

(No Model.)

3 Sheets—Sheet 1.

J. E. CARVER.
GRAVITY MOTOR.

No. 487,715.

Patented Dec. 13, 1892.

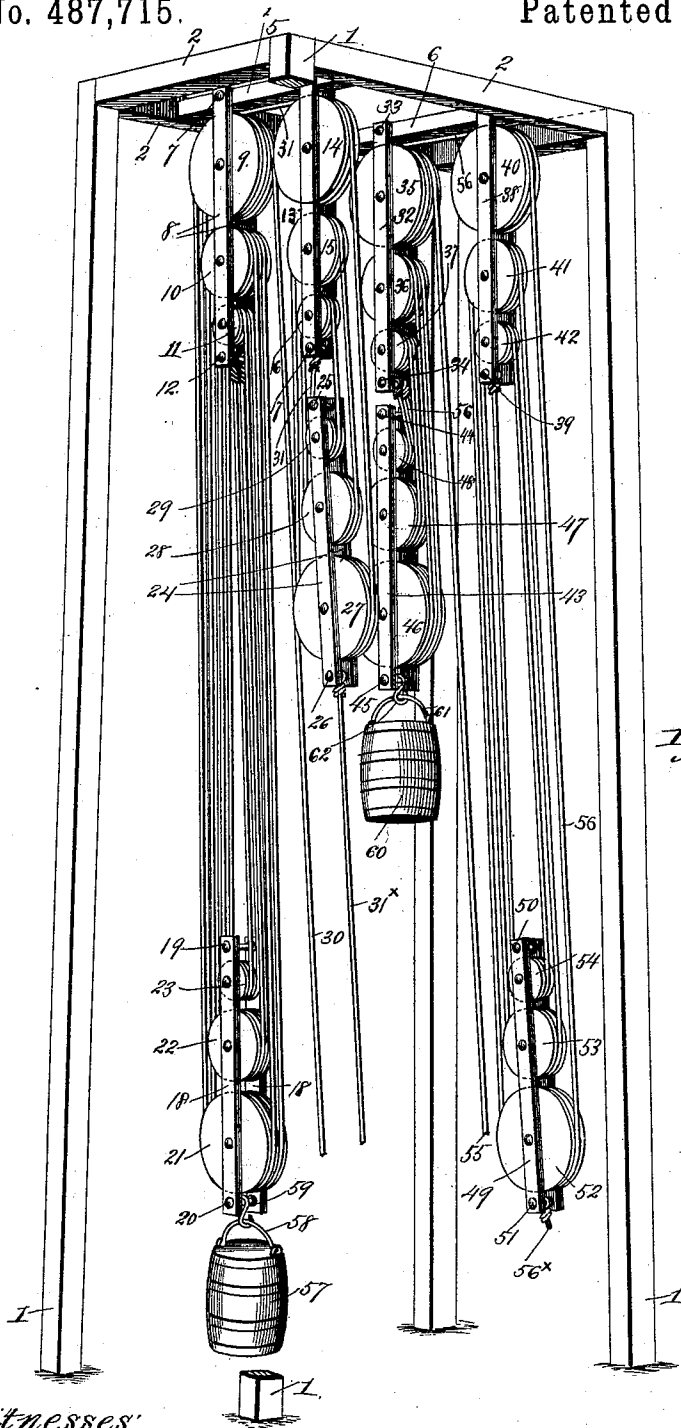


Fig. 1.

