

No. 661,417.

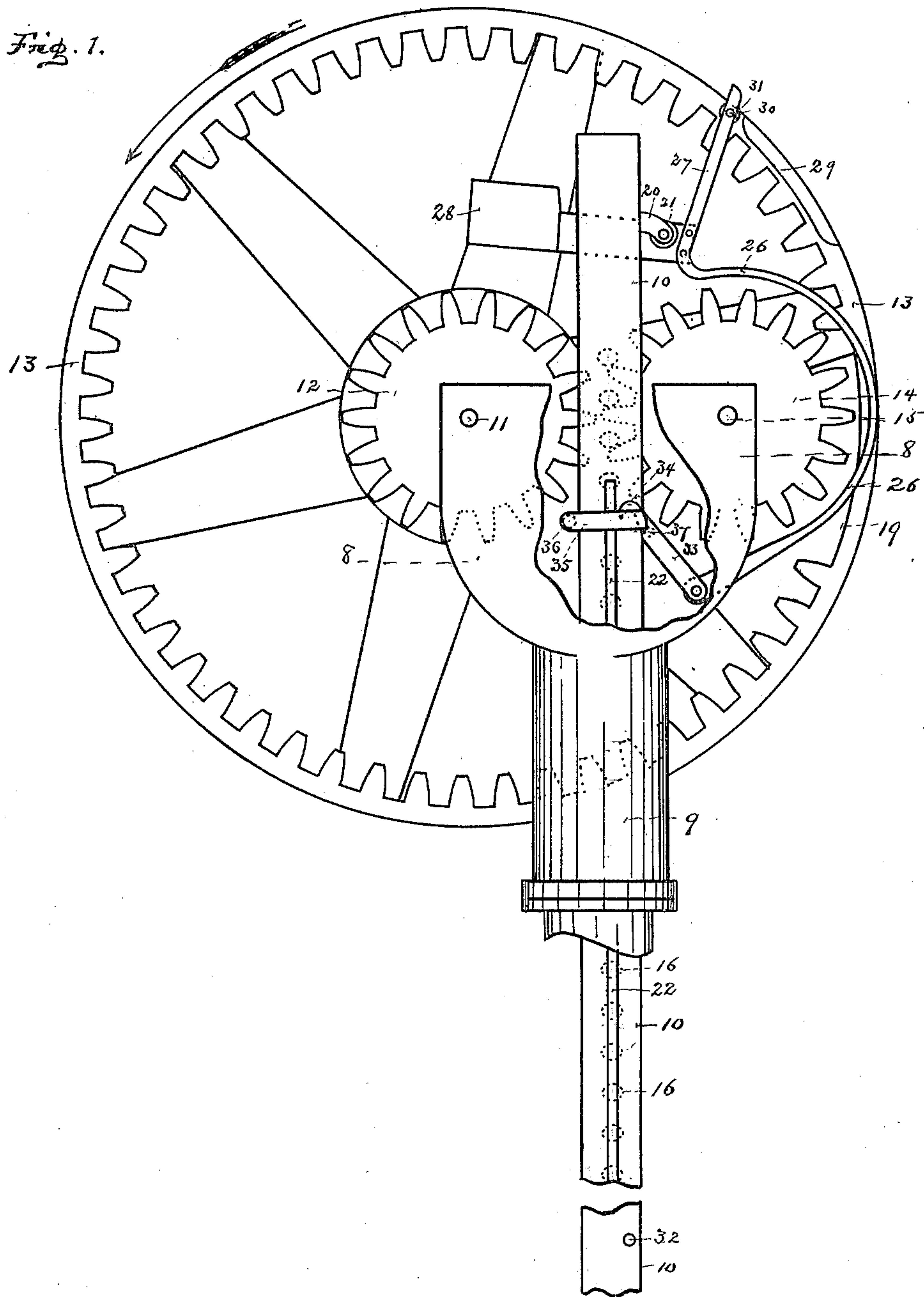
Patented Nov. 6, 1900.

F. M. MOSSMAN.
MECHANICAL MOVEMENT.

(Application filed Apr. 27, 1899.)

(No Model.)

2 Sheets—Sheet 1.



WITNESSES:

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H. C. Hartman

His ATTORNEY.

