(No Model.)

J. E. WEST.

MECHANICAL MOTOR.

No. 505,339. Patented Sept. 19, 1893.

Fig: 1.

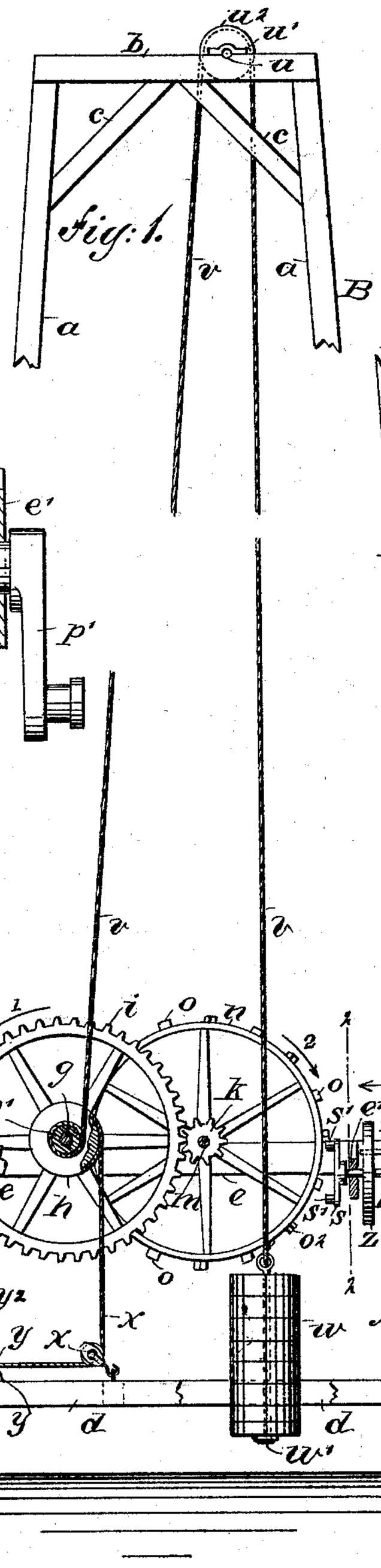


Fig: 2.

