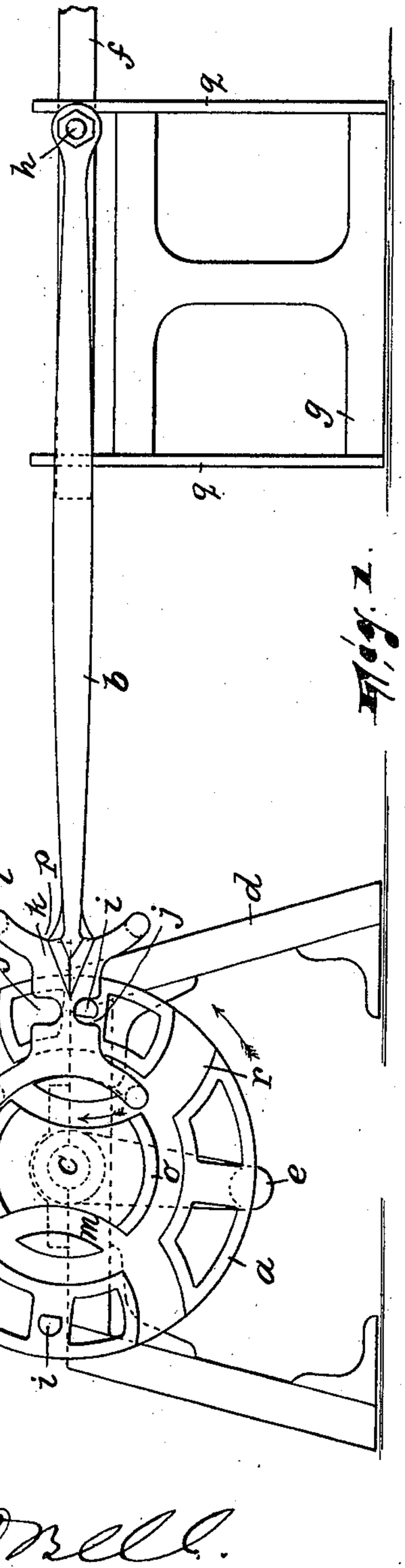

Fig. 1.

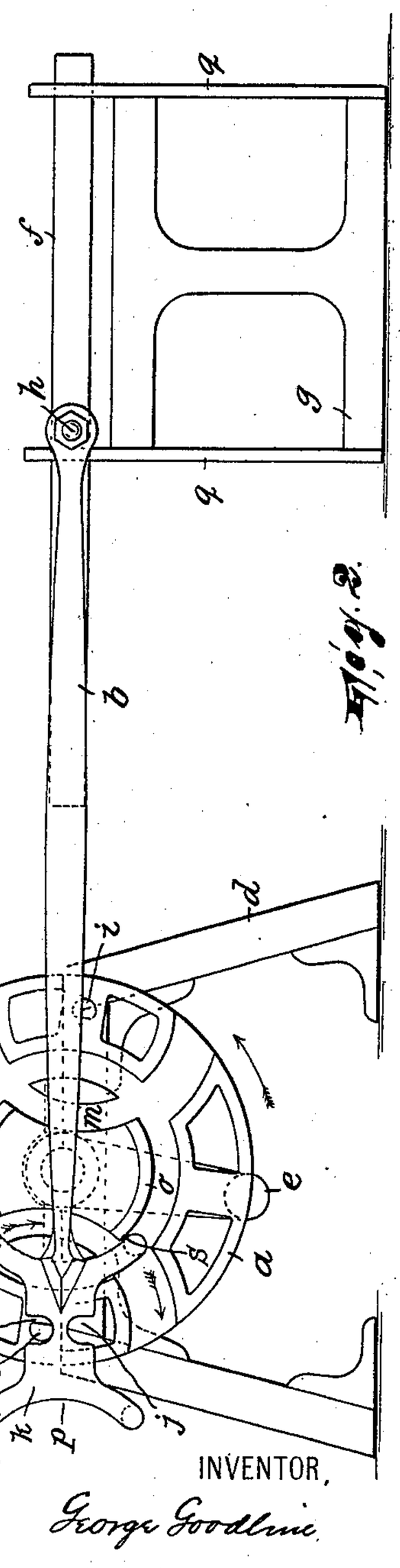

Fig. 2.

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(Model.) 4 Sheets—Sheet 2.

