

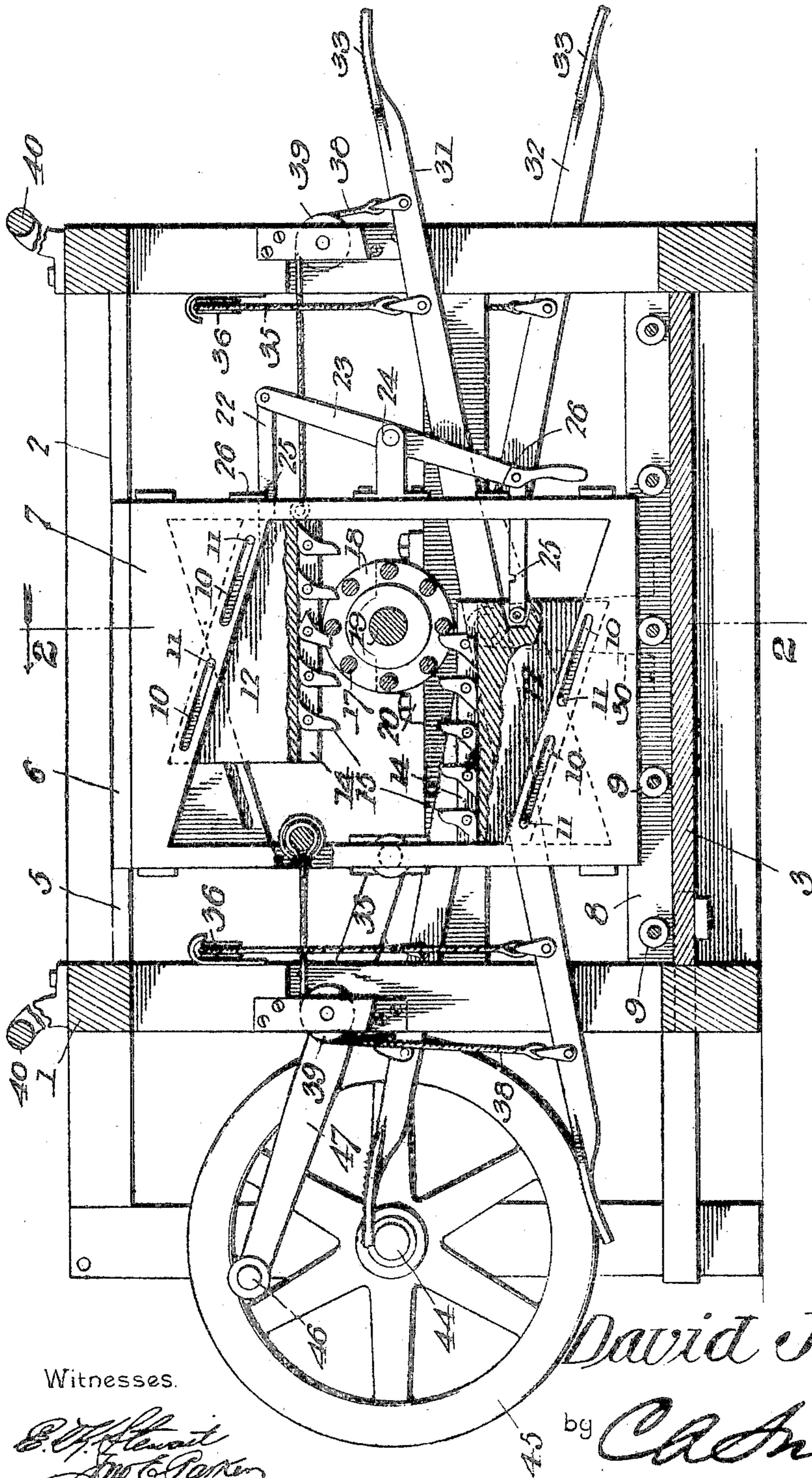
No. 797,619.

PATENTED AUG. 22, 1905.

D. J. SHEA.  
MOTOR.

APPLICATION FILED NOV. 3, 1904.

4 SHEETS—SHEET 1.



Witnesses.

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4 SHEETS—SHEET 2.

Fig. 3.