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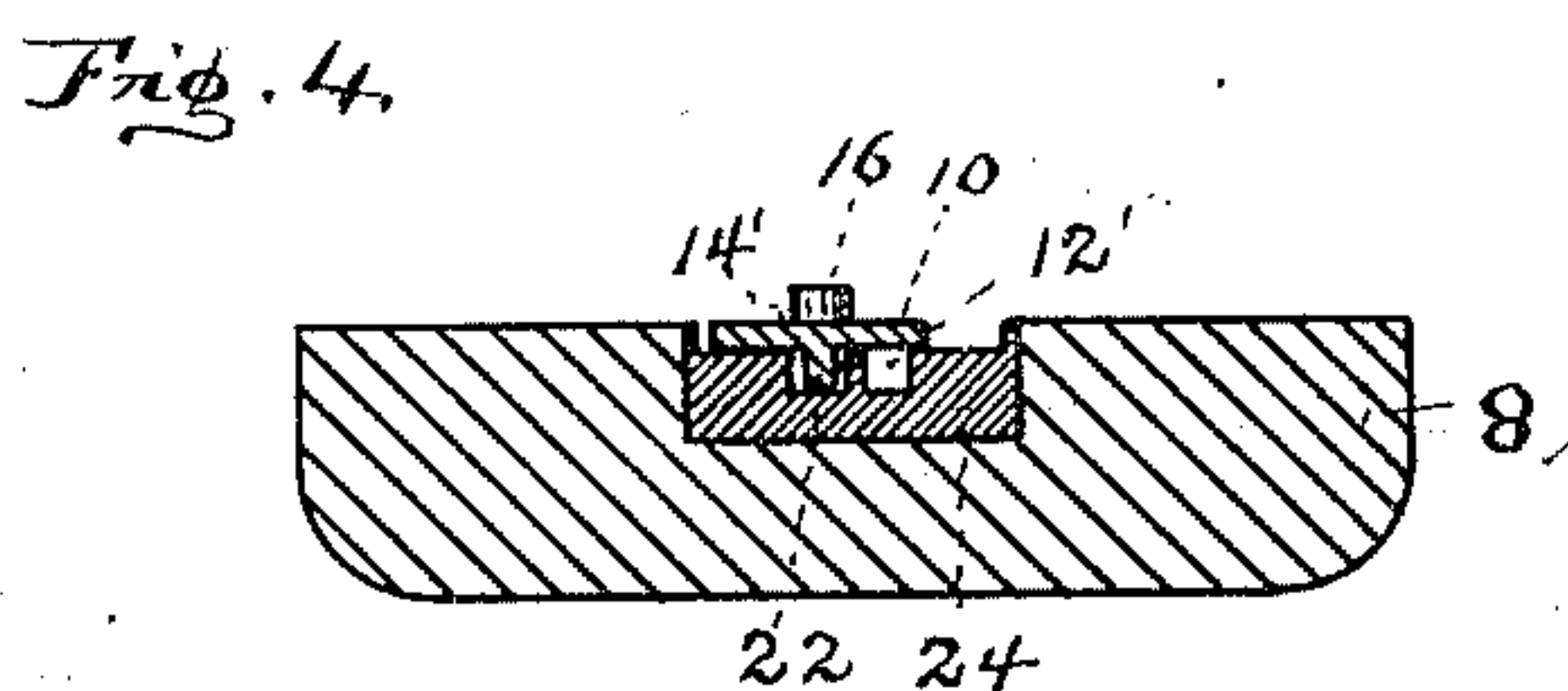
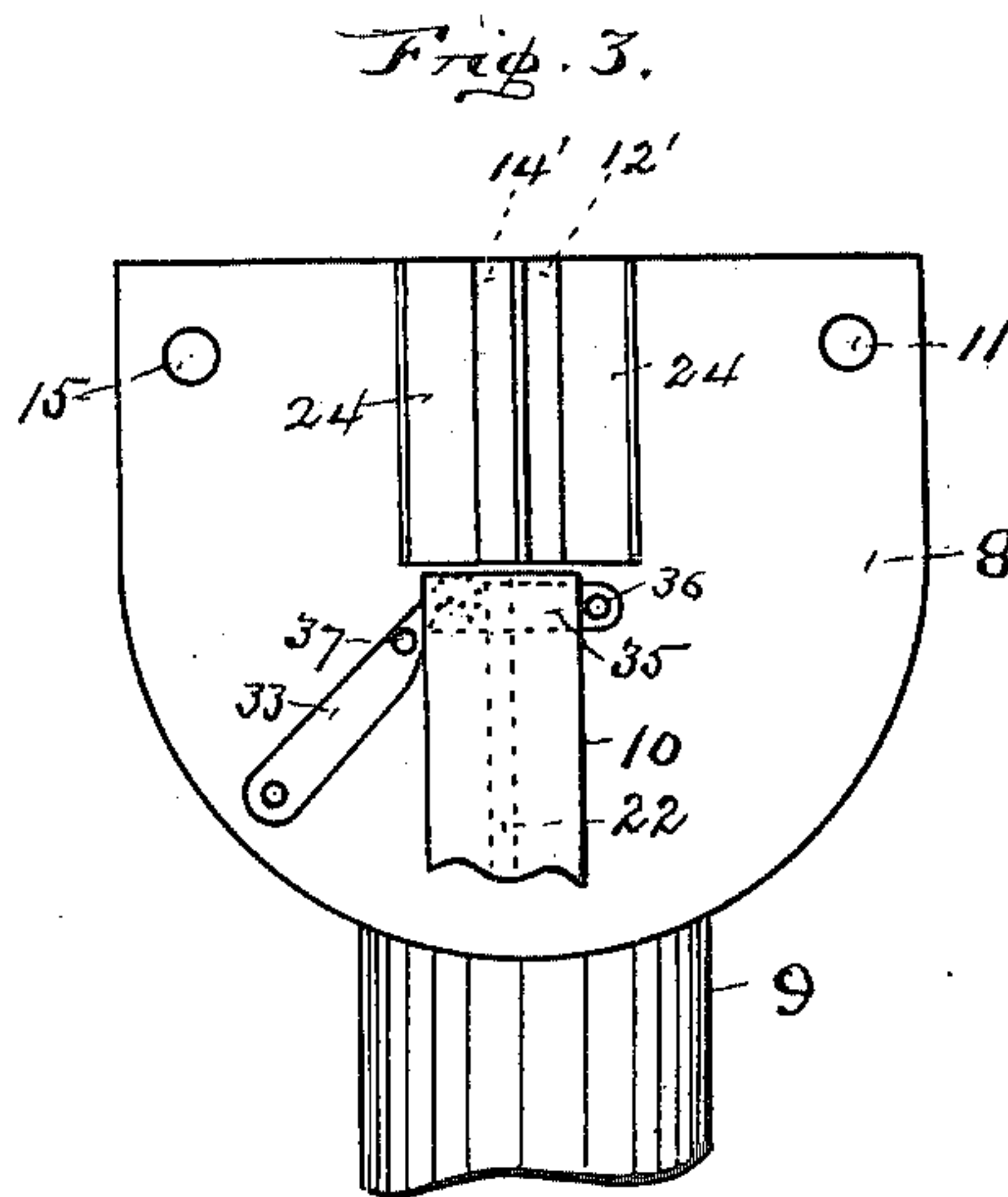