Witnesses:

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Geo. L. Cordron

Inventor:

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By Higdon & Higdon,
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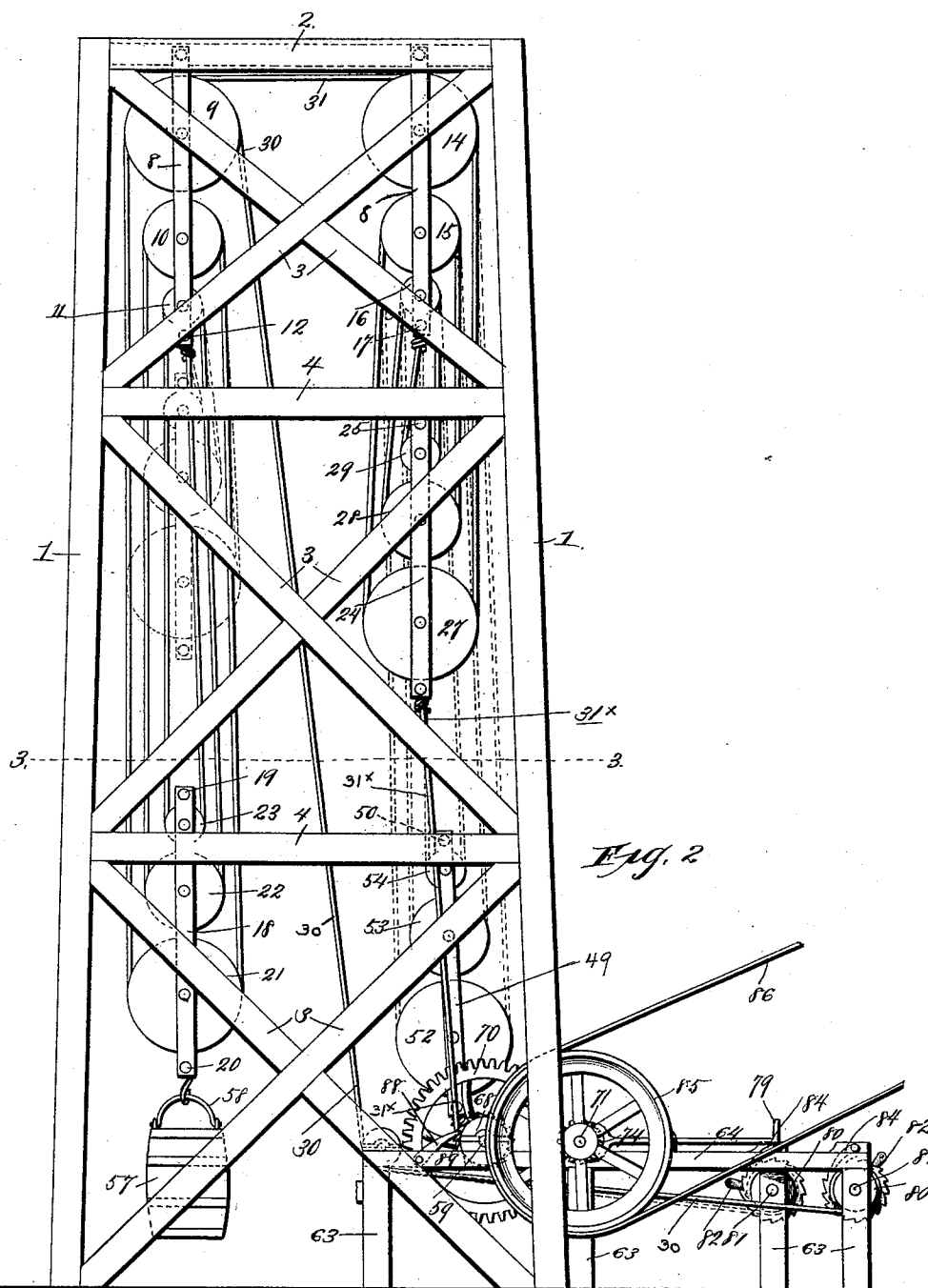