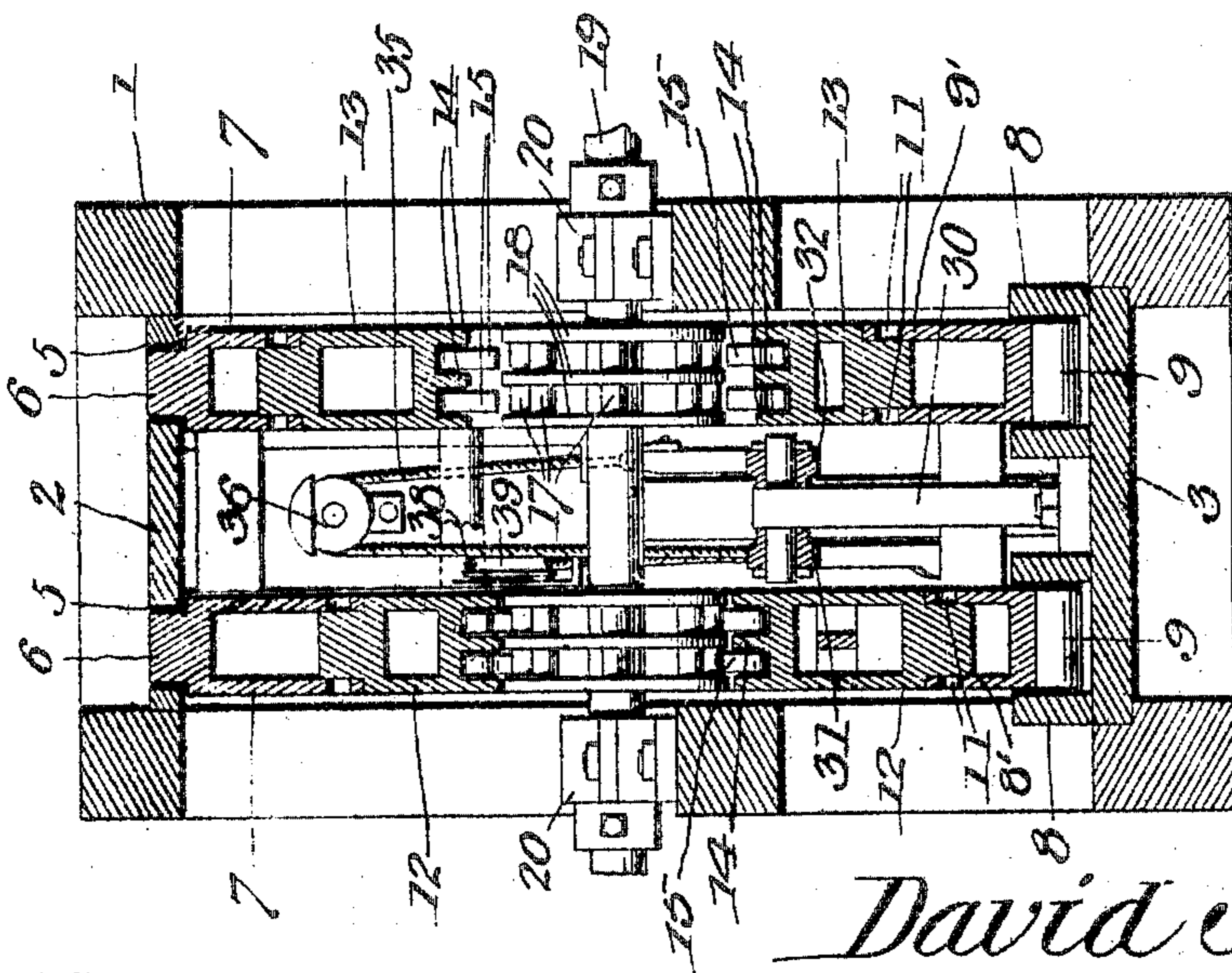
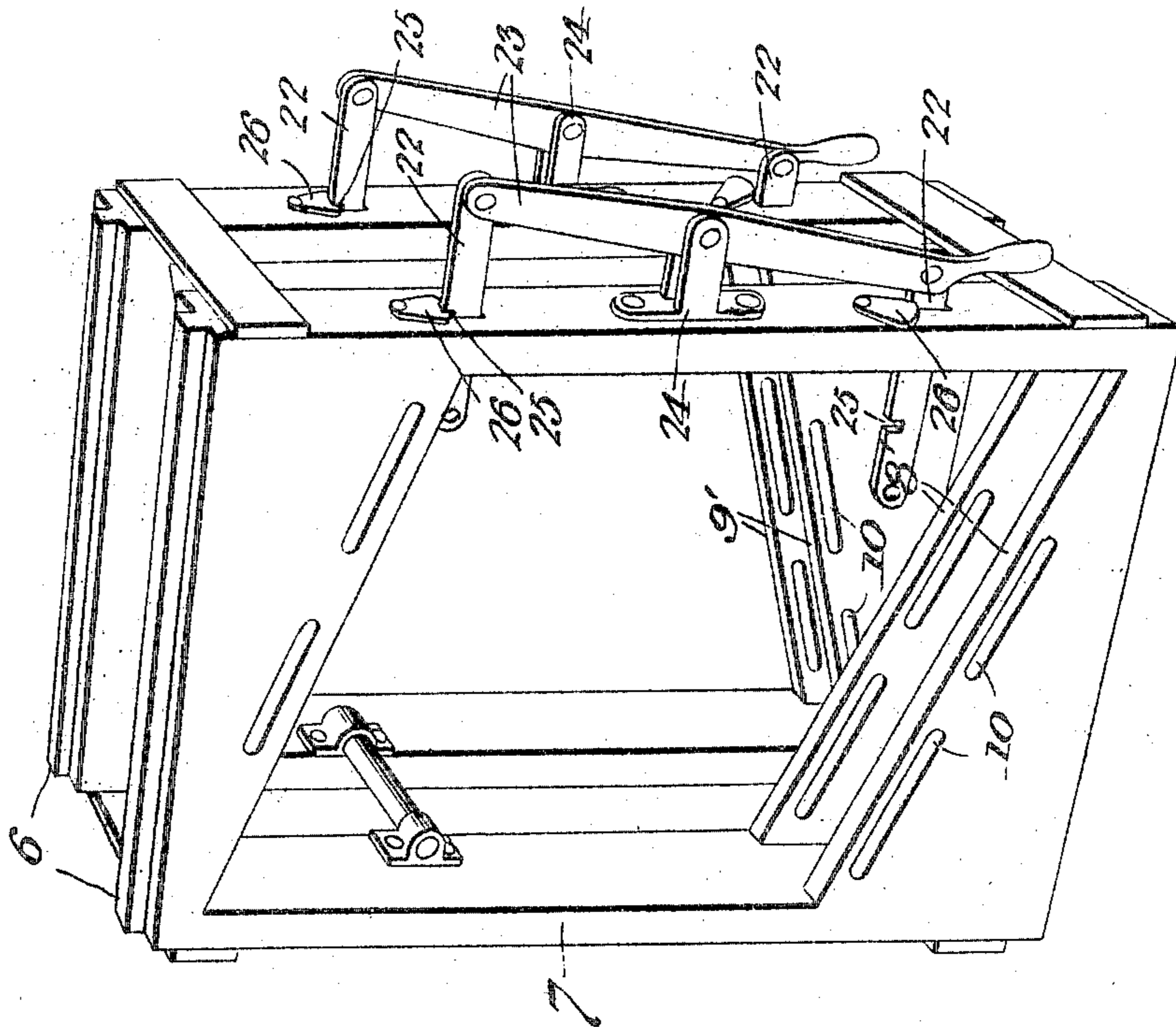


