2 Sheets--Sheet 1.

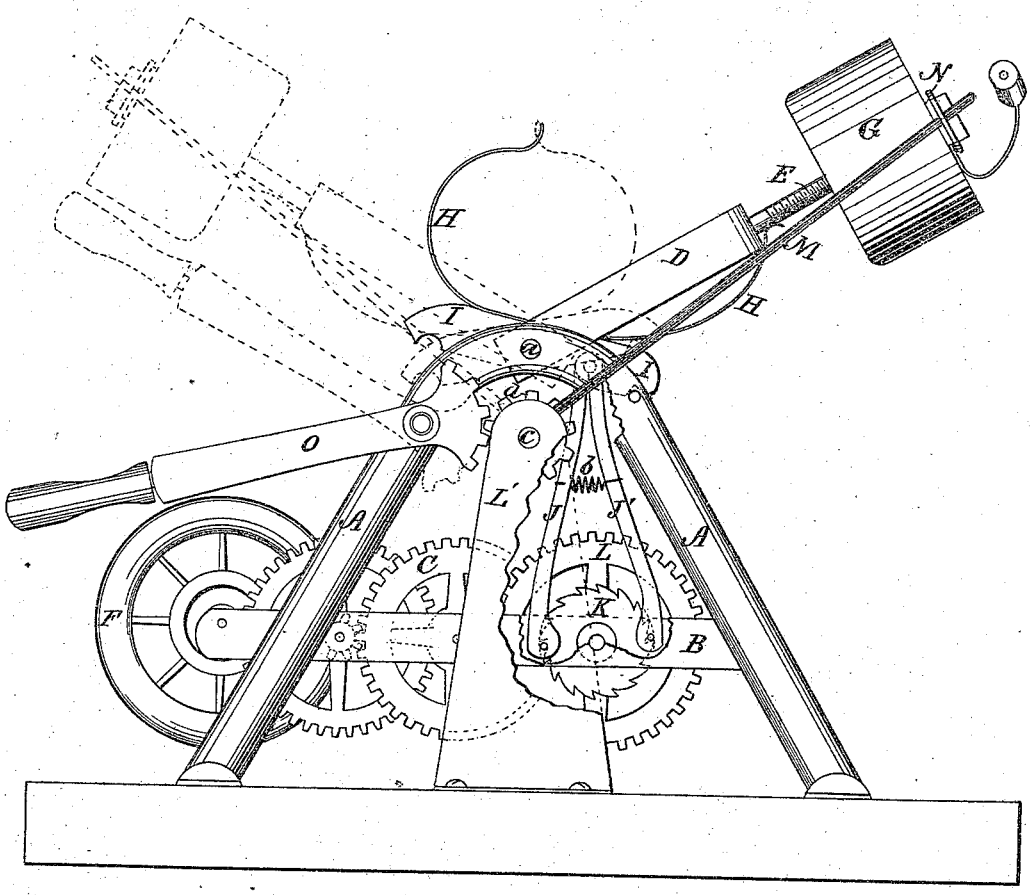
J. M. CAYCE.

Motor.

No. 160,646.

Patented March 9, 1875.

Fig. 1.



WITNESSES:

W. W. Hollingsworth

L. A. Pettit

INVENTOR:

John M. Cayce

BY

ATTORNEYS.

THE GRAPHIC CO. PHOTO-LITH. 39 & 41 PARK PLACE, N.Y.

