No. 647,048. Patented Apr. 10, 1900.

J. THAYER.

MECHANICAL MOVEMENT.

(Application filed Sept. 2, 1899.)

(No Model.) 2 Sheets—Sheet 1.

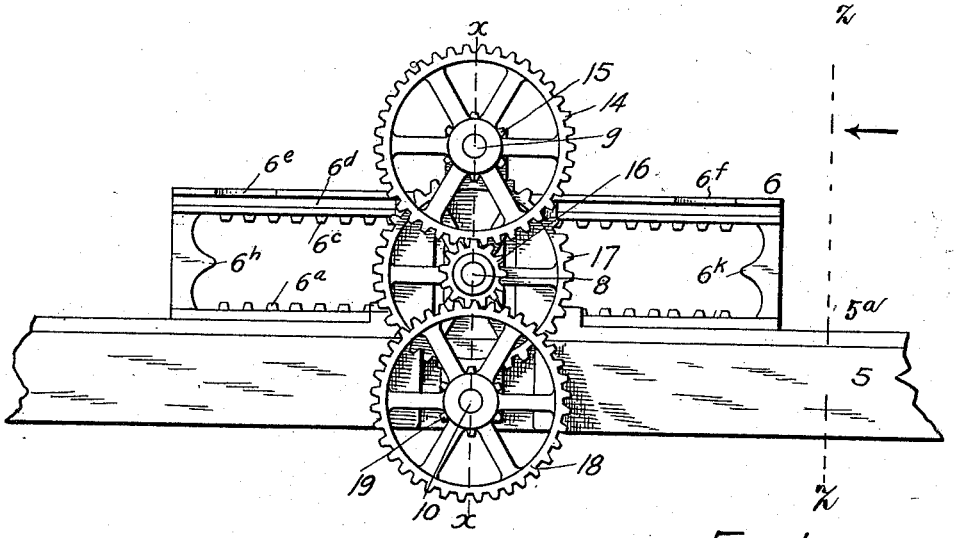

FIG. 1

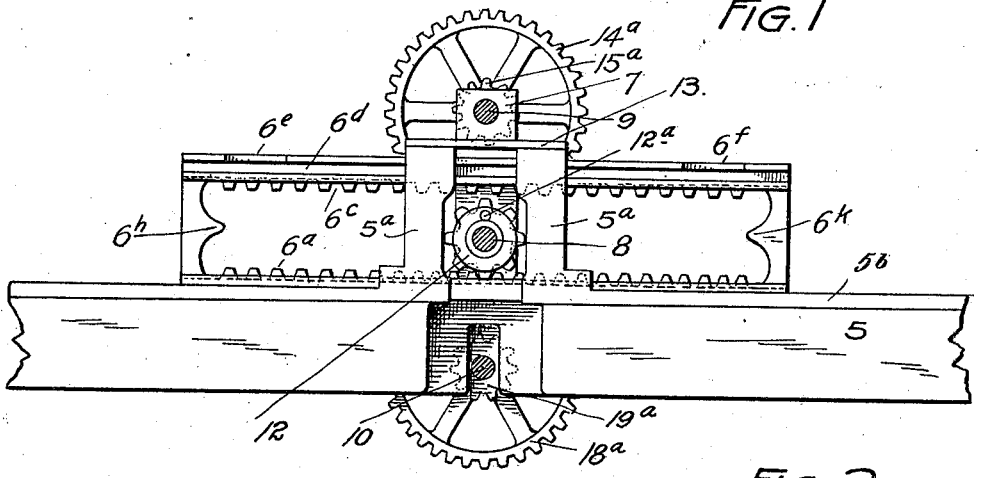

FIG. 2

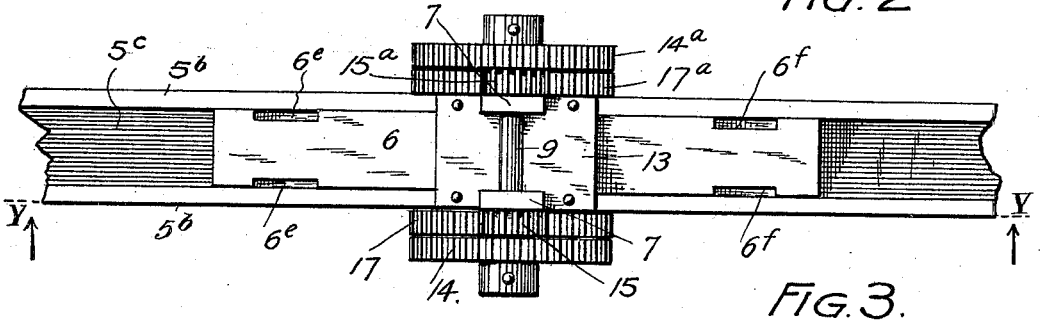

FIG. 3.