Fig. 2.

Witnesses

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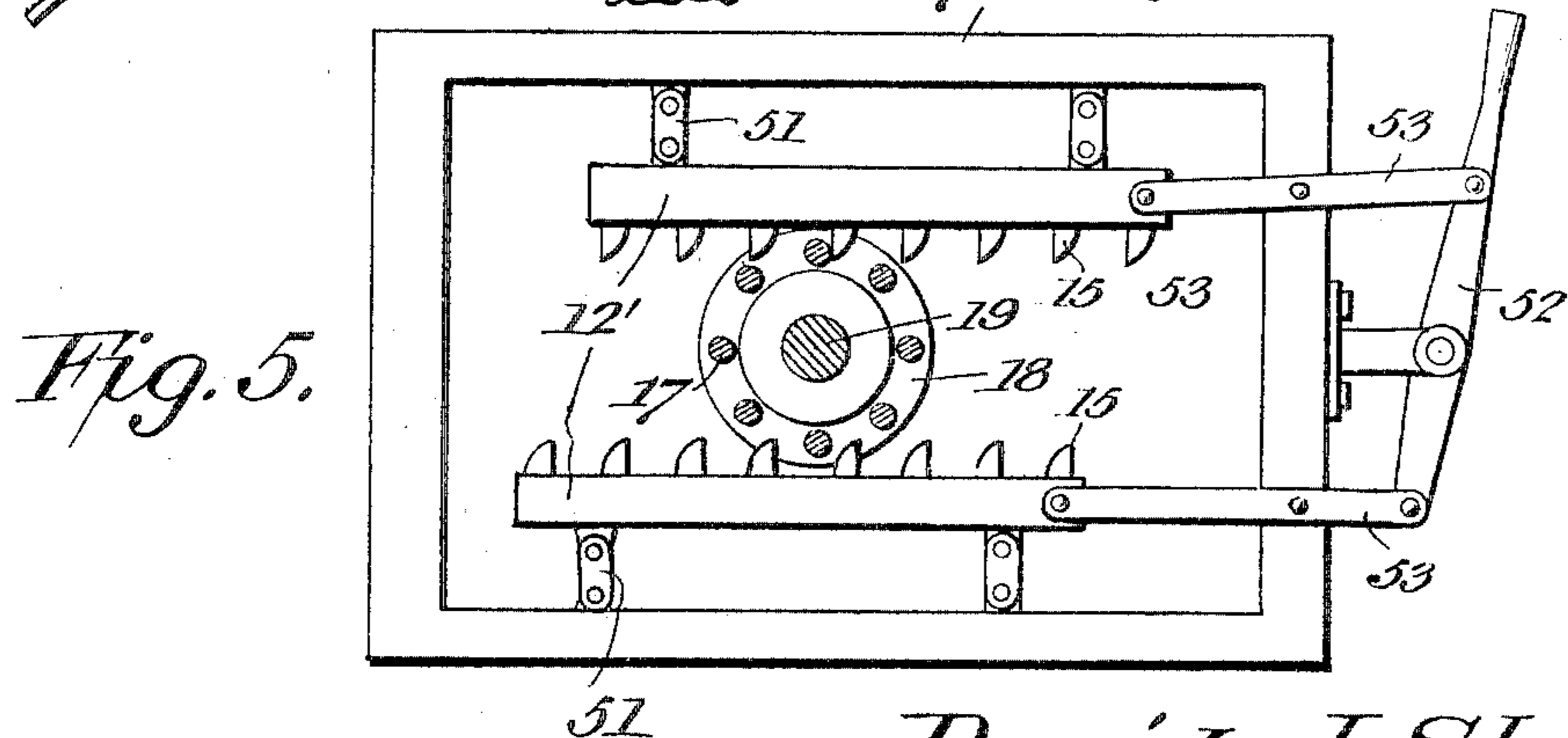