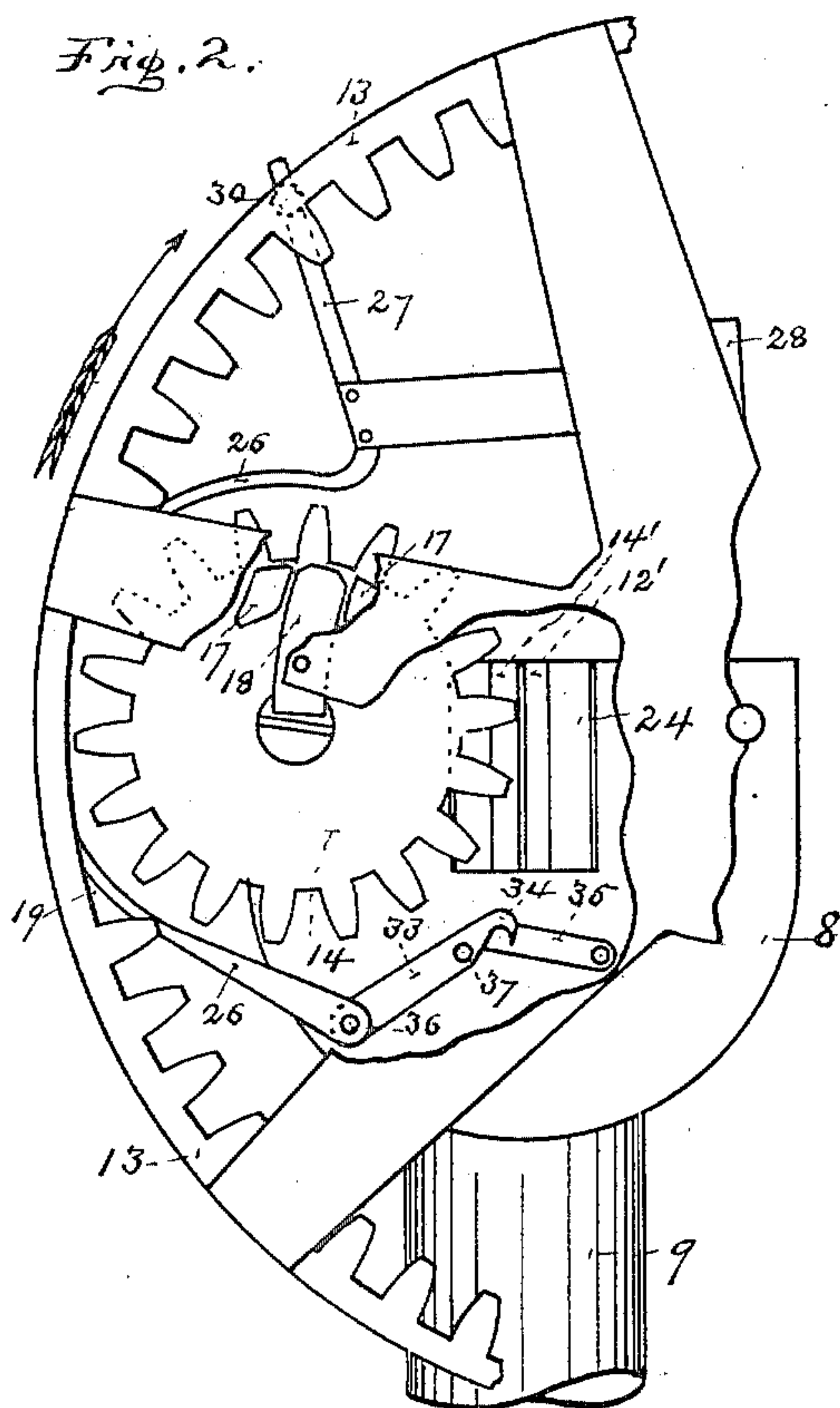
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2 Sheets—Sheet 2