Fig. 2

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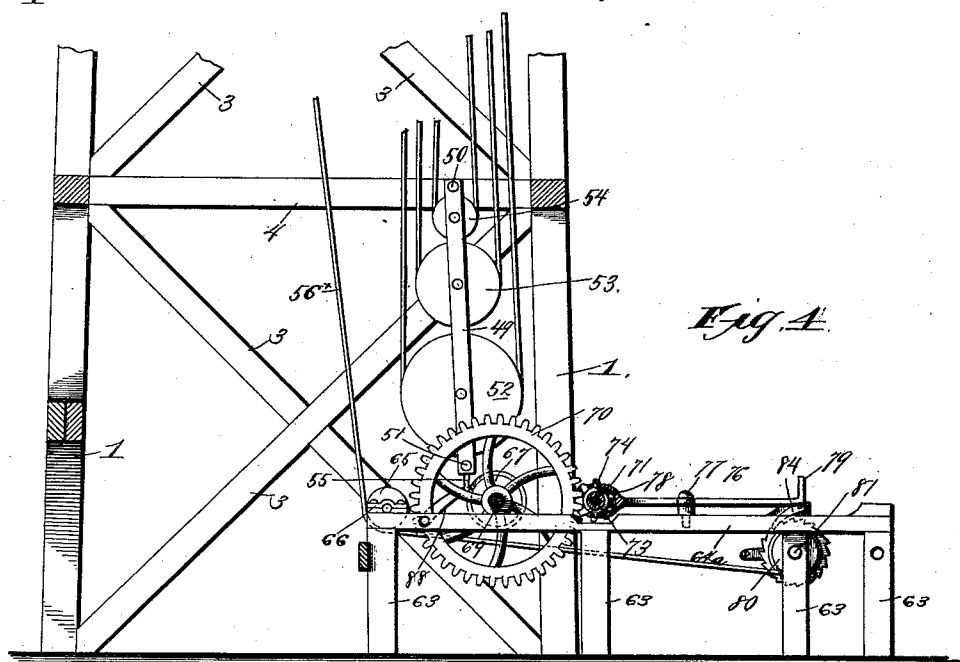
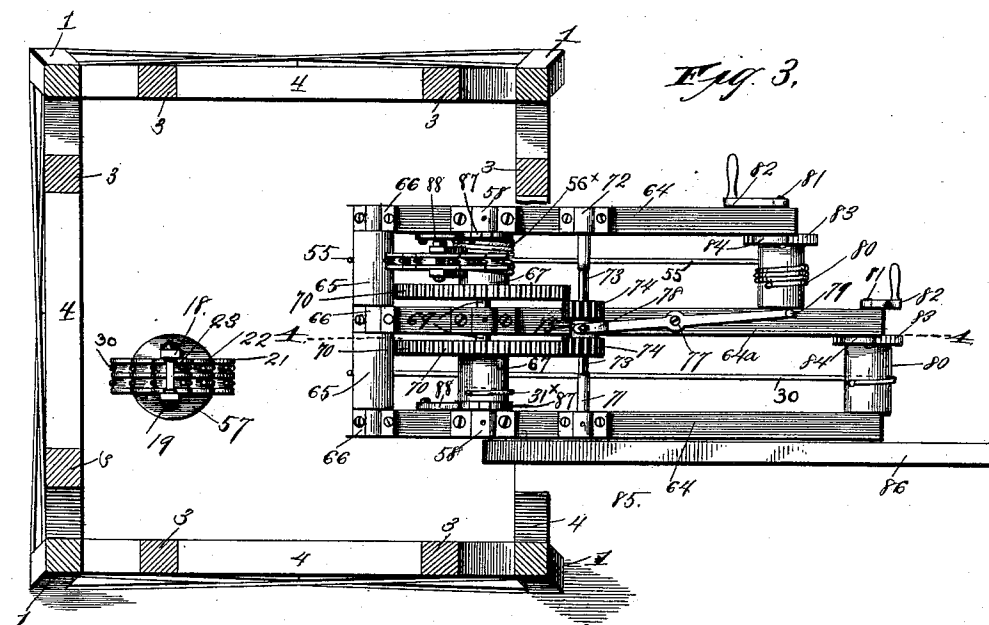
(No Model.)