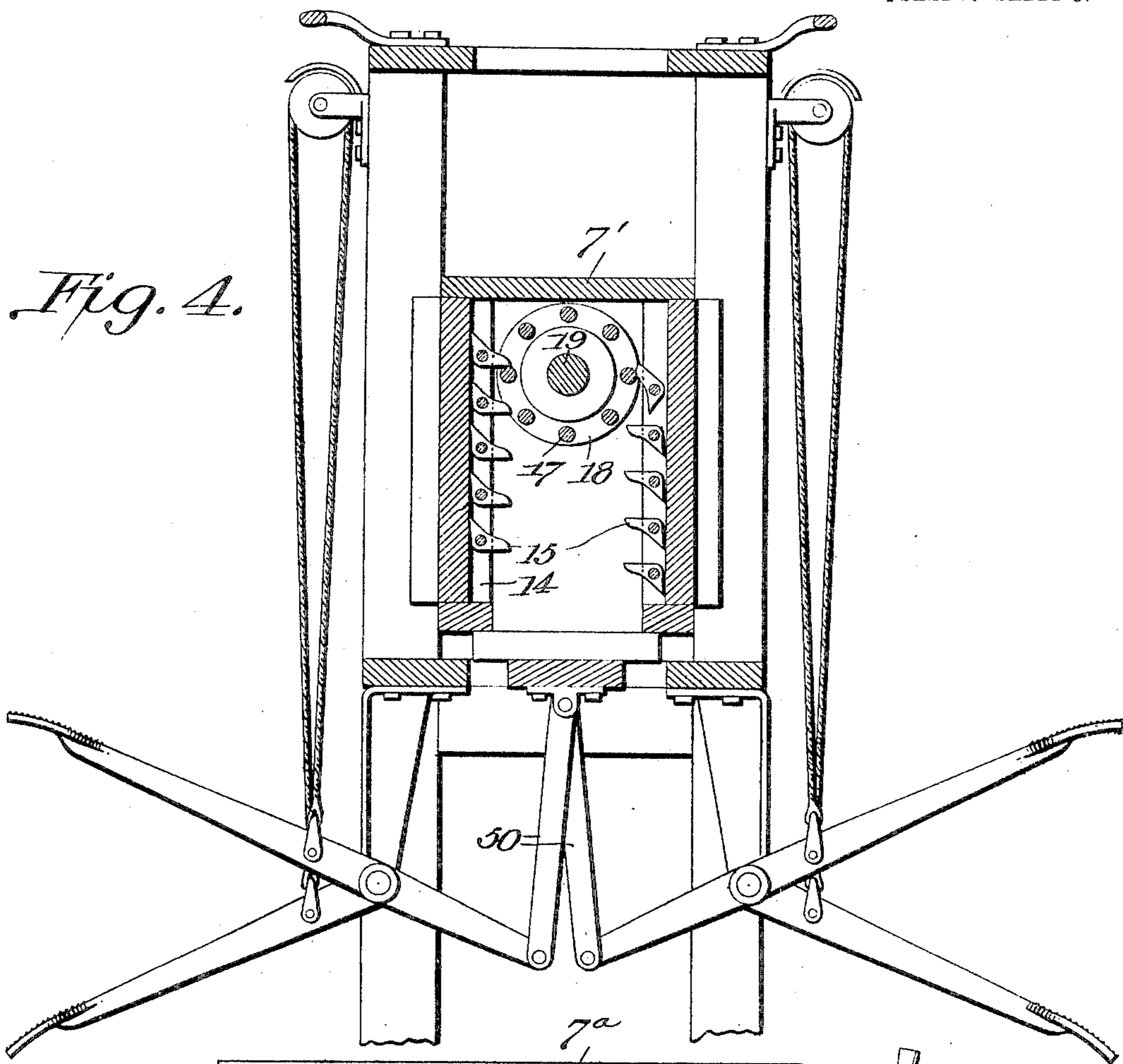
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