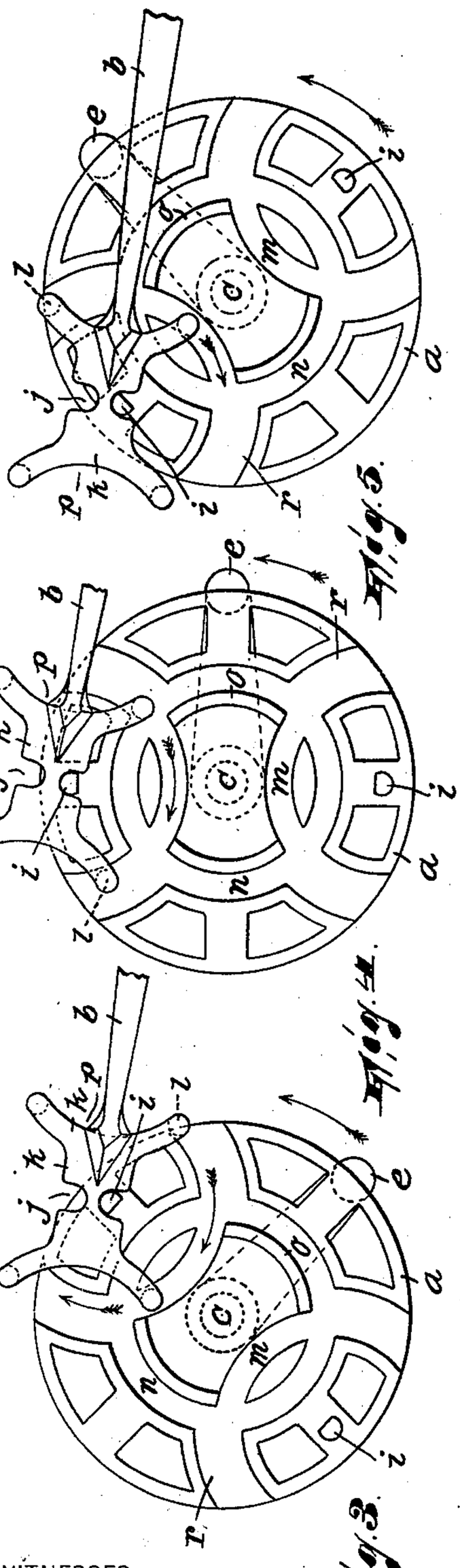

Fig. 5.

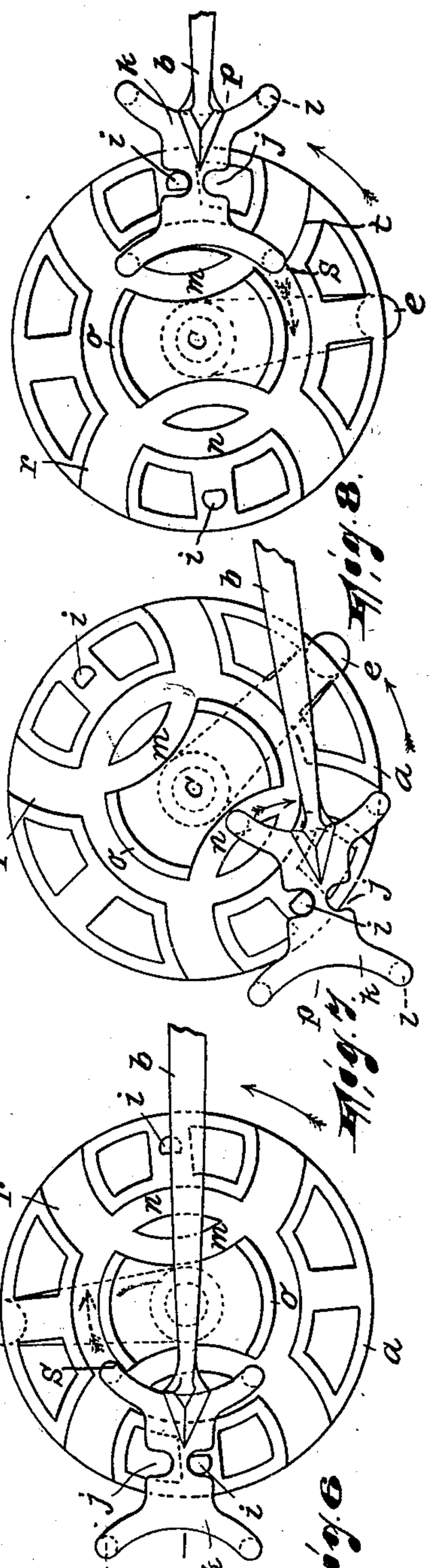

Fig. 8.