WITNESSES:

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UNITED STATES PATENT OFFICE.

FRANCIS M. MOSSMAN, OF NEAR COLLINS, INDIANA, ASSIGNOR OF ONE-HALF TO JOHN F. MOSSMAN, OF COESSE, INDIANA.

MECHANICAL MOVEMENT.

SPECIFICATION forming part of Letters Patent No. 661,417, dated November 6, 1900.

Application filed April 27, 1899. Serial No. 714,642. (No model.)

To all whom it may concern:

Be it known that I, FRANCIS M. MOSSMAN, a citizen of the United States, residing near Collins, Whitley county, in the State of Indiana, have invented a new and useful Mechanical Movement, of which the following is a specification.

My invention relates to improvements in mechanical movements in which a reciprocating rectilinear motion of a bar is produced by the rotary movement of gear-wheels; and the objects of my improvements are, first, to afford an improved device for causing the bar to move in one direction with a greater speed than when it is moved in an opposite direction; secondly, to provide means by which the rack-bar is thrown into engagement alternately with opposite gear-wheels to produce the reciprocating motion, and, third, to provide a device of the class named which shall be simple in construction and positive in action, with a minimum amount of friction.

The invention consists in the construction and novel combination of parts hereinafter described, pointed out in the appended claims, and illustrated in the accompanying drawings, in which—

Figure 1 is an elevation of the device, showing a rear view of the same with part of the frame removed. Fig. 2 is a detail showing a front view of the idle wheel and locking device when in the position shown in Fig. 1, in which the rod is in position to be shifted. Fig. 3 is a front view of a detail, showing the guide-plate attached to the frame and a section of the reciprocating bar cut off just below the guide-plate; and Fig. 4 is a top view of the guide-plate, bar, and part of the frame.

Similar numerals of reference refer to similar parts throughout the several views.