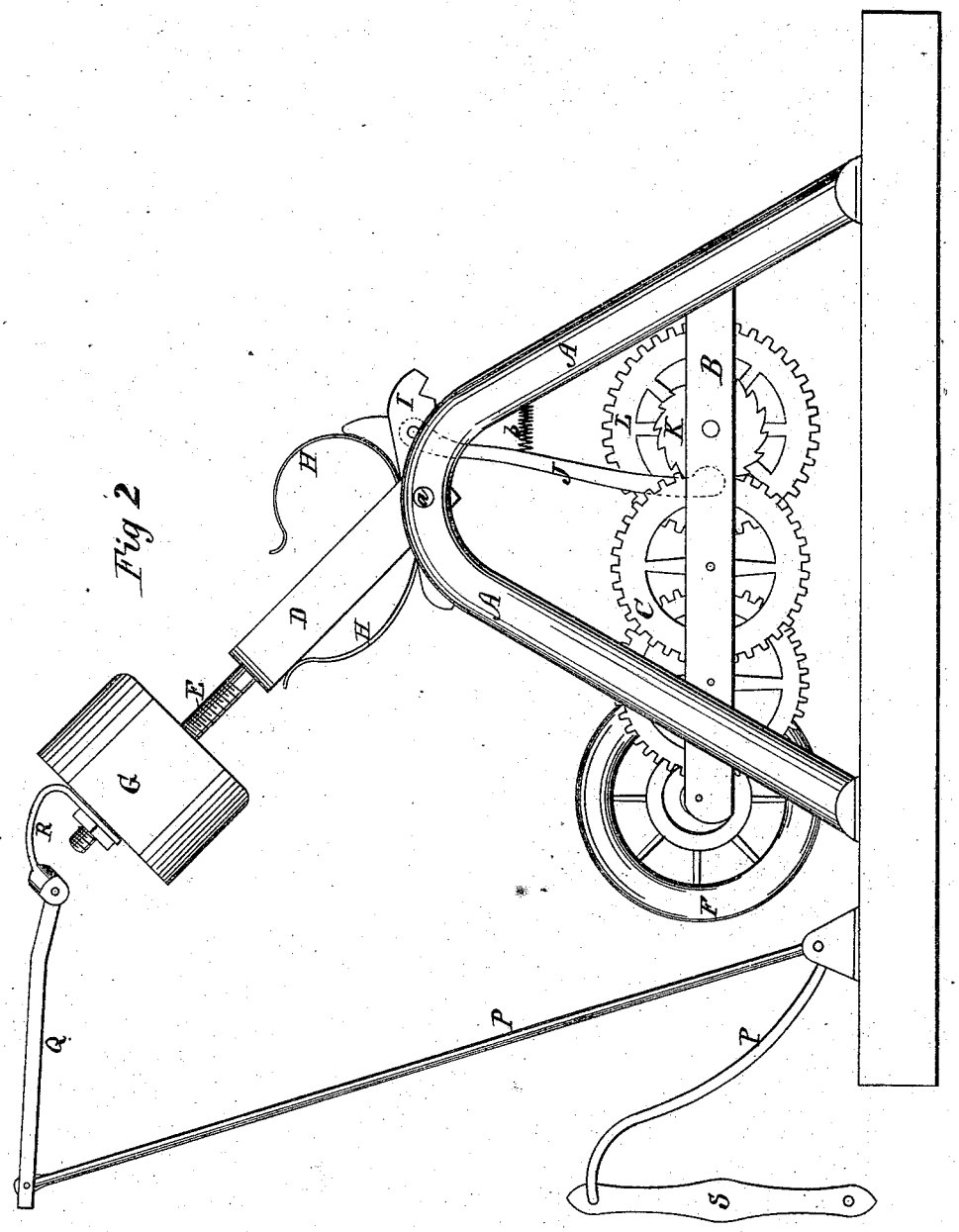
2 Sheets--Sheet 2.

J. M. CAYCE.

Motor.

No. 160,646. Patented March 9, 1875.

Fig 2



WITNESSES:

W. W. Hollingsworth

L. A. Pettit

INVENTOR:

John M. Cayce

BY Munn & Co

ATTORNEYS.

THE GRAPHIC CO. PHOTO-LITH. 39 & 41 PARK PLACE, N.Y.

UNITED STATES PATENT OFFICE.

JOHN M. CAYCE, OF FRANKLIN, TENNESSEE.

IMPROVEMENT IN MOTORS.

Specification forming part of Letters Patent No. **160,646**, dated March 9, 1875; application filed February 23, 1875.

To all whom it may concern:

Be it known that I, JOHN M. CAYCE, of Franklin, in the county of Williamson and State of Tennessee, have invented a new and Improved Motor; and I do hereby declare that the following is a full, clear, and exact description of the same, reference being had to the accompanying drawing, forming a part of this specification, in which—

Figure 1 is a side elevation; Fig. 2, a side elevation, showing modification of the device.

The object of my invention is to enhance the practical value of a gravity motor by securing the best effects of the attraction of gravitation with a comparatively small expenditure of force for restoring the actuating-weight to its original position for a continuation of the motion. It consists in a weight attached to or near the end of a pivoted support, which is intermittently shifted from one side to the other of C-shaped springs attached to a rock-seat, the said rock-seat being connected by means of a pivoted pawl with a ratchet-wheel mechanism and lever, which actuates the running-gear.

The principal of the operation is, that when the weight or support is out of perpendicular and resting upon one of the limbs of the C-shaped springs, its full weight is imparted through the rock-seat, which acts as a lever to the pawl upon the ratchet-wheel, and the running-gear is operated thereby until the rock-seat reaches its limit of motion. When this takes place the weight is, if two pawls are used, shifted to the other limb of the C-shaped spring; or, if but one pawl is used, is raised and allowed to come back upon the same side of the spring, but with the pawl in a position for a new purchase upon the ratchet. The vital point of the invention rests in the function of the C-shaped springs.