Witnesses
F. C. Wilby,
Chas. E. Brock

By his Attorney

Inventor
J. Thayer,
Otis & Le

No. 647,048. Patented Apr. 10, 1900.

J. THAYER.

MECHANICAL MOVEMENT.

(Application filed Sept. 2, 1899.)

(No Model.) 2 Sheets—Sheet 2.

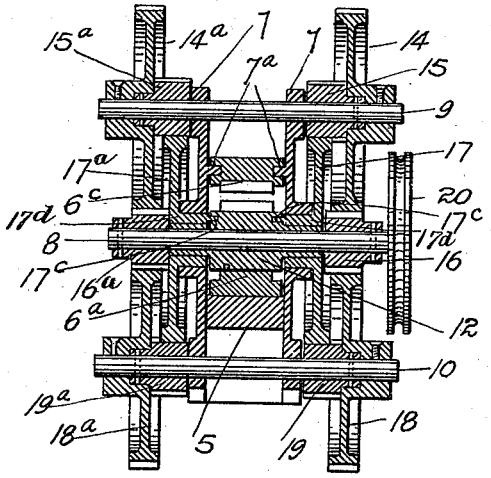

FIG. 4

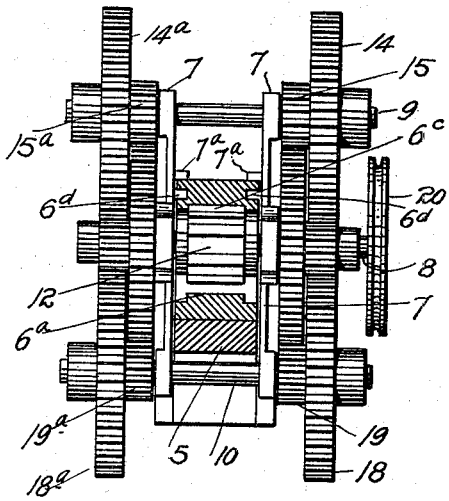

FIG. 5

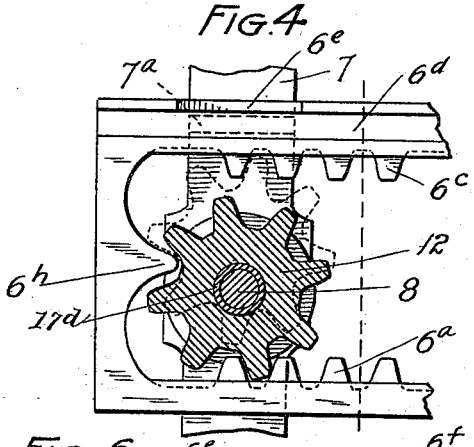

FIG. 6

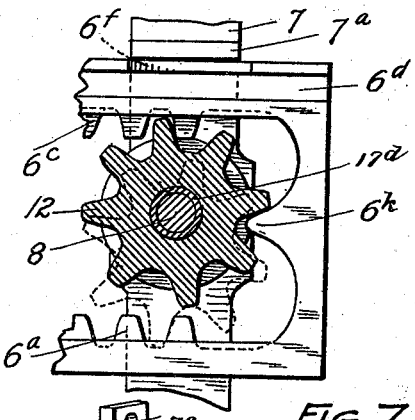

FIG. 7

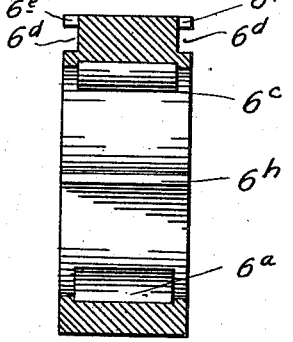

FIG. 8

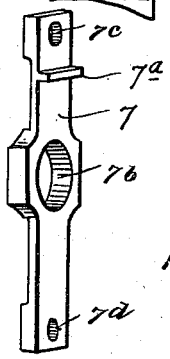

FIG. 9.