The mechanism is supported by a head or frame 8, which is provided with a vertical supporting-standard 9, having an orifice or opening through it for the reciprocating bar 10 to pass through and also act as a vertical guide therefor. The form of the head and standard illustrated in the drawings is preferably for a wind engine or mill for pumping water. In such case the fan or vane wheel is mounted on the driving-shaft 11. A driving-pinion 12 and a larger internal gear-wheel

13 are mounted on the shaft 11, by which they are rotated, the shaft being mounted in bearings in the frame 8. Opposite the driving-pinion 12 an idle gear-wheel 14 is mounted on a gudgeon 15 in the same horizontal line with the shaft 11, the pinions being placed so that they may revolve freely without affecting each other and yet so near together that the rack-bar 16 of the reciprocating bar 10, which passes down between them, is always in engagement with one or the other, according as the bar 10 is moved laterally for such engagement. The teeth of the rack-bar 16 and the internal gear 13 not being on the same plane, the rim of the idle wheel 13 is made of such width as to engage both when in operation. The hub and arms of the internal gear-wheel 13 are arranged to one side to provide space for the operation of the idle wheel 14 and the locking-plate 18.

The cogs on the internal gear-wheel 13 are adapted in number to revolve the idle wheel 14 three times, and the number of cogs removed are adapted to provide a mutilated portion 19, which will permit the idle wheel 14 to remain stationary while the shifting of the bar 10 takes place, as hereinafter described. The center or driving pinion 12 has the same number of cogs as the idle wheel, and the rack-bar 16 on the bar 10 has three times as many cogs as the driving-pinion, preferably one more, for certainty of action.

The reciprocating bar 10 is provided on its front surface with cogs or teeth, forming a rack-bar 16. On its rear surface, directly back of or on the opposite side of the rack-bar 16, is formed or secured a narrow metallic strip or tongue 22, its length being that of the stroke minus the vertical length of the guide-plate, with allowance for easy motion in shifting.

The constructions and method for shifting the reciprocating bar laterally so as to make alternate connections or meshings of the rack-bar 16 with the pinions 12 and 14 automatically are as follows: A guide-plate 24 is secured to the frame 8 in rear of the two operating-pinions 12 and 14, its vertical length being preferably about one-half of the diameter of the pinion 12, and it is provided with two grooves 12' and 14' for the tongue 22 to move in, and thereby hold the rack-bar in

place laterally. These grooves 12' and 14' are so arranged that when the tongue 22 is moving or placed in one of them, 12', the rack-bar 16 is thereby held in engagement with the driving-pinion 12, whereby the bar 10 is moved upward, and when moving or placed in the other groove, 14', the rack-bar 16 is held in engagement with the idle wheel 14, whereby it is moved downward. When the guide-rib 22 passes down out of said groove 14', means are provided whereby the bar 10 is shifted automatically over to the other side of the guide-plate 24 in position for the tongue 22 to enter the other groove 12' nearest the driving-pinion 12, by which the bar 10 is moved upward. Such means preferably consist of the lug 20, attached to the upper end of the bar 10 and projecting to one side and preferably provided with a friction-roller 21. A swinging arm 26, having a limited movement, has one end pivoted to the frame 8 and the other provided with an inclined contact-piece 27, with a weight 28 to hold it inwardly toward the driving-shaft 11. It also is provided with a bolt 30, on which is mounted a friction-roller 31, against which roller a cam 29 on the rim of the internal gear-wheel impinges to operate the contact-piece 27. The function of the weight 28 is to hold the upper part of the swinging arm 26 toward the driving-shaft 11. The lug 20 is so located on the bar 10 that its friction-roller 21 will strike the inclined contact-piece 27 as the bar 10 moves downward to its limit. At this time the friction-roller 30 on the contact-piece is engaged by the cam 29 on the internal gear-wheel, which in its further revolution forces the arm 10 inwardly until its guiding-rib 22 is in line to enter the groove 12'. Then the driving-pinion 12 engages the rack-bar 16 and the rib 22 enters the groove 12'. The bar 10 is then moved upward by the pinion 12, and when it approaches its upward limit it is shifted into engagement with the idle wheel 14, preferably by means of a pin 32, placed at one side of the bar 10 and the same distance from the end of the tongue 22 as the friction-roller 20 above the other end of said tongue. A short arm 33 is pivoted at one end to the frame 8, and its other end is provided with a hook 34 to engage said pin 32 when it is moved upward, the arm 33 then being at an angle to the bar 10 of about forty-five degrees. The arrangement is such that as the bar 10 moves upward it is drawn thereby over against the side of the guide-plate 24 nearest the idle wheel, the pin moving in an arc whose radius is the length of said arm 33. To hold this hook 34 in position to positively engage said pin 32, a cross-arm 35 is rigidly attached to the shifting arm 33 at such an angle thereto that when the hook 34 of the shifting arm 33 is at its highest elevation the cross-arm 35 is in a horizontal line across the bar 10. A projection 36 on the inner end of the cross-arm 35 and a projection 37 on the arm 33 are so placed that the bar 10 moves freely between