3 Sheets—Sheet 3.

J. E. CARVER.
GRAVITY MOTOR.

No. 487,715.

Patented Dec. 13, 1892.



Witnesses:

Wm. H. Thorne,
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UNITED STATES PATENT OFFICE.

JAMES E. CARVER, OF GARA, MISSOURI.

GRAVITY-MOTOR.

SPECIFICATION forming part of Letters Patent No. 487,715, dated December 13, 1892.

Application filed August 1, 1892. Serial No. 441,776. (No model.)

To all whom it may concern:

Be it known that I, JAMES E. CARVER, of Gara, Gentry county, Missouri, have invented certain new and useful Improvements in Gravity-Motors, of which the following is a full, clear, and exact description, reference being had to the accompanying drawings, forming a part hereof.

My invention relates to that class of motors for driving machinery of all kinds in which the power developed by the gravity of a descending weight is multiplied and directed through suitable gearing to the point where it is to be applied.

The objects of my invention are to produce a motor which shall be simple, strong, and durable in construction and direct and positive in its operation and the mechanism of which shall be so arranged that the motor shall be uniform and continuous in its action, one of the actuating-weights being raised while another is descending and operating the motor.

A further object of my invention is to produce a motor which, in addition to the advantages above enumerated, shall be at all times under complete control and which shall be capable of applying its power to all kinds of machinery and to all classes of work.

To the above purposes my invention consists in certain peculiar and novel features of construction and arrangement, as hereinafter described and claimed.

In order that my invention may be fully understood, I will proceed to describe it with reference to the accompanying drawings, in which—

Figure 1 is a perspective view of the main frame and pulleys of the motor, the frame being partly broken away and the transmitting-gearing being removed. Fig. 2 is a side elevation of the entire mechanism, the set of pulleys and ropes at the farther side of the machine being shown in dotted lines to avoid confusion. Fig. 3 is a horizontal section of the motor on the line 3 3 of Fig. 2. Fig. 4 is a vertical sectional view on the line 4 4 of Fig. 3, the lower part of the main frame being shown in inner side elevation.

In the said drawings, 1 designates the standards or uprights of the main frame, these

standards or uprights being shown as inserted at their lower ends into the ground and converging upward toward each other. These uprights or standards are of suitable height and are connected together at their upper ends by four cross-bars 2, which constitute a horizontal rectangular frame. Between their upper and lower ends these standards or uprights 1 are shown as connected together by a number of horizontal braces 4, between which are interposed oblique cross-braces 3, which are arranged in pairs in the form each of a cross. The main frame is thus securely braced together, and it is to be understood that the supporting-frame may, if desired, be braced externally by suitable braces which extend obliquely upward from outside of the frame toward the top of said frame. In the top of the supporting-frame are secured two horizontal parallel cross-bars 5 and 6, the ends of which are bolted or otherwise suitably secured to the two opposite cross-pieces 2 of the top frame. To the rear portion of the cross-piece 5 are bolted, as at 7, or otherwise suitably secured the upper ends of two pendent bars 8, the lower ends of which are connected together by a cross bolt or pin 12 for a purpose to be hereinafter explained, between the upper portions of which is journaled a pulley wheel or sheave 9, the periphery of which is formed with two circumferential grooves. Between the two bars 8, at a point just below the pulley 9, is journaled a second pulley wheel or sheave 10, which is of less diameter than the wheel or sheave 9 and the periphery of which is also formed with two circumferential grooves. Between the two bars 8, at a point just below the wheel or sheave 10, is journaled a third pulley wheel or sheave 11, which is of less diameter than the wheel or sheave 10 and the periphery of which is formed, also, with two circumferential grooves. To the front portion of the cross-bar 5 are bolted or otherwise secured the upper ends of two pendent bars 13, the lower ends of which are connected together by a cross bolt or pin 17 for a purpose to be hereinafter described. Between the upper portions of these two bars 13 is journaled a pulley wheel or sheave 14, the periphery of which is formed with a single circumferential groove. Between the two

arms 13, at a point just below the pulley or sheave wheel 14, is journaled a second pulley or sheave wheel 15, which is of less diameter than the wheel or sheave 14 and the periphery of which is also formed with a single circumferential groove. Between the two arms 13, at a point just below the pulley or sheave 15, is journaled a third pulley or sheave 16, which is of less diameter than the pulley or sheave 15 and the periphery of which is formed with a single circumferential groove.