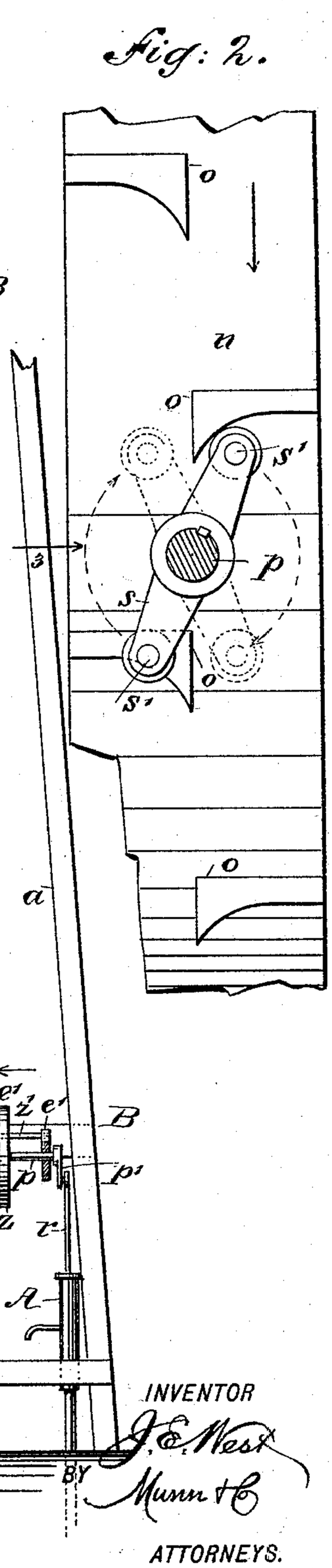
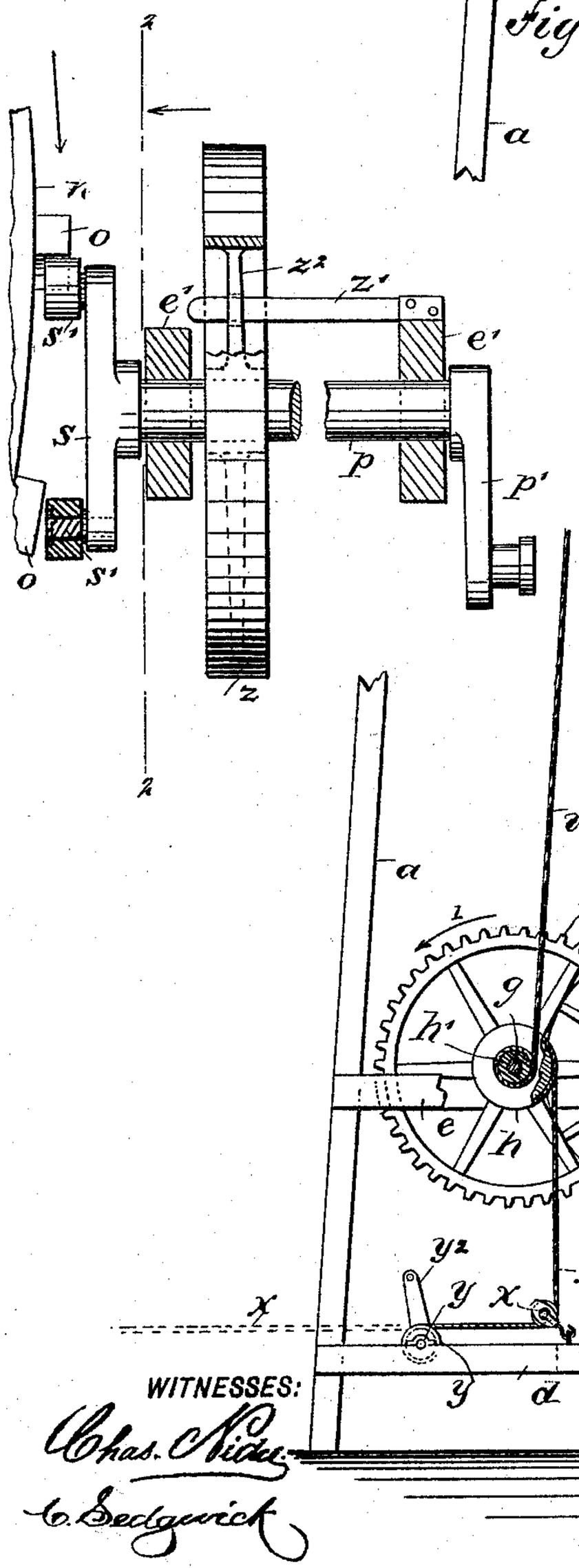


Fig: 3.



WITNESSES:

Chas. Nicol.

C. Sedgwick

INVENTOR

J. E. West

BY

Munn & Co

ATTORNEYS.

UNITED STATES PATENT OFFICE.

JOHN E. WEST, OF CENTRALIA, WASHINGTON, ASSIGNOR TO HIMSELF AND MAGGIE J. HORR, OF SAME PLACE.

MECHANICAL MOTOR.

SPECIFICATION forming part of Letters Patent No. 505,339, dated September 19, 1893.

Application filed February 18, 1893. Serial No. 462,861. (No model.)

To all whom it may concern:

Be it known that I, JOHN E. WEST, of Centralia, in the county of Lewis and State of Washington, have invented a new and useful Improvement in Mechanical Movements, of which the following is a full, clear, and exact description.

My invention relates to an improved means for converting a rotary motion into a reciprocating movement; and more particularly has for its object to provide simple, inexpensive and reliable mechanism, which will economically utilize the force of gravity afforded by a falling weight, and convert rotary motion produced thereby into a vertical reciprocating movement, for the actuation of a plunger pump, or other device requiring such a movement.

To this end my invention consists in the construction and combination of parts, as is hereinafter described and claimed.

Reference is to be had to the accompanying drawings, forming a part of this specification, in which similar letters of reference indicate corresponding parts in all the figures.

Figure 1 is a broken, partly sectional side view of the improvement applied to a pump. Fig. 2 is an enlarged transverse sectional view in part, of details of construction embodying the improvement, on the line 2—2 in Figs. 1 and 3; and Fig. 3 is a broken sectional view of completed details of construction, seen opposite the arrow 3, in Fig. 2.