Fig. 7.

Fig. 10.

Fig. 9.

Fig. 12.

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(Model.) 4 Sheets—Sheet 3.

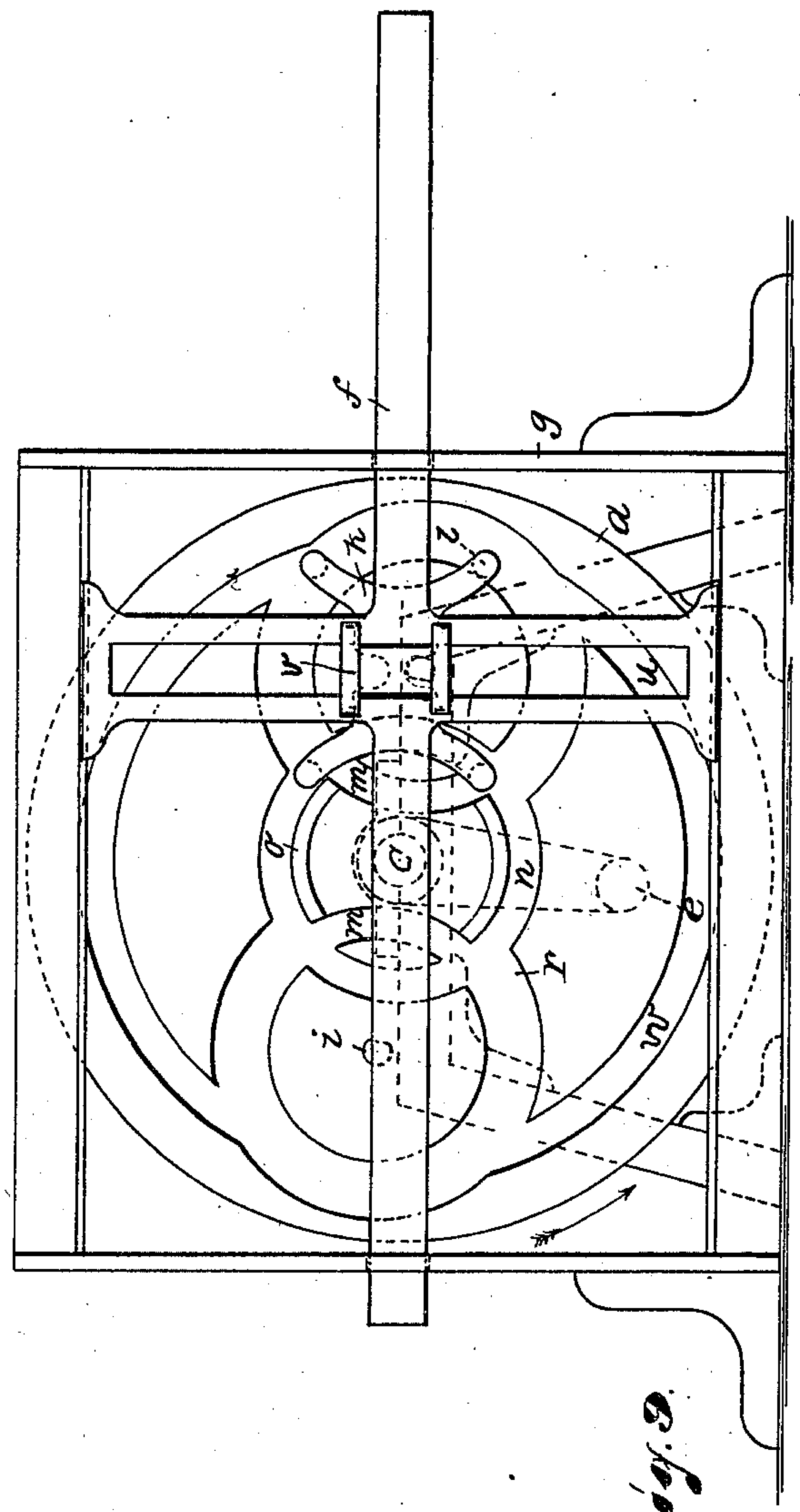

Fig. 9.