18 designates two elongated bars the upper ends of which are connected together by a cross bolt or pin 19 and the lower ends of which are likewise connected together by a similar cross bolt or pin 20, the purpose of the cross pin or bolt 20 being hereinafter explained and the two bars extending parallel with each other. Between the lower portion of these two bars 18 is journaled a pulley wheel or sheave 21, the periphery of which is formed with two circumferential grooves. Between the said arms 18, at a point just above the pulley wheel or sheave 21, is journaled a second pulley wheel or sheave 22, which is of less diameter than the pulley wheel or sheave 21 and the periphery of which is formed with two circumferential grooves. Between the two bars 18, at a point between the upper connecting pin or bolt 19 and the upper pulley wheel or sheave 22, is journaled a third pulley wheel or sheave 23, which is of less diameter than the pulley wheel or sheave 22 and the periphery of which is formed with two circumferential grooves.

24 designates a second pair of parallel side bars, the upper and lower ends of which are connected together, respectively, by two cross bolts or pins 25 and 26, the purpose of the lower cross bolt or pin being hereinafter explained. Between the lower portion of these two bars, at a point just above the lower cross bolt or pin 26, is journaled a pulley wheel or sheave 27, the periphery of which is formed with a single circumferential groove, while between said side bars, at a point just above the wheel 27, is journaled a second wheel or sheave 28, which is of less diameter than the wheel 27 and the periphery of which is also formed with a single circumferential groove. Between the side bars 24, at a point just above the pulley 28, is journaled a third pulley wheel or sheave 29, which is of less diameter than the second wheel 28 and the periphery of which is also formed with a single circumferential groove.

30 designates a rope, which is either of hemp, manila, wire, or any other suitable flexible material and leads from a windlass, to be hereinafter described. The rope or flexible connection leads first upward and over the pulley 9 in one of its grooves, thence downward beneath the pulley 21 in one groove of the same, thence upward and over the pulley 10 in one of its grooves, thence downward and beneath the pulley 22 in one of its grooves, thence upward and over the pulley 11 in one of its grooves,

thence downward and beneath the pulley 23 in one of its grooves, and finally upward and is secured to the lower cross bolt or pin 12.

31 designates a second rope, which, like the rope 30, is either of hemp, manila, wire, or any other suitable flexible material, and one end of this rope is secured, also, to the lower cross bolt or pin 12. From the cross bolt or pin 12 this rope extends downward and beneath the pulley 23 in its other groove, thence upward and over the pulley 11 in its other groove, thence downward and beneath the pulley 22 in its other groove, thence upward and over the pulley 10 in its other groove, thence downward and beneath the pulley 21 in its groove, and then upward and over the pulley 9 in the other groove. From the pulley 9 this rope 31 passes to and over the pulley 14 and in its groove, and thence downward and beneath the pulley 27 and in its groove, thence upward and over the pulley 15 and in its groove, thence downward and beneath the pulley 28 and in its groove, thence upward and over the pulley 16 and in its groove, thence downward and beneath the pulley 29 and in its groove, and finally upward and to the cross bolt or pin 17, to which this end of the rope is attached. A third rope 31* is connected at one end to the cross bolt or pin 26 and leads to a windlass, which is to be hereinafter described.