The improvement is shown in Fig. 1, as applied to operate a common water lifting pump A, and to this end is suitably mounted on a derrick frame B. The derrick frame is of a proper height for effective service, and in completed form, not shown, is rectangular at the base, this structure being composed of four corner posts *a*, which incline an equal extent inwardly, so as to reduce the degree of their separation at their upper ends, which are joined together by four similar cap plates *b*, one being shown in Fig. 1. The junctions of the posts *a* with the cap plates *b*, are reinforced by the diagonal braces *c* that are extended across the upper corners of the frame, and have their ends affixed to the parts mentioned, so as to stiffen the upper part of the framed structure. Near the lower ends of the posts *a*, these parts are joined by the four horizontal beams *d*, two being represented in Fig. 1, these pieces which are attached at their ends to the posts, lying in the same horizontal plane. Above the beam *d*, at a proper point, four other frame timbers *e*, are in a like manner affixed by their ends upon the inclined posts *a*, and occupy a plane parallel with the beams named, their degree of separation therefrom being such as will adapt them to properly receive and sustain working parts of the improvement which consists essentially of features of construction which will be presently described. A winch drum is provided, which is secured upon a shaft *g*, that is rotatably supported and secured transversely on two of the frame pieces *e*, which are opposite, said drum consisting of two cylindrical and concentric portions *h*, *h'*, the latter being of considerably less diameter than the one *h*, said drums occupying space between the parallel frame pieces whereon the shaft *g*, is adapted to rotate. There is a large spur gear wheel *i*, secured on the shaft *g*, intermediately of the frame pieces *e*, which wheel meshes with a small pinion *k*, affixed upon a counter-shaft *m*, which is supported to rotate on the frame pieces mentioned, parallel with, and at a proper distance from the shaft *g*.

An essential feature of the improvement consists of a comparatively large escapement wheel *n*, that is also secured on the counter-shaft *m*. As shown in Fig. 2, the rim of the escapement wheel *n*, has a suitable width provided to permit two series of peculiarly shaped cam blocks *o* to be formed or secured upon its peripheral surface. The cam blocks or teeth *o*, are of a like form in both series, and a proper equal number is provided for the two sets of teeth, each set or series being spaced apart correctly to adapt them for effective service. The length of each series of cam teeth *o* is proportioned to the breadth of the wheel face they are projected from, so as to locate the inner terminals of each set of teeth on a circumferential line at the transverse center of said peripheral surface, the teeth of one series being alternated in position with regard to those of the other series, so as to locate them individually at the center of the

space between two teeth of the mating series, as indicated in Fig. 2. Each cam tooth *o*, projects radially a proper distance from the peripheral face of the wheel *n*, and the lower edges of said teeth considered on the part of the wheel face nearest to the pump A, are similarly incurved, of a correct radius which by prolongation would intersect the upper inner corner of the tooth. The incurved edge portion of each tooth *o*, is by preference prolonged as a straight wall, parallel with the other edge of the tooth, that forms a right angle with the edge of the wheel rim, from which the tooth is longitudinally extended.

Two timbers *e'* are transversely extended between the frame pieces *e*, and have their ends attached to them, said timbers being properly spaced apart, parallel with each other, and designed to afford support for a rock shaft *p*, which is journaled therein as indicated in Figs. 1, 2, and 3. The transverse timbers *e'* are located between the escapement wheel *n*, and the upright pump A, so as to allow the horizontal rock shaft *p*, to lie intermediately of said parts, and in the same vertical plane with their transverse centers. The length of the shaft *p*, is correctly proportioned to the space between the upright pump rod *r*, and the periphery of the wheel *n*, a crank-arm *p'* on one end of this shaft being pivoted to the upper end of the pump rod and having a throw adapted to properly reciprocate the latter. On the opposite end of the rock shaft *p*, which is near to the circular face of the wheel *n*, a dual rock arm *s*, is secured at its longitudinal center, producing two aligned and similar limbs that are individually of a nearly equal length to that of the crank-arm *p'*. One rock arm limb projects in the same direction as the crank arm *p'*, and consequently the other limb is oppositely extended, both of the rock arm limbs lying in the same plane with the crank arm. At an equal distance from the axis of the rock shaft *p*, two studs *s'*, are projected from the surface of the dual rock arm *s*, on the side nearest the periphery of the wheel *n*, and near said circular face; the shaft *p* being located such a distance below the axis of the counter-shaft *m*, as will permit the stud *s'*, which is uppermost when the dual rock arm is in a vertical position, to lie nearly in a horizontal plane with the counter shaft axis, as indicated in Fig. 1. The studs *s'* are each provided with anti-friction thimbles that are loosely secured on them as shown in section in Fig. 3, these thimbles forming the cylindrical exteriors of the studs that are in service pallet toes whereon the cam teeth *o*, successively impinge when the device is in use. On the cap plates *b* of the derrick frame B, a shaft *u*, is transversely sustained, parallel with the drum shaft *g*, the ends of said shaft *u*, being rotatably engaged with two boxes *u'*, one shown in Fig. 1.