Witnesses

F. W. Lilly,

Chas. E. Borrell

By his Attorney

Inventor

J. Thayer,

Pierce & Co

UNITED STATES PATENT OFFICE.

JOSEPH THAYER, OF DENVER, COLORADO.

MECHANICAL MOVEMENT.

SPECIFICATION forming part of Letters Patent No. 647,048, dated April 10, 1900.

Application filed September 2, 1899. Serial No. 729,357. (No model.)

To all whom it may concern:

Be it known that I, JOSEPH THAYER, a citizen of the United States, residing at Denver, in the county of Arapahoe and State of Colorado, have invented a new and useful Mechanical Movement, of which the following is a specification.

My invention relates to mechanical movements, and more especially to that class of mechanical movements for converting continuous rotary motion into reciprocating rectilinear motion, the object of the invention being to provide an improved mechanical movement of this class which while composed of a small number of simple parts will be steady, safe, reliable, and powerful in operation.

The invention consists also in certain details of construction and novelties of combination and arrangement of parts, all of which will be fully described hereinafter and pointed out in the claims.

In the drawings forming part of this specification, Figure 1 is a view in elevation of one side of a mechanical movement constructed in accordance with my invention. Fig. 2 is a longitudinal vertical sectional view thereof, taken on the plane indicated by the dotted line Y Y of Fig. 3. Fig. 3 is a top plan view. Fig. 4 is a transverse vertical sectional view on the plane indicated by the dotted line x x of Fig. 1. Fig. 5 is a transverse vertical sectional view on the plane indicated by the dotted line z z of Fig. 1. Fig. 6 is a detail sectional view through the central gear-wheel, showing the sliding rack at the left-hand end of its stroke and with gear-wheel in full lines in engagement with the lower rack and in dotted lines in engagement with the upper rack. Fig. 7 is a similar view, the sliding rack being at the right hand of its stroke, with the gear shown in full lines in engagement with the upper rack and in dotted lines in engagement with the lower rack. Fig. 8 is a transverse vertical sectional view through the sliding rack looking toward the right-hand end. Fig. 9 is a detail perspective view of one of the vertically-sliding bearing-plates.

Like numerals of reference mark the same parts wherever they occur in the various figures of the drawings.

Referring to the drawings by numerals, 5 indicates the base or supporting block of the machine, and a plate secured upon or forming part thereof is cut away on its upper surface, leaving side walls 5^b with a flat depressed surface 5^c between them. Standards 5^a—two on each side—are erected centrally on the base-plate, that portion of the walls being cut away, the inner faces of the standards being flush with the inner faces of the walls 5^b, and a vertically-extending space being left between the two standards on each side.

6 indicates a sliding frame rectangular in outline in side elevation and resting between the walls 5^b on surface 5^c. Within the lower bar of the sliding frame are inwardly-projecting rack-teeth 6^a, forming the lower rack, and on the inside of the top bar similar teeth 6^c, forming the upper rack, the ends of the frame being provided with inwardly-projecting curved faced teeth 6^h and 6^k. In the sides of the upper bar of the sliding frame are longitudinal grooves 6^d, the upper walls of said grooves being cut away near each end, forming notches 6^e and 6^f.

7 indicates an upright bearing-plate (of which there are two) slidably mounted in the space between the uprights 5^a on each side, each bearing-plate being provided with a horizontal switching-flange 7^a near the top and with a central opening 7^b, an upper opening 7^c, and a lower opening 7^d.

8, 9, and 10 indicate three transverse shafts arranged in the same vertical plane in respectively central, upper, and lower positions, passing through and having their bearings in the openings of the slidable bearing-plates 7.

12 indicates the gear-wheel, which I denominate the "central" gear-wheel, loosely journaled centrally on central shaft 8, adapted to engage alternately with the racks 6^a and 6^c, as hereinafter explained, and provided with openings 12^a in each side by the side of and parallel with its central bore.