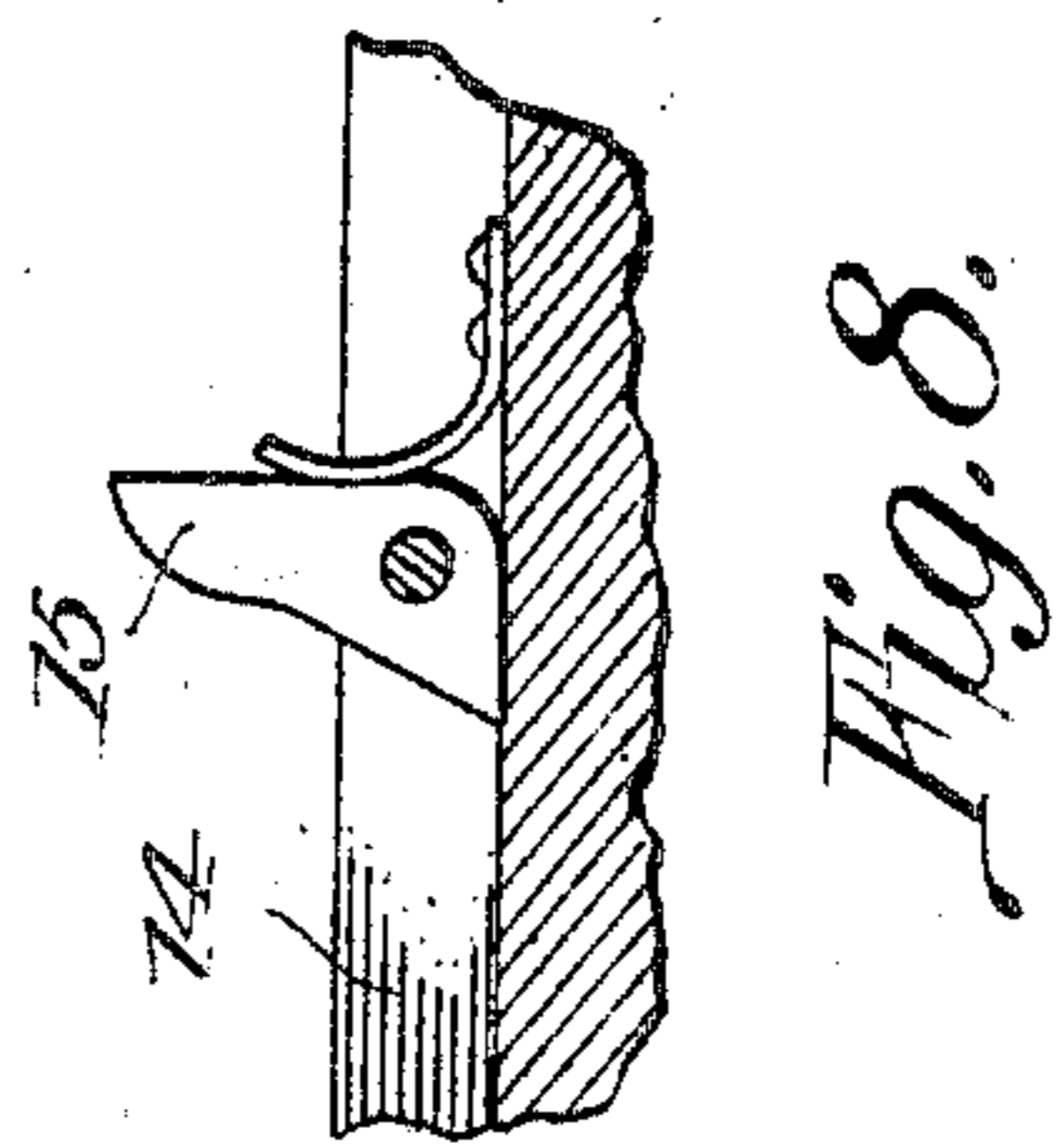
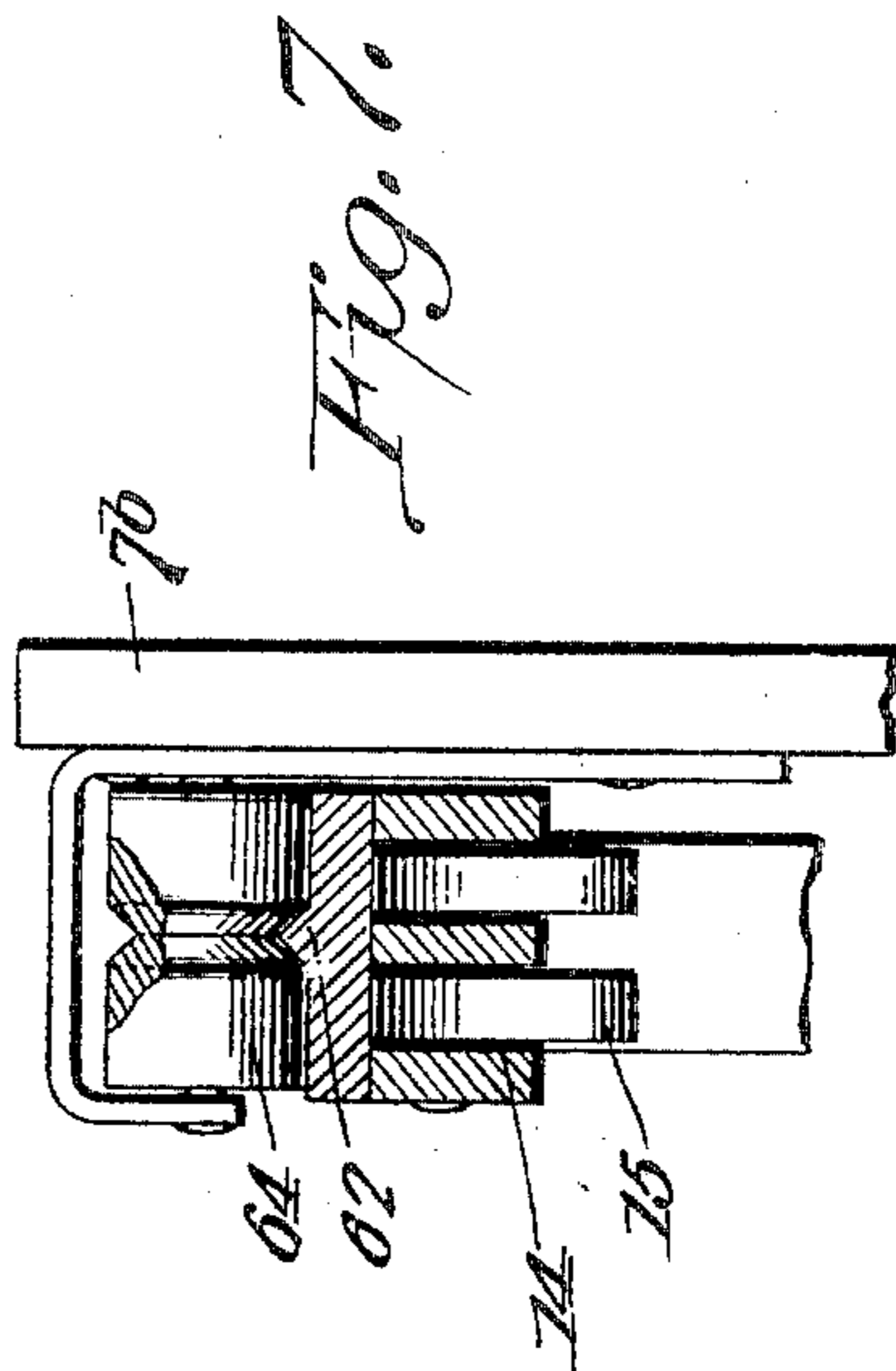
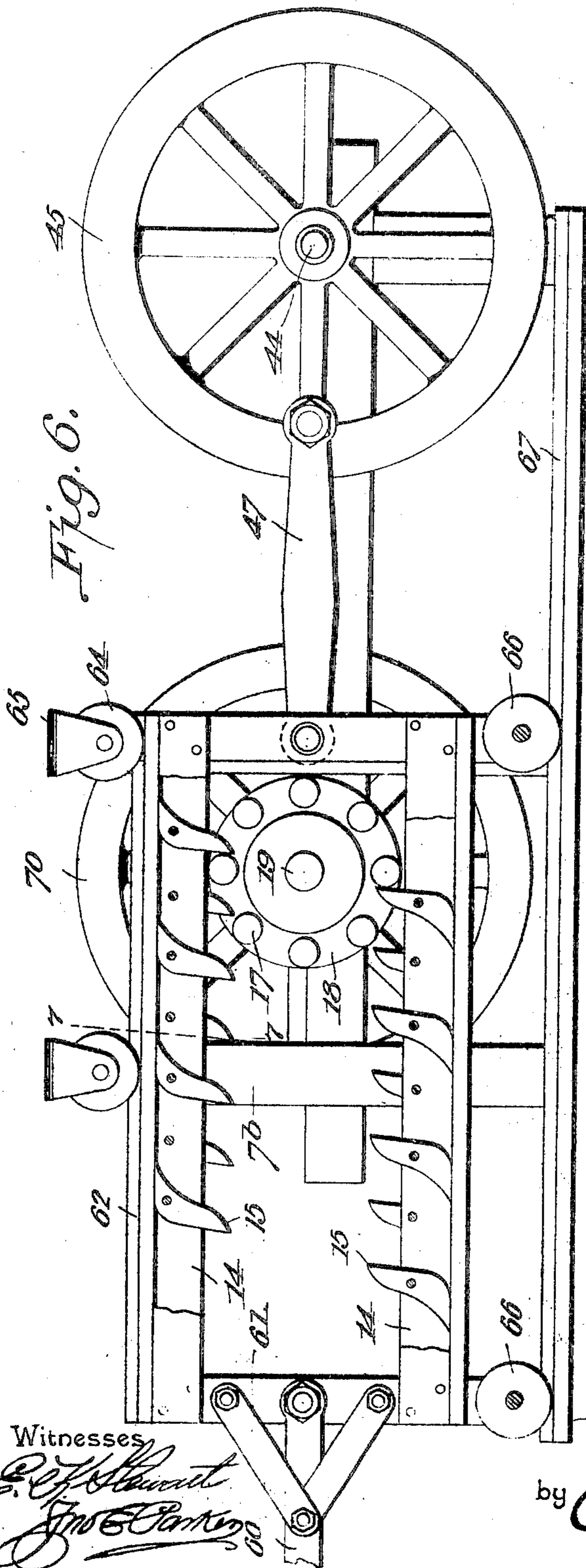
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# UNITED STATES PATENT OFFICE.