There is a grooved pulley u^2, secured on the shaft *u*, on which pulley a rope *v* is imposed, that has one end secured to the smaller band *h'* of the winch drum that is mounted upon the shaft *g*, as before explained, the other end portion of the rope *v*, having a secured engagement with a series of weights *w*, which are removably placed on a hanger rod *w'*, so that the heft of the multiple weight may be increased or diminished as occasion may require.

On the larger portion *h*, of the winch drum, another rope *x*, is secured by one end, and wrapped in a suitable number of coils, a portion of the rope being extended downwardly to pass through a snatch block *x'*, that is attached upon a transverse beam that extends between the horizontal beams *d*, which are shown in Fig. 1.

A windlass shaft and a drum *y*, are rotatably supported by the boxes *y'* secured on the beams *d*, near two of the corner posts *a*, which shaft is adapted for rotation by the provision of the crank handle y^2. The end of the rope *x*, which is extended beyond the block *x'*, is attached to the drum *y*. For effective service, the rope *x* should be wrapped and engaged as stated, when the other rope *v* is unwrapped from the drum *h*, and the attached weights *w*, are pendent near the base of the derrick frame, as indicated in Fig. 1.

On the rock shaft *p*, near the dual rock shaft *s*, a balance wheel *z*, is mounted and secured, said wheel having its rim of a diameter and weight that will adapt it for efficient service. A preferably flat spring *z'*, is provided to co-act with the wheel *z*, and has one of its ends secured on a cross timber *e'*, or other proper stable support, at a proper distance from the wheel *z*, and its free end is projected toward the latter, passing through a slot in an arm z^2, of said wheel or having a like loose connection established therewith, so as to utilize the resilience of the spring for the steady oscillation of the wheel when the latter is periodically and rotatively moved in one direction, and as will presently be explained.

In use, the weights *w*, are elevated to a point near the pulley u^2, by a manipulation of the crank handle y^2, so as to unwrap the rope *x*, from the drum *h*. Or the rope *x*, may be prolonged sufficiently beyond the drum shaft *y*, after said rope has been wrapped upon the drum thereon, so as to allow animal power to be attached and utilized as a draft force to elevate the weight *w*, by unwrapping the rope *x*, from the drum *h*, and consequently wrapping the other rope *v*, on the smaller drum *h'*. When the parts are arranged as stated, the gravity of the elevated weights *w*, will cause the spur wheel *i*, to revolve in the direction of the arrow 1, and the escapement wheel *n*, in an opposite direction, as indicated by the arrow 2, in Fig. 1, so that the cam teeth *o* will be successively brought into forcible contact with the pallet toes *s'*. It will be seen that the impinge of a pallet toe by one of the pawl teeth *o*, when the dual rock arm *s* is in its normal position, will rock the arm as

indicated by dotted lines in Fig. 2, and when the engaged toe s', is depressed a proper degree, the curvature of the wheel rim, from which the cam tooth projects, will remove the tooth from the toe. The spring z' will serve to hold the parts mentioned in assured contact and prevent chattering or back-lash of the pallet toe. The release of the toe s', as just stated, will be effected when the other limb of the rock arm and its toe is projected into the path of an approaching cam tooth o, that is extended from the other edge of the escapement wheel n toward the transverse center of the latter, so that this tooth will be engaged at the time the one of the opposite series is released, whereby the continued oscillation of the dual rock arm will be effected, and the pump A, actuated, in an obvious manner.