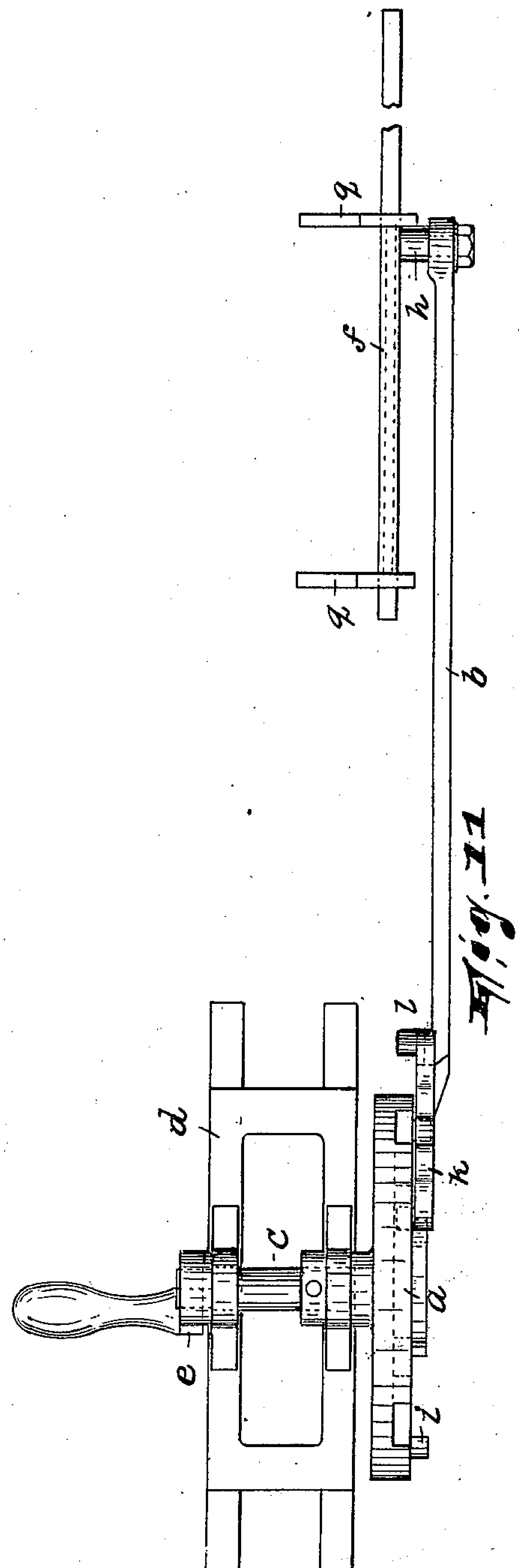

Fig. 11.

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(Model.) 4 Sheets—Sheet 4.