DAVID J. SHEA, OF MARIANNA, ARKANSAS.

## MOTOR.

No. 797,619.

Specification of Letters Patent.

Patented Aug. 22, 1905.

Application filed November 3, 1904. Serial No. 231,219.

*To all whom it may concern:*

Be it known that I, DAVID J. SHEA, a citizen of the United States, residing at Marianna, in the county of Lee and State of Arkansas, have invented a new and useful Motor, of which the following is a specification.

This invention relates to motor mechanisms, and has for its principal object to provide an improved mechanism for transforming reciprocatory into rotary motion.

A further object of the invention is to construct a mechanism of this kind in which provision is made for reversing the direction of movement of the reciprocatory member at the completion of each stroke without shock or jar and without interruption in the transmission of movement to the revolving element.

A still further object of the invention is to provide a motor mechanism of this character in which the direction of rotative movement may be changed at will.

A still further object of the invention is to provide a novel form of mechanism for transforming reciprocatory into rotary motion, wherein the reciprocatory member may be driven either manually or by any desired power—as, for instance, by coupling said reciprocatory member directly to the piston-rod of an engine.

A still further object of the invention is to provide a mechanism of this character which may be instantly thrown into or out of action.

With these and other objects in view, as will more fully hereinafter appear, the invention consists in certain novel features of construction and arrangement of parts hereinafter fully described, illustrated in the accompanying drawings, and particularly pointed out in the appended claims, it being understood that various changes in the form, proportions, size, and minor details of the structure may be made without departing from the spirit or sacrificing any of the advantages of the invention.

In the accompanying drawings, Figure 1 is a longitudinal sectional elevation of a motor mechanism constructed in accordance with the invention. Fig. 2 is a transverse sectional view of the same on the line 2 2 of Fig. 1. Fig. 3 is a detail perspective view of the rack-carrying frame with the rack detached. Fig. 4 is a sectional elevation illustrating a slightly-modified construction in which the racks are arranged for movement in a vertical line.

Fig. 5 illustrates a further form of rack-carrier and rack-adjusting means. Fig. 6 is a side elevation illustrating a further embodiment of the invention. Fig. 7 is a transverse sectional elevation of the same on the line 7 7 of Fig. 6. Fig. 8 is a detail view illustrating one of the rack-teeth and its supporting-spring.

Similar numerals of reference are employed to indicate corresponding parts throughout the several figures of the drawings.

The apparatus forming the subject of the present invention may receive motion from any suitable source of power and may be employed as a substitute for the usual crank and connecting rod of an ordinary reciprocatory engine, or it may be utilized to advantage in the propulsion of locomotives, steamboats, and the like or for use as a manual power.

The working parts of the apparatus are supported on a suitable frame 1, which may be of any desired construction, its size and shape being modified to meet the requirements. In the present case the frame includes upper and lower plates 2 and 3, the upper plate being provided with a pair of longitudinal slots 5 for the reception of ribs 6, that are secured to or form a part of the rack-carrying frame 7. The lower plate is provided with side bars 8, having bearings for the reception of small rollers 9, on which the rack-carrying frames are freely moved to and fro.

The rack-carrying frame is provided with two sets of inclined guides 8' and 9', each set comprising upper and lower plates arranged at an oblique angle, and in each of the plates is formed a plurality of slots 10 for the passage of small guiding-lugs 11, that project from the opposite sides of the racks 12 and 13. These racks are all of the construction shown in Figs. 1 and 2, and each comprises a block, the lower edge of which is inclined and disposed parallel with the edges of the bearing-plates. The opposite edge of the block is provided with ribs 14, between which are pivoted teeth 15, that are adapted to engage small antifriction-rollers 17, that are pivotally mounted between disks 18, the latter being secured to a transversely-extending shaft 19, that is adapted to suitable bearings 20, carried by the frame of the machine. The teeth are so mounted that on movement of the rack-carrying frame in one direction the teeth of one of the racks—for instance, the teeth of

the highest rack—will engage the gear formed by the rollers 17 and disks 18 and will positively rotate the same, while the teeth of the opposite or lowest rack will yield. On movement in the opposite direction the teeth of the upper rack will yield and those of the lower rack will engage with and positively rotate the gear.

The teeth of the racks 12 are arranged in a plane opposite to that in which the teeth of the racks 13 are disposed, and when one set of racks is working the opposite set must be adjusted to inoperative position, provision being made for adjusting both sets of racks so that either set may be moved to operative position in accordance with the direction in which it is desired to rotate the shaft.

From each of the racks 12 extends a link 22, and these are connected, respectively, to opposite ends of a handled lever 23, fulcrumed on the bracket 24. By moving this lever in one direction the projecting lugs 11 of the racks may be forced to travel up or down the inclined slots 10, and thus move the rack-bars from engagement or in engagement with the teeth of the gear-wheel. Each of the bars 22 is provided with a slot 25, which may be engaged by a locking-plate 26 in order to hold the racks in either position to which they may be adjusted.

To a central bracket 30 in the frame is pivoted a pair of levers 31 32, said levers extending from end to end of the machine and being provided with two pedal-plates 33, on which the operators stand. The opposite end portions of the levers are connected by a cable or chain 35, extending over suitable guiding devices 36, so that when the weight of the operator is placed on one lever the mating lever will be raised. One of the levers is connected by a pair of flexible cables 38 to the rack-carrying frame, said cable passing over guiding-sheaves 39.

In the operation of the device the operators will stand at opposite ends of the machine on the pedal-plates 33 and may grasp the handles 40. The weight is then placed alternately on the opposite pedal-levers, and the rack-carrying frame is reciprocated, thus transmitting the reciprocatory movement of the racks to the gears and revolving the main shaft.

In order to reverse the movement of the rack-carrying frame without jar or shock, the frame is provided with bearings for the reception of the shaft 44, on which is mounted a reversing-wheel 45, having a crank-pin 46, that is connected by a pitman 47 to the rack-carrying frame. In practice it is found that by employing a reversing device in the form of a rather heavy balance-wheel the operation will be uniform and regular, movement of the rack in both directions being gradually stopped as the rack-frame nears the limit

of its movement and thence gradually started again in the opposite direction without appreciable jar or shock.