To the rear end portion of the cross-bar 6 are bolted, as at 33, or otherwise suitably secured two parallel pendent and elongated side bars 32, the lower ends of which are connected together by a cross pin or bolt 34, the purpose of which will be hereinafter explained. Between the upper ends of these two side bars, at a point just below the upper end of the same, is journaled a pulley wheel or sheave 35, the periphery of which is formed with two circumferential grooves, while between the side bars and at a point just below the wheel 35 is journaled a second pulley wheel or sheave 36, which is of less diameter than the wheel 35 and the periphery of which is also formed with two circumferential grooves. Between the side bars 32 and at a point just below the wheel 36 is journaled a third pulley wheel or sheave 37, which is of less diameter than the second pulley-wheel 36 and the periphery of which is also formed with two grooves.

38 designates two enlarged parallel side bars, the upper ends of which are bolted or otherwise suitably secured to the front-end portion of the cross-bar 6 and which are pendent therefrom, the lower ends of these side bars being connected together by a cross pin or bolt 39, the purpose of which will be hereinafter explained. Between the upper end portions of the side bars 38 and at a point just below the upper ends of the same is journaled a pulley wheel or sheave 40, the periphery of which is formed with a single circumferential groove, and between said side bars, at a point just below this wheel 40, is journaled a second pulley wheel or sheave 41,

which is of less diameter than the wheel 40 and the periphery of which is also formed with a single circumferential groove. Between the side bars 38 and at a point just below the second pulley 41 is journaled a third pulley wheel or sheave 42, which is of less diameter than the second wheel and the periphery of which is also formed with a single circumferential groove.

43 designates a pair of elongated parallel side bars, which are connected together at their upper and lower ends, respectively, by cross bolts or pins 44 and 45, the purpose of the cross bolt or pin 45 being hereinafter explained. Between the lower end portions of the side bars 43 and just above the lower cross bolt or pin 45 is journaled a pulley wheel or sheave 46, the periphery of which is formed with two circumferential grooves, while between said side bars and at a point just above the pulley 46 is journaled a second pulley wheel or sheave 47, which is of less diameter than the wheel 46 and the periphery of which is also formed with two circumferential grooves. Between the side bars 43 and at a point just above the second wheel 47 is journaled a pulley wheel or sheave 48, which is of less diameter than the wheel 47 and the periphery of which is also formed with two circumferential grooves.

49 designates another pair of elongated parallel side bars, the upper and lower ends of which are connected together, respectively, by cross bolts or pins 50 and 51, the purpose of the cross bolt or pin 51 being hereinafter explained. Between the lower end portions of these side bars is journaled a pulley wheel or sheave 52, the periphery of which is formed with a single circumferential groove, while between the side bars and at a point just above the wheel 52 is journaled a second pulley wheel or sheave 53, which is of less diameter than the wheel 52 and the periphery of which is also formed with a single circumferential groove. Between the upper end portions of the side bars is journaled a third pulley wheel or sheave 54, which is of less diameter than the second wheel 53 and the periphery of which is formed, also, with a single circumferential groove.

55 designates a rope, which is of hemp, manila, wire, or other flexible material and which leads from a second drum, to be hereinafter described. This rope or flexible connection leads upward and over the pulley 35 in one of its grooves, thence downward and beneath the pulley 46 in one of its grooves, thence upward and over the pulley 36 in one of its grooves, thence downward and beneath the pulley 47 in one of its grooves, thence upward and over the pulley 37 in one of its grooves, thence downward and beneath the pulley 48 in one of its grooves, and finally upward to the cross bolt or pin 34, to which this end of the rope is connected.

