J. M. CAYCE.

WEIGHT-MOTOR.

No. 191,930. Patented June 12, 1877.

Fig. 1.