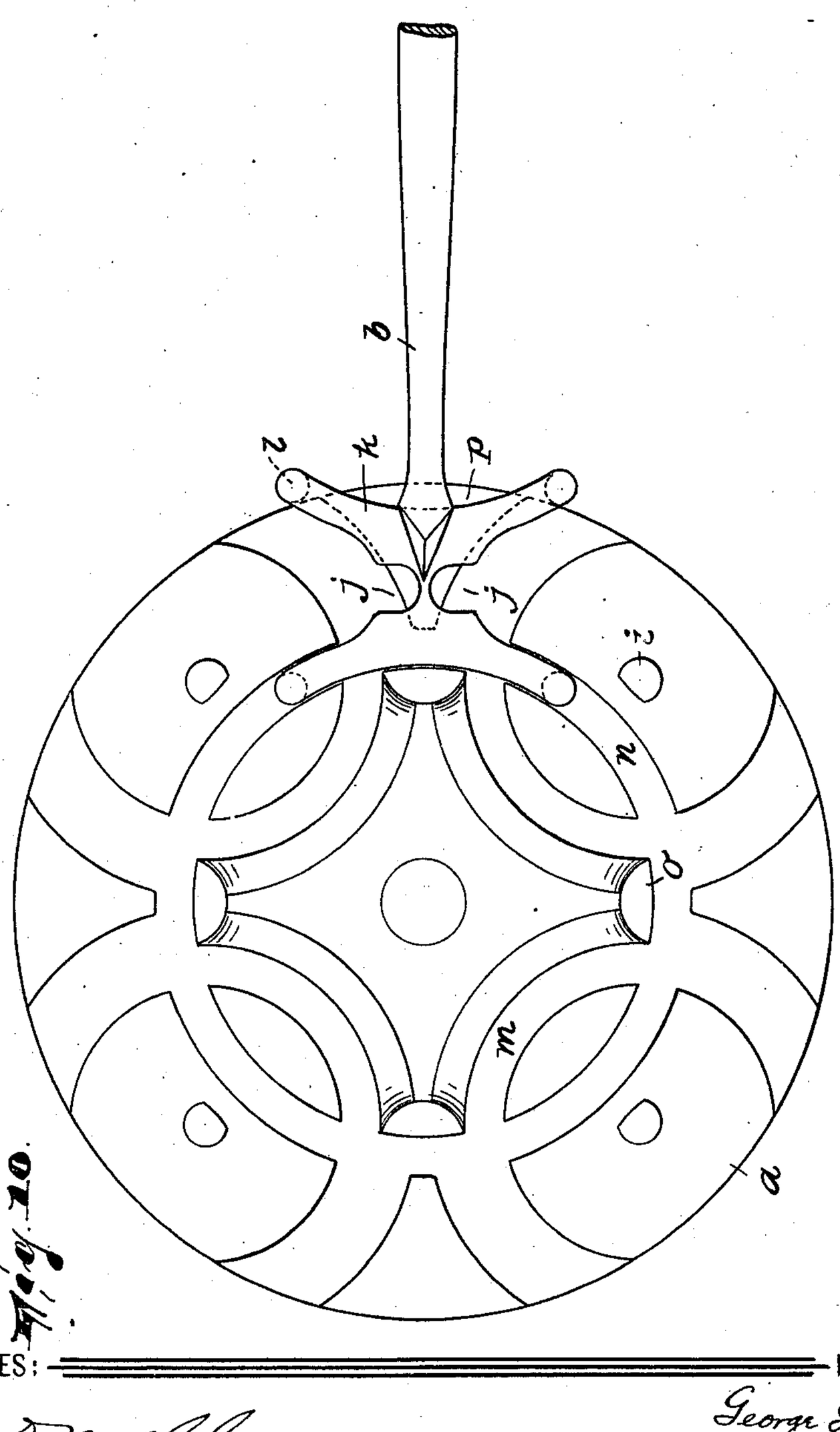

Fig. 10.

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UNITED STATES PATENT OFFICE.

GEORGE GOODLINE, OF PATERSON, NEW JERSEY.

MECHANICAL MOVEMENT.

SPECIFICATION forming part of Letters Patent No. 685,420, dated October 29, 1901.

Application filed December 17, 1900. Serial No. 40,108. (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 Mechanical Movements; 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 letters of reference marked thereon, which form a part of this specification.

This invention relates to mechanical movements; and the object of the invention is to provide a certain combination of parts of which one is rotary and the other oscillatory, whereby one of said parts, the oscillatory one, is intermittently actuated by the other part and between its actuations held positively against movement.

By constructing and arranging the parts substantially as will be hereinafter described and finally embodied in the causes of the claim I am able in attaining the object in view to produce a movement of the kind indicated above which is theoretically and practically perfect. A perfect movement of this kind is of great value in various mechanical adaptations where it is necessary that a reciprocating part should be intermittently maintained at a "dwell," especially if simplicity is a characteristic feature of the mechanism from which such movement is derived and the parts are susceptible of being constructed with a view to durability and for alterations, so that variations in the relative extent of the resultant reciprocation or dwell can be obtained.

As illustrating particularly one adaptation of my invention reference is made to its application as an actuating mechanism for the box-structure of a loom, this being an excellent example of an intermittently-movable part, which circumstances require should be held positively stationary between its actuations.

The invention is fully illustrated in the accompanying drawings, wherein—

Figures 1 and 2 are side views of one form of the mechanism whereby I obtain the movement above referred to, the arrangements of the parts in the two figures being such that said parts are ready on the one hand for the movement of the oscillatory part in one direction and on the other hand for the movement of said oscillatory part in the other direction. Figs. 3, 4, and 5 illustrate the relative disposition of the parts at several points during the movement of the oscillatory part in one direction. Fig. 6 illustrates the relative disposition of the parts at the inception of a dwell in the action of said oscillatory part. Figs. 7 and 8 illustrate the relative disposition of the parts at two points during the movement of the oscillatory part in the other direction. Figs. 9 and 10 illustrate modified forms of said mechanism, and Fig. 11 is a top plan view of the mechanism illustrated in the first eight figures.

In said drawings, *a* designates the rotary part, the same being preferably in the form of a disk, and *b* denotes the oscillatory part. Said rotary part has a shaft or axis *c*, which is journaled in a frame *d*, and it is provided with a crank *e*, attached to said shaft, whereby said rotary part is driven.

f is the element to which the desired alternating reciprocation and dwell movements are to be imparted, and *g* is the support in which said element slides.

h designates a pin pivotally connecting the part *b* and the element *f*. The free end portions of the part *b* and the part *a* are disposed side by side, and the range of movement of the former is approximately equal to the diameter of the latter.