56 designates a second rope or flexible connection, which is also of hemp, manila, wire,

and one end of this rope is also connected to the cross bolt or pin 34. From the cross bolt or pin 34 this rope leads downward and beneath the pulley 48 in its other groove, thence upward and over the pulley 37 in its other groove, thence downward and beneath the pulley 47 in its other groove, thence upward and over the pulley 36 in its other groove, thence downward and beneath the pulley 46 in its other groove, and thence upward and over the pulley 35 in its other groove. From the pulley 35 the rope 56 leads to and over the pulley 40 in its groove, thence downward and beneath the pulley 52 in its groove, thence upward and over the pulley 41 in its groove, thence downward and beneath the pulley 53 in its groove, thence upward and over the pulley 42 in its groove, thence downward and beneath the pulley 54 in its groove, and finally upward to the cross bolt or pin 39, to which this end of the rope is attached. A third rope 56^x is connected at one end to the cross bolt or pin 51 and leads to and around a second windlass, to be hereinafter described.

To the cross bolt or pin 20 above described is shown as connected a keg or barrel 57, which is also shown as provided with a bail 58, an S-hook 59 serving as the means for connecting the bail to the cross pin or bolt. A second keg or barrel 60, which is shown as provided with a bail 61, is also shown as connected by an S-hook 62 to the cross bolt or pin 45, above referred to. These barrels are designed to be filled with scrap-iron, sand, or any other weighty substance, and it is to be understood that, if preferred, heavy castings may be substituted for the kegs or barrels, such parts serving in any event as the gravity-weights of the motor. It will be seen that there are two series of connected compound pulleys, each series consisting of four sets of connected compound pulleys, and the arrangement being such that when that set of movable pulleys which immediately carries the weight is depressed the companion set of movable pulleys of this series is elevated, and vice versa. It will also be seen that the two series of compound pulleys are entirely independent of each other; but it is to be understood that the preferred arrangement is such that when one series is in action, with its weight descending, the other series shall be operated upon to raise and wind its weight, as hereinafter described.

I will now proceed to describe the two sets of windlasses and drums to which the two sets of ropes are attached, as above mentioned, and also the shafting-gearing for said windlasses.

63 designates four short posts or standards, which are shown as driven into the ground, so as to extend vertically upward therefrom, the said posts or standards being located at opposite sides of the mechanism now to be described. Upon the upper ends of each pair of these posts or standards 63, at opposite sides of the mechanism, are bolted or other-

wise secured two horizontal longitudinal side bars 64, as shown, between which is placed a third longitudinal and horizontal bar 64^a.

65 designates two horizontal rollers, which are journaled at their ends in bearings 66, said bearings being bolted or otherwise secured upon the front ends of the side and intermediate bars just referred to.

67 designates two horizontal windlasses, which are placed end to end and which extend transversely of the frame near the front end thereof. The shafts 69 of these windlasses are journaled in bearings 68, which are bolted or otherwise secured to the side and middle bars 64 and 64^a, and at its inner end each windlass carries a larger gear-wheel 70.

71 designates a horizontal shaft, which is mounted behind the windlasses 67 and parallel therewith and the ends of which are journaled in bearings 72, said bearings being bolted or otherwise secured to the side bars 64 of the frame. The middle portion 73 of this shaft is formed square or angular and extends across the upper side of the intermediate bar 64^a, as shown. Upon this square or angular portion 73 are mounted two gear-pinions 74, which are carried at opposite ends of a common hub 75, the arrangement being such that the hub and pinions shall revolve with the shaft 71 and at the same time be capable of movement longitudinally of said shaft for a purpose to be hereinafter explained.

76 designates a horizontal shifting-lever, which is pivoted, as at 77, about midway of its length upon the intermediate bar 64^a and the front end of which is forked or bifurcated, as at 78, to embrace the hub 75 of the gear-pinions 74. The rear end of this lever is shown as formed with an upwardly-extending handle 79, and the arrangement is such that by moving the lever 76 in one or the opposite direction one or the other of the gear-pinions shall be engaged with its corresponding gear-wheel 70, the opposite gear-pinion being disengaged from its corresponding gear-wheel 70.

Each windlass 67 is shown as provided at that end which is opposite from the gear-wheel 70 with a ratchet ring or disk 87, the teeth of which are engaged by a pawl 88, which is pivoted upon an adjacent portion of the framework of the mechanism and which serves to prevent retrograde movement of the wheel and windlass.