The mechanical movement that has been shown as operating a pump by the force of gravity due to the falling of a weight, may be applied to actuate other machinery which requires a vertical reciprocating motion, hence it is not desired to limit the use of the novel movement to the driving of a pump.

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

1. The combination with an upright frame, a winch drum rotatable thereon near its base, a loose pulley at the head of the frame, a rope passing from the drum over the pulley, a pendent weight on the rope, a counter-shaft, a pinion thereon engaged by a spur wheel on the drum shaft, and an escapement wheel on the counter-shaft, of a rotatable rock shaft at a right angle to the counter-shaft, a dual rock arm on one end of the rock shaft near the face of the escapement wheel and adapted to be alternately engaged near its ends by teeth on said escapement wheel, and a crank arm on the other end of the rock shaft, substantially as described.

2. The combination with an upright frame, a rotatable transverse shaft thereon near its base, a winch drum on said shaft, a rope extended upwardly from the drum and engaging a loose pulley on the head of the frame and pendent therefrom, a weight thereon, and means to rotate the drum and elevate said weight, of a spur wheel on the drum shaft, a counter-shaft, a pinion thereon, an escapement wheel having staggered teeth in two series, a rock shaft rotatable on the frame at right angles to the counter-shaft, a dual rock arm near the face of the escapement wheel, pallet toes on the ends of the rock arm adapted to be alternately impinged by the teeth of the escapement wheel, and a crank arm on the other end of the rock shaft, substantially as described.

3. In a mechanism supported on an upright frame, and having a rotatable transverse shaft thereon near its base, a winch drum of two diameters, on said shaft, a rope extended upwardly from the smaller drum, and engaging a loose pulley on the head of the frame and pendent therefrom, a weight thereon, a second rope engaging the larger winch drum and a windlass shaft below the drum, and a snatch block between the drum and windlass, the following co-acting parts, viz: a spur wheel on the drum shaft, a counter-shaft, a pinion thereon, an escapement wheel having two series of staggered cam teeth, a rock shaft rotatable on the frame at right angles to the counter-shaft, a dual rock arm thereon near the face of the escapement wheel, pallet toes on the ends of the rock arm, adapted for an alternate engagement with the cam teeth, and a crank arm on the other end of the rock shaft, in the same plane with the dual rock arm, substantially as described.

4. A mechanical movement, comprising a supported rotatable escapement wheel, two series of spaced cam teeth thereon, one series alternating with the other series and each tooth incurved on the lower side at its inner end, a rock shaft rotatable in a plane below and at right angles to the axis of the escapement wheel, a transverse dual rock arm centrally on the rock shaft end near the cam teeth, pallet toes thereon near its ends, each having a rotatable thimble thereon and adapted to be alternately engaged by the duplicate series of cam teeth, a crank arm on the other end of the rock shaft, in the same plane with the dual rock arm, and mechanism adapted to transmit the motion of a descending weight to the escapement wheel, substantially as described.

5. In a mechanism supported on a derrick frame, and having a rotatable transverse shaft thereon near its base, a winch drum of two diameters, on said shaft, a rope extending upwardly from the smaller drum and engaging a loose pulley on the top of the frame and pendent therefrom, a weight thereon, a second rope engaging the larger drum and a windlass shaft below the drum, and a snatch block between the drum and windlass, the following co-acting parts, viz: a spur wheel on the drum shaft, a counter-shaft, a pinion thereon, an escapement wheel having two series of staggered cam teeth incurved on their lower sides at their inner ends, a rock shaft rotatable on the frame at right angles to the axis of the counter-shaft and below said shaft, a balance wheel thereon, a plate spring engaging the balance wheel, a dual rock arm on the end of the rock shaft near the cam teeth, two thimble-covered pallet toes on the ends of the rock arm, adapted to alternately engage the cam teeth, a crank arm on the other end of the rock shaft, and an upright pump connected by its rod with said arm, substantially as described.

JOHN E. WEST.

Witnesses:
W. O. BENNETT,
JOHN A. FIELD.