It is obvious that if the weight is to be lifted by any of the ordinary devices there is no gain in power, for the same amount of force is used in winding up or restoring the weight to its former position as it utilizes in gravitating. When my rock-seat, however, has reached its limit of motion, and the support and weight are to be shifted, it is only necessary to apply to the same, to accomplish this object, a force which is equal to the difference between the gravity of the weight and the pressure of the spring upon the same, which will be but a small fraction of its full effective power, the gravity of the weight, and the strength and elasticity of the spring, being so relatively proportioned as to make the weight almost in a state of equilibrium to any external force.

In the drawing, A represents a frame-work, having cross-pieces B, which contain a spur-gear, C, and fly-wheel F, which may represent the running-gear of any kind of a machine. D is a support, which is made of strong and heavy material, and is pivoted upon a rod or bolt, *a*, passing through the frame-work. Said support is extended in the form of a screw-rod, E, upon which is placed the weight G, the object of the screw-rod being to admit of the adjustment of the weight farther from or closer to the pivot, to increase or diminish the effective power of the same. The said weight may also be made in sections for the same purpose, and the sections taken off or put on, according to circumstances. H is a C-shaped spring, rigidly and securely attached to a rock-seat, I, which is pivoted upon the same bolt *a* with the support D, but is separate and independent from the same. Said springs are made with leaves, after the manner of carriage-springs, which said leaves may be made easily detachable, and additional ones put in to strengthen the spring when the weights are made larger for increased power. J J′ are two pawls, pivoted to the same side of the rock-seat, and engaging at their lower extremities with opposite sides of a ratchet-wheel, K, rigidly attached to a gear-wheel L. Said pawls have bifurcated ends connected by a pin, which engages with the ratchets, and the two are held tightly together upon the wheel by a spring, *b*, one pawl operating with a traction and the other with a pushing motion. In the application of my invention I may dispense with the use of one of these pawls, as shown in Fig. 2, in which event the weight will operate on one side of the spring only. L′ are standards, attached to the frame, in which is journaled a shaft, *c*, bearing a cog-wheel, *d*. To said shaft *c* are attached the arms M, which pass through holes in a cross-plate, N, which latter is attached to the screw-

rod to hold on the weights. Said arms M are operated by a segment-headed lever, O, and constitute, with the latter, one of the means for shifting the position of the weight to the other side of the C-shaped springs.

In Fig. 2 another means is shown for operating the said weight, which is intended to be applicable to sewing-machines and all other varieties of treadle motion. It consists of an elbow-lever, P, attached, by means of a connecting-rod, Q, and a piece, R, to the top of the weight, the arm of the elbow-lever being connected by a pitman, S, to the treadle.

I do not limit myself to any particular device for operating said weight, for it is obvious that for different machines different devices will be necessary.

It will be observed that in Fig. 2 but one pawl is used. This only utilizes every other stroke of the treadle, and brings the weight always back upon the same side of the spring, which motion may be desirable under some circumstances.

The operation of the device is as follows: The weight G imparts the force of gravity, multiplied according to the character of the leverage, through the spring H to the rock-seat, and from thence through the pawls to the running-gear, the motion of the rock-seat being limited by stop projections in the frame-work. Now, when it is desired to shift the weight to the other side of the C-shaped spring, the gravity of the weight being nearly balanced by the pressure of the spring, it requires but a small application of new power to change its position to the other side. The tension of the spring being greatest when the weight is nearest the horizontal position, and the leverage of the weight being less when it is near the perpendicular position, or after the spring ceases to be auxiliary to the shifting of the same, it can be readily seen wherein the advantage lies.

I propose to use these machines either singly or have a number of them set up in alignment in the same frame-work and operating together.

By means of my improved motor I am enabled to accomplish all of the conditions set forth in the premises, and secure a practically useful power which is uniform, constant, with but little jar, and thoroughly effective.

Having thus described my invention, what I claim as new is—

1. The combination, with a pivoted support bearing a weight, of a spring that opposes the fall of the weight, and a rock-seat rigidly attached to the said spring, for the purpose of utilizing the full power of the weight through the rock-seat as a lever, and yet admit, through the auxiliary agency of the spring, of the shifting of the weight by a smaller application of power than the gravity of the said weight, substantially as and for the purpose described.

2. The combination of the weight G, the support D, the C-shaped springs H, the rock-seat I, the pawls J J′, and the ratchet-wheel K, substantially as and for the purpose described.

3. The combination, with the pivoted support and the weight, of the shifting device, consisting of the shaft *c*, cog-wheel *d*, arms M, and segment-headed lever O, or its equivalent, substantially as and for the purpose described.

JOHN M. CAYCE.

Witnesses:
CHAS. A. PETTIT,
EDWD. W. BYRN.