On the face of one of the two parts *a b* which is adjacent the other I provide a pin *i*, and in the other part I provide two sockets or recesses *j*, which open in opposite directions, extending substantially in a line drawn at right angles to the line of reciprocation of part *b*. Since it is essential to the production of the movement I am presently to describe that the recesses or sockets maintain substantially the relative disposition referred to, whatever the positions which the parts themselves assume, it is preferable, in order to preserve the mechanism as simple as possible, that the pin *i* be mounted, as shown, on the part *a*, while the two sockets are formed the one in the upper edge and the other in the lower edge of part *b*. Now upon rotating the part *a*, it being assumed that no external force,

such as the action of gravity, is operating on part *b*, the latter will be engaged by the pin *i*, which will first move into the adjacent recess, pushing the free end of part *b* before it and imparting to it its own rotary motion until they together reach such a position that with the continued movement of the pin said pin can clear the recess and finish its circle of movement idle. Thereupon said pin will continue on till it again enters the other recess, and, as before, will drive the part *b* before it until the latter reaches a position diametrically opposite its last stopping-point, when the pin will clear this recess also, passing on idle till the original recess is again entered. In this way alternate reciprocations and dwells can be effected in the part *b*. Where one pin is provided, the part *a* makes one and one-half revolutions to each movement of the part *b*. Where, as preferred and as illustrated in the drawings, two pins are provided, being diametrically disposed, part *b* makes one movement to each full revolution of part *a*, the operation being otherwise similar to that where one pin is used. Of course in order that the pin or pins may clear the part *b* as they pass the same it is necessary that at the point where they proximate it, at least, it should be formed to offer no obstruction. Fig. 10 shows the main portion of said part offset as regards the free end portion thereof, so as to afford the necessary clearance.

The mechanism so far described is capable of producing merely the desired alternate reciprocation and dwell movement in a given part and is without means, after the pin that has just acted leaves one of the sockets, for maintaining such part positively stationary during the dwell. Such means I will now describe.

To the end in view I preferably provide the part *b*, which is in effect a connecting-rod, with a head *k*, having four pins *l*, and constituting what I term a "claw." It is this part which is provided with the sockets or recesses *j*. These pins, which project toward the part *a*, are arranged in pairs, one above and one below the longitudinal axis of the rod *b*. The pins in one pair are equidistant from the rotating center for the pins *i* in the adjacent socket *j*, while the pins in the other pair are equidistant from the corresponding point in the other socket *j*. On the face of the disk or other device forming the part *a*, which adjoins the rod *b*, two diametrically-disposed channels *m* are formed, these channels being adapted for the reception of the pins *l*. The pins in each pair (provided it is the socket *j* corresponding thereto which is at the time holding one of the pins *i* and provided this pin is acting to drive the rod *b* from the one to the other of its limits of movement) are adapted to follow each other through the channel as the disk makes a half-revolution, (see the arrows in Figs. 1, 2, 3, 5, and 7,) and for this reason the said channels have a circular or part-circular form, being described about the pins *i* and having radii of coincident length with the distance between each pin *l* and its corresponding socket *j*. In the said face of the disk I also cut a circular channel *n*, which intersects the other two and has its center coincident with the center of rotation of said disk. In this channel while the rod is at dwell and waiting for the approaching pin the innermost pins—*i. e.*, the innermost one in each pair—have free way, the one after the other, while the disk completes its half-revolution unimpeded. (See the arrows in Figs. 6 and 8.) Said channel, therefore, in the interval when the pins *i* are clear of the sockets or recesses *j* coacts with the pins *l* to prevent any longitudinal movement of the rod *b*. To prevent movement of said rod in any direction during this time, concentric guards *o*, which are arranged to project from those portions of the face of the disk which are inside of and immediately adjacent the circular channel *n* and between its intersections with the channel *m*, are provided. While these guards project out clear of the general surface of the disk, they do not extend so far, of course, but that the body portion of the rod will always clear them as they pass. The ends of the claw are cut out, so as to produce recesses *p*, which are so formed as to have substantially the shape of the guards, which are thus adapted to exactly fit therein. These guards prevent perfectly any movement of the claw in a direction toward the center of the disk, and since they exactly fit the recesses formed in the ends of the claw they insure against any movement of the latter in a direction transverse to the longitudinal axis of the rod *b*. Moreover, if suitable stops are provided, such as the uprights *q* of the support *g*, against which the pins *h* take such stops will keep the claw against the guards and will coact with the latter to obviate the movement of the rod *b* in either direction longitudinally when at its limits of motion.