them in both upward and downward movements. When the bar 10 moves downward, its pin 32 is out of engagement with the hook 34 and the arm 33 drops inwardly until its projection 37 rests against the edge of the bar, while the projection 36 is then entirely out of contact with said bar. When the pin 32 is moving upward and engages the hook 34 of the shifting arm 33, it carries the cross-arm 35 upward until it attains a horizontal position, as above stated. Then this projection 36 impinges against the inner edge of the bar 10 while the projection 37 is out of contact, the arrangement being such as to hold the arm 10 in position, as above stated, the projections 36 and 37 aiding to limit the movements of the shifting arm 33, but at no time locking or impeding the movement of the bar 10.

It is obvious that at the moment of shifting the reciprocating bar, as described, it must not be acted upon by either the driving-pinion nor the idle wheel, but remain for the moment stationary vertically. It will be seen that when the bar 10 is moved up to its highest point of motion it is shifted, as described, by the action of the pinion and arm 33, the arrangements of the parts being such that during such shifting the idle wheel 14 is opposite the mutilated part 19 of the internal gear-wheel 13 and not operated, and therefore the wheel 14 being free the bar would run down unless some locking device were used. For this purpose two lugs 17 and a locking-plate 18 are provided, and the arrangement is such that as the idle wheel becomes free from its engagements with the internal gear-wheel 13 by reason of passing the mutilated part 19 the locking-plate 18 on said wheel engages said lugs 17 and passes on between them, carried by the internal gear-wheel 13, the time of such passage and locking being long enough to permit the shifting described. As the locking-plate 18 passes out of such engagement the internal gear-wheel 13 again engages the idle wheel 14, and thereby operates the rack-bar 16, moving it downward with three times the velocity of its upward movement. Another function of the locking device described is to hold the idle wheel 14 in position for meshing with the gear-wheel 13, when its cogs again engage it.

The mode of operation is obvious from the above description of the parts and their functions.

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

1. In a mechanical movement by which rotary motion is converted into reciprocating rectilinear motion, a driving-shaft: a pinion and an internal gear-wheel mounted on said shaft: an idle pinion mounted on a gudgeon and meshing with said internal gear-wheel: a guide-plate provided with two grooves on its front face: a reciprocating bar provided with a rack on its front side and on its rear

side with a guiding rib or tongue adapted to move in the grooves in said guide-plate: and means to automatically shift said reciprocating bar at each end of the stroke, so that said rib or tongue shall move first in one groove and then in the other alternately.

2. In a mechanical movement by which rotary motion is converted into reciprocating rectilinear motion, the combination of a supporting-frame: gear-wheels or pinions adapted to mesh with the rack on a reciprocating bar: means to rotate the gear-wheels or pinions: a reciprocating bar provided on its front side with a rack, and on its rear side with a rib or tongue: means to shift said bar at the end of each stroke automatically, consisting of a guide-plate provided with two grooves for said rib: a lug 20 and a pin 32 attached to said reciprocating bar: a swinging arm 26 provided with an inclined end and with a bolt 30 having a friction-wheel: an internal gear-wheel provided with a cam: an arm 33 attached to the supporting-frame and provided with a hook adapted to engage said pin 32: a cross-arm 35 having the guide pins or projections 36 and 37 for the purpose and substantially as described.

3. In a mechanical movement in which ro-

tary motion is converted into reciprocating rectilinear motion, a reciprocating bar provided on one side with a rack and on its other side with a rib or tongue: a guide-plate provided with two grooves for said rib to move in alternately: means to automatically shift said reciprocating bar so that said rib shall move in said grooves alternately: and means to operate the rack-bar reciprocally and to shift it alternately at the end of each stroke.

4. In a mechanical movement by which rotary motion is converted into reciprocating rectilinear motion, a bar provided on one side with a rack: a pinion mounted on a driving-shaft: an idle wheel mounted on a gudgeon: a driving-shaft having an internal gear-wheel mounted thereon meshing with said idle wheel: means to shift and guide said bar automatically at the end of each stroke while the driving-shaft is in motion, so that its rack shall alternately engage said pinion and said idle wheel respectively.

In witness whereof I have hereunto set my hand in the presence of two witnesses.

FRANCIS M. MOSSMAN.

Witnesses:

BENTON E. GATES,
CURTIS W. JONES.