14 and 14^a indicate gear-wheels secured upon shaft 9 outside of the bearing-plates 7 on the right-hand and left-hand ends, respectively, as seen in Figs. 4 and 5, having pinions 15 and 15^a secured to their inner sides on the shaft. The gear-wheels 14 and 14^a respectively engage with pinions 16 and 16^a, rigidly secured to shaft 8. Gear-wheels 17 and 17^a are loosely journaled upon the ends

of the hub-wheel 12 inside of pinions 16 and 16^a and are provided with horizontal pins 17^c, projecting from the inner sides of their hubs and in position to enter the openings 12^a in the central gear-wheel 12 to cause the gear-wheels 17, 12, and 17^a to rotate with each other on the shaft, the hubs of gear-wheels 17 and 17^a being extended in the form of sleeves 17^d to the inner faces of the bearing-plates 7, being journaled in openings 7^b therein.

The lower shaft 10 carries rigidly secured thereon gear-wheels 18 and 18^a, meshing with pinions 16 and 16^a, and pinions 19 and 19^a, meshing with gear-wheels 17 and 17^a, and the central shaft 8 carries a belt-pulley 20 to receive a belt from any suitable driving-pulley. (Not shown.)

The construction of my invention will be readily understood from the foregoing, and its operation is as follows: Supposing the parts to be in the positions illustrated in Figs. 1, 2, and 4, with the central gear-wheel in engagement with the lower rack of the sliding frame and power applied to rotate the central shaft 8, the pinions 16 and 16^a thereon will cause the gear-wheels 14 14^a and 18 18^a, pinions 15 15^a and 19 19^a, and shafts 9 and 10 to be rotated to the left. The pinions 15 15^a and 19 19^a engaging gear-wheels 17 17^a, which are loose on shaft 8, will cause them to be rotated to the right on said shaft at a much slower rate than the shaft is being rotated, their power being correspondingly increased. The gear-wheels 17 and 17^a being coupled to the central gear-wheel 12 by the engagement of pins 17^c in holes 12^a, the central gear-wheel will rotate to the right with said gear-wheels and by the engagement with the lower rack 6^a cause the sliding frame to be carried to the left. When the right-hand end of the sliding frame reaches the central gear-wheel, the switching-flanges 7^a of the vertically-slidable bearing-plates 7, which during this movement have been engaged in the horizontal grooves 6^d of the sliding frame, will be immediately under the notches 6^f in the upper walls of said grooves, and one of the teeth of the central gear-wheel engaging on top of tooth 6^c (see Fig. 7) will raise the bearing-plates and all the gearing, the switch-flanges 7^a passing through notches 6^f, and the central gear-wheel meshing with the upper rack will reverse the motion of the sliding frame. The switch-flanges in this reverse movement will rest upon the upper surfaces of the upper walls of grooves 6^d until notches 6^e at the left-hand end are brought under the flanges, and the central gear-wheel engaging under the tooth 6^h will drop the bearing-plates again, bringing the switch-plates through notches 6^e into line with grooves 6^d, ready for the opposite movement of the sliding frame, caused to begin at this time by the engagement of the central gear-wheel with the lower rack.

In the foregoing description the central shaft is driven to the right; but the whole mechanism will work equally well if it is driven to the left and the described movement of all the other parts reversed.

From the foregoing description it will be seen that I have provided means whereby a swift rotary motion is converted into a steady powerful rectilinear reciprocation, which will be applicable to all kinds of machinery requiring such a movement, more especially such machinery as is to be driven by high-speed motors.

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

1. In a mechanical movement, the combination with a horizontally-slidable frame, having horizontal grooves in its outer sides with their upper walls cut away at each end to form notches, provided with upper and lower interior racks and inwardly-projecting end teeth, of vertically-slidable bearing-plates, having inwardly-projecting horizontal switch-flanges near their upper ends adapted to engage in said grooves, a transverse shaft journaled therein, a central gear-wheel on said shaft within the sliding rack-frame and of less diameter than the distance between the upper and lower racks, and means for rotating the central gear-wheel, substantially as described.

2. In a mechanical movement, the combination of a horizontally-slidable interiorly-toothed rack-frame, a central shaft passing through the frame, a central gear-wheel loosely journaled upon said shaft, pinions rigidly secured to the central shaft at each end, upper and lower shafts in the same vertical plane and parallel with the central shaft, gear-wheels rigidly secured on the upper and lower shafts at each end engaging the pinions of the central shaft, a pinion secured alongside each gear-wheel on the upper and lower shafts, and gear-wheels loosely journaled on the central shaft engaging said pinions and coupled to the central gear-wheel, substantially as described.

JOSEPH THAYER.

Witnesses:
GEO. F. DUNKLEE,
J. D. FERN.