Owing to the fact that the centers in the sockets or recesses *j* of the claw for the two pairs of pins are not coincident, one pair of said pins is farther away from each center than the other, and so it becomes necessary to widen each channel *m* outwardly from its center and from the intersection of the three channels to the periphery of the disk, as at *r*, so that after the disk completes its idle semirevolution (the channel *n* having been in use) the pins *l* of the pair now about to be idle—*i. e.*, thrown out of a channel *m*—can move the one out of and the other into said channel *m* during, respectively, the beginning and ending of the consequent stroke of the rod *b*.

The fact that the centers for the two pairs of pins *l* in the sockets or recesses *j* of the claw are not coincident, and the consequent fact that each pin in each pair is farther from the center for the other pair of pins than the latter themselves are, is advantageous in that

the innermost one of the two pins which in the last shifting of the rod *b* was idle is thus enabled to take against the inner side of the channel *n*, as at *s*, to thereby begin the locking action.

It has been so far assumed that no force, such as gravity, is acting on the rod *b*, as if, for instance, the parts rested horizontally; but if the parts must, in the use to which they are put, stand vertically, as in Figs. 1, 2, 9, and 10, there need be no interference or clogging in their action if a reasonable amount of care is observed in cutting the grooves and otherwise forming the mechanism proportionately throughout. For instance, though, when one of the pins *i* has carried the rod *b* to the position shown in Fig. 8 the tendency of the rod *b* under the action of gravity is to fall, so that the upper innermost pin *l* might as likely drop into channel *m* as channel *n*, and so clog the movement. If the widened portions of the channel *m* have only the necessary and no greater width, the corresponding lower pin will take against the side of the widened portion of the channel which it is entering, as at *t*, and so sustain the claw and properly guide the said upper pin.

In order to insure the pins *i* leaving the sockets with clearance, the inner portion of each of them may be trimmed off. I prefer this to cutting away the corners at the mouth of each socket, since thereby the perfect engagement of the pins in the socket is preserved.

I do not wish to be limited to the use of two or any number, in fact, of the channels *m*. For instance, but one need be provided, though in this case there must be but one pin *i*, and this one must be at its center. Whatever the number of channels *m* there should be corresponding pins *i* therefor. Moreover, I do not wish to be limited to the combination of the means whereby I effect the reciprocations of the element *f* with the means whereby I effect the locking of said element *f* between its actuations, for each is susceptible of use independently of the other, and I therefore claim them independently.

Fig. 9 illustrates a mechanism whereby the action of the claw is transmitted to the element to be reciprocated directly instead of through the medium of a pivoted connection, such as the body portion of the rod *b*, of which it forms a part in the other embodiment of my invention. In this modification the claw is guided in the element *f* for movement transversely to the direction of movement of said element, preferably by providing the latter with a slot *u*, in which a suitable projection *v* on the claw is guided.

In Fig. 9 the disk is shown enlarged, so as to illustrate that the channels *m* may be extended, if desired, to complete the circular form.

In the modification presented in Fig. 10 a disk having several of the channels *m* and corresponding pins *i* is shown. The principle of operation of this disk is practically identical with that which I have already described, so that it is unnecessary to recur to it. A slight modification, applicable, in fact, whether the disk has one, two, or several channels, is also illustrated in this figure. It will be observed that the outer margins of those portions of the disk which are outside the channel *n* and which stand in relative relief present a generally circular outline and that the latter is spaced from the channel a distance corresponding to the spaces between the pins in each pair of pins *l*. Thus while the pins *i* are free of the recesses and are revolving idle the two outermost pins coact with the two innermost pins which are working in the channel *n* to lock the claw positively against movement. It will be apparent, therefore, that this construction may be made use of in substitution for the guards *o*.

A free way for the outer pins, so that they cannot interfere with the action of the disk while the pins *i* are rotating idle, may be produced either by cutting away the outer portion of the disk or by forming a special channel *w*, such as is shown in Fig. 9.

Any suitable means may of course be provided for keeping the claws against the disk.

I wish it to be understood that the disk is susceptible of being rotated in either direction indiscriminately, only one direction being shown by the arrows in order to avoid confusion.