It is to be understood that while I have shown the ratchet rings or disks 87 as mounted upon the outer ends of the windlasses 67 they may be mounted upon the opposite or inner ends of said windlasses, the pawls 88 being pivoted adjacent to the ratchet wheels or disks.

80 designates two horizontal drums the shafts 81 of which are journaled in the upper parts of the rear standards 63 and which are located at opposite sides of the intermediate bar 64^a. At one end the shaft of each drum 80 carries a crank-arm and crank-handle 82,

and each drum carries at one end a ratchet-wheel, the teeth of which are engaged by a pawl 84, which prevents retrograde movement of the wheel and drum. A belt-wheel 85 is mounted upon one end of the shaft 71, and over this belt-wheel runs a suitable belt 86, which runs to a belt-wheel upon a machine to be driven by the motor or upon a line-shafting or in any other required situation. It will be seen by reference to Fig. 3 that the ropes 31^x and 56^x are wound around the windlasses 67, while the ropes 30 and 55 are wound around the drums 80.

The operation of the device is as follows: The barrel or weight 57 being in the position shown in Fig. 1, the cords or ropes for raising said weight are unwound from around the drum 80 and also from around the windlass or drum 67, while the weight 60 is being elevated. The operating cords or ropes therefor are wound upon their respective drums 67 and 80. To raise the weight 57, it is necessary, therefore, to operate the crank-handle 82 of its respective windlass 80 with one hand and to turn the large gear-wheel with the other, causing the ropes or cords to wind upon the windlass 80 and its corresponding drum 67 of gear-wheel, and thus elevate the weight 57. When about to operate the handle 82 the lever 76 is operated to throw in gear the pinion 74 and the large gear-wheel 70 of the drum 67, upon which is wound the rope of the elevated weight 60. At the same instant the pawl 88 of said drum is thrown back, allowing the weight to descend and revolve the drum, and through the medium of the large gear thereof and the pinion 74 the belt-wheel is revolved to actuate the machinery desired. When the weight 60 has descended to its limit, the pinion 74 is thrown in gear with the other large gear-wheel and its pawl is thrown back and the elevated weight 57 thereof is allowed to descend and actuate the machinery in the manner described, thus affording a constant propelling power to the machinery, as will be understood.

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

1. A gravity-motor comprising a suitable supporting-framework, a set of compound pulleys composed of four series of pulley wheels or sheaves, each journaled in supports, and two of said series of pulleys being secured to the framework, while the other two series are movable, two flexible connections running over the pulley wheels or sheaves and connected at their ends to the supports of one movable series of pulleys, and a weight carried by one series of movable pulleys, substantially as set forth.

2. A gravity-motor comprising a suitable supporting-framework, two sets of compound pulleys, each composed of four series of pulley wheels or sheaves, and each series being journaled in suitable supports, and two series of pulleys of each set being secured to the

framework, while the other two series of the set are movable, two sets of flexible connections, each composed of two flexible connections running over the pulleys of one set and being attached at their ends to the fixed-pulley supports and also to one of the movable-pulley supports, and a pair of weights, each of which is connected to one of the movable-pulley supports, substantially as set forth.

3. A gravity-motor comprising a suitable supporting - framework, a number of compound pulleys mounted in said framework, and auxiliary supporting-framework and a pair of windlasses mounted thereon, a pair of drums also mounted on said auxiliary frame-

work, a shaft also mounted upon said framework and carrying a longitudinally-movable hub provided with two gear-pinions, a pair of gear-wheels carried by the windlasses and meshing with the gear-pinions, pawl-and-ratchet connections for the drums and windlasses, and a pivoted lever engaging the pinion-carrying hub for shifting the same, substantially as set forth.

In testimony whereof I affix my signature in the presence of two witnesses.

JAMES E. CARVER.

Witnesses:

J. W. PERRY,
C. E. REID.