In some cases the rack-carrying frame may be arranged to reciprocate vertically, a frame 7' of this character being shown in Fig. 4, and in this case the frame may be connected to the pedal-levers by links or levers 50 and a positive movement of said frame insured.

Fig. 5 illustrates one of the most simple forms of the device. In this case the frame 7" is connected to the rack-bars 12' by links 51, and said rack-bars are connected to an operating-lever 52 by links 53, so that by a simple movement of said lever the racks may be simultaneously moved to operative or inoperative positions. When in operative position, the racks are locked by a turn-button or catch 26, pivotally connected to a portion of the frame and engaging a notch 25, formed in one of the rack-bars in the manner shown in Figs. 1 and 3.

It will be noted that the racks may be moved away from the toothed wheel, the upper rack swinging to the left and the lower rack to the right, the ends of the upright portions of the frame being sufficiently remote from the ends of the rack-bars to permit its movement.

It will of course be understood that the invention is applicable to all places where it may be desired to dispense with the use of an ordinary crank in the transforming of reciprocatory into rotary movement, and in Figs. 6 and 7 is illustrated one application of the invention where it is not necessary to provide for reversal in the direction of rotation.

The rack-carrying frame 7<sup>b</sup> is of practically the same construction as previously described and is connected by a rod 60 to a suitable source of power—as for instance, the piston of a reciprocating engine—and the connection between the rod and frame may be strengthened by the employment of brace-rods 61.

The rack-carrying frame is provided with an upper rail 62, that fits in grooved rollers 64, carried by brackets 65, extending from the stationary frame, said rollers serving to properly guide the rack-carrying frame during its reciprocatory movement and serving at the same time to prevent lateral play. The frame is provided with an auxiliary pair of rollers 66, that run on a rail 67, that may form a portion of a suitable bed or base plate, and the number of rolls may be increased or diminished to any desired extent and their location may be altered in accordance with circumstances. In this case also the rack-frame is connected by a pitman 47 to a reversing-wheel 45, that may be disposed at any desired distance from the rack-frame, while the main shaft 19 is provided with a balance-wheel 70. This feature of construction may be used to advantage in connection with the mechanisms previously described.

In all cases the teeth may be either counter-

weighted or may be held in position by means of springs, as illustrated, for instance, in Fig. 8, wherein 80 designates a small leaf-spring bearing against one of the rack-teeth and serving to restore the same to operative position.

Having thus described the invention, what is claimed is—

1. The combination with a reciprocatory frame, of a pair of racks carried by the frame and adjustable thereon to operative and inoperative positions, the teeth of the racks being yieldable in opposite directions, respectively, a shaft, and a gear carried by the shaft and intermeshing with said racks.

2. The combination with a reciprocatory frame, of a pair of racks carried by the frame and adjustable thereon, an adjusting means connecting both racks for mutual movement, a shaft, and a gear carried by the shaft and intermeshing with said racks.

3. In a motor, the combination with a shaft, of a pair of gears secured thereto, a pair of sets of racks for intermeshing with the gears, said racks serving, respectively, to impart rotative movement in opposite directions to the gear-wheels, and means for adjusting the racks to operative and inoperative positions.

4. The combination with a shaft, of a pair of gears carried thereby, a reciprocatory frame, a pair of sets of racks carried by and movable with the frame, said racks being provided with teeth yieldable in one direction, said racks serving respectively to revolve the shaft in opposite directions, and an adjusting means connecting the racks of each set for mutual movement to operative and inoperative positions.

5. In a motor, a shaft, a gear mounted on the shaft, a reciprocatory frame having a pair of inclined guide-plates, a pair of racks carried by said guide-plates, and provided with yieldable teeth for engagement with the gear-wheel, and means for adjusting said racks on the inclined guide-plates thereby to move the

teeth of the racks into and out of mesh with the teeth of the gear.

6. The combination in a motor, of a shaft, a gear mounted on the shaft, a reciprocatory frame, a pair of sets of slotted guide-plates carried by the frame, said slots being arranged on oblique lines, a pair of racks having lugs fitting within said slots, the teeth of the racks being yieldable in one direction and serving to impart rotative movement to the gear, and an adjustable lever pivoted to the frame and having a link connection with both racks.

7. The combination with a frame, of a shaft having bearings on said frame, a reciprocatory frame guided within the main frame and having a pair of sets of slotted guide-plates arranged on oblique lines, a pair of racks carried by the guide-plates and provided with lugs fitting within said slots, said racks having yieldable teeth, a gear intermeshing with the racks, an adjustable lever pivoted to the reciprocatory frame, a pair of notches, links connecting said lever to the racks, and locking-plates carried by the reciprocatory frame and adapted to enter said notches.

8. In mechanism for transforming reciprocatory into rotary motion, a shaft, a ratchet-wheel thereon, a rack engaging the ratchet-wheel, means for operating the rack, a revolvable wheel connected to said rack and serving as a means for reversing the movement thereof.

9. In a means for transforming reciprocatory into rotary motion, a shaft, a ratchet-wheel thereon, a rack engaging the ratchet-wheel, a reversing-wheel, and a pitman connecting said reversing-wheel to the rack.

In testimony that I claim the foregoing as my own I have hereto affixed my signature in the presence of two witnesses.

DAVID J. SHEA.

Witnesses:

W. A. JOHNSTON,  
DUNCAN BROWN.