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

1. The combination of a rotary part and an oscillatory part arranged side by side, one of said parts having sockets or recesses which open oppositely, each substantially in a direction transverse to the line in which the positions of limits of motion of said oscillatory part are located, and said sockets being, as to such arrangement, substantially constant, and the other part being adapted to engage said first-named part first in one recess and then in the other, as the rotary part rotates, to move the oscillatory part alternately to positions substantially diametrically opposite with reference to said rotary part, substantially as described.

2. The combination of a rotary part and an oscillatory part arranged side by side, said oscillatory part having sockets or recesses which open oppositely, each substantially in a direction transverse to the line in which the positions of limits of motion of said oscillatory part are located, and said sockets being, as to such arrangement, substantially constant, and said rotary part having an eccentric projection adapted to engage said oscillatory part first in one recess and then in the other, as said rotary part rotates, to move the oscillatory part alternately to positions substantially diametrically opposite with reference to said rotary part, substantially as described.

3. The combination of a rotary part and an

oscillatory part arranged side by side, said oscillatory part having sockets or recesses which open oppositely, each substantially in a direction transverse to the line in which the positions of limits of motion of said oscillatory part are located, and means for guiding said oscillatory part to maintain said sockets or recesses in the disposition indicated, said rotary part having a pin adapted to engage said first-named part first in one recess and then in the other, as the rotary part rotates, to move the oscillatory part alternately to positions substantially diametrically opposite with reference to said rotary part, substantially as described.

4. The combination of an oscillatory part and a rotary part arranged side by side, said parts having on their adjacent faces the latter communicating channels of which one is substantially circular, and the other, projections, and said projections being adapted to alternately engage said channel at the limits of motion of said oscillatory part to lock the latter temporarily against movement, substantially as described.

5. The combination of a rotary part and an oscillatory part arranged side by side, said parts having on their adjacent faces the former, intersecting channels of which one is substantially circular and has its center coincident with the axis of said part, and the latter, projections, and said projections being movable from one of said channels into the other and being adapted, when in the circular channel, to lock said oscillatory part against movement, substantially as described.

6. The combination of a rotary part, a suitably-guided oscillatory part, said parts being arranged side by side and said oscillatory part having sockets or recesses which open oppositely, each substantially in a direction transverse to the line in which the positions of limits of motion of said oscillatory part are located, and said sockets being, as to such arrangement, substantially constant, a pin projecting from said rotary part and adapted to alternately engage said recesses, and pairs of other pins projecting from said oscillatory part toward the rotary part, said rotary part having intersecting channels of which one is substantially circular and has its center coincident with the axis of said part, and said last-named pins being movable from said circular channel into the other channel or channels and vice versa, substantially as described.

7. The combination of a rotary part, a suitably-guided oscillatory part, said parts being arranged side by side and said oscillatory part having sockets or recesses which open oppositely, each substantially in a direction transverse to the line in which the positions of limits of motion of said oscillatory part are located, and said sockets being, as to such arrangement, substantially constant, pins projecting from said rotary part and each being adapted to alternately engage said recesses, pairs of other pins projecting from said oscillatory part toward the rotary part, said rotary part having intersecting channels of which one is substantially circular and has its center coincident with the axis of said part and of which the others are described each about one of said first-named pins as a center, and the other pins being movable from said circular channel into the other channels and vice versa, and guards projecting from said rotary part and adapted to be engaged by said oscillatory part, substantially as described.

8. The combination of a rotary disk, a suitably-guided oscillatory part having pairs of pins projecting toward said disk and thus forming a claw, said claw and the disk being arranged side by side and the former having sockets or recesses which open oppositely, each substantially in a direction transverse to the line in which the positions of limits of motion of said claw are located, and said sockets being, as to such arrangement, substantially constant, pins projecting from said rotary disk and each being adapted to alternately engage said recesses, said rotary disk having intersecting circular channels of which one has its center coincident with the axis of said part and of which the others are described each about one of said first-named pins as a center, and the other pins being movable from said circular channel into the other channels and vice versa, and concentric guards projecting from said disk, the ends of said claw being provided with recesses adapted to fit said guards, substantially as described.

9. The combination of a rotary part and an oscillatory part arranged side by side, said parts having on their adjacent faces the former, intersecting channels of which one is substantially circular and has its center coincident with the axis of said part, said rotary part also having a circular way disposed outside of and concentric with said circular channel, and the latter, projections, said projections being movable from one of said channels into the other and vice versa and being spaced from each other a distance corresponding to that between said circular channel and the way, substantially as described.

In testimony that I claim the foregoing I have hereunto set my hand this 14th day of December, 1900.

GEORGE GOODLINE.

Witnesses:
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JOHN W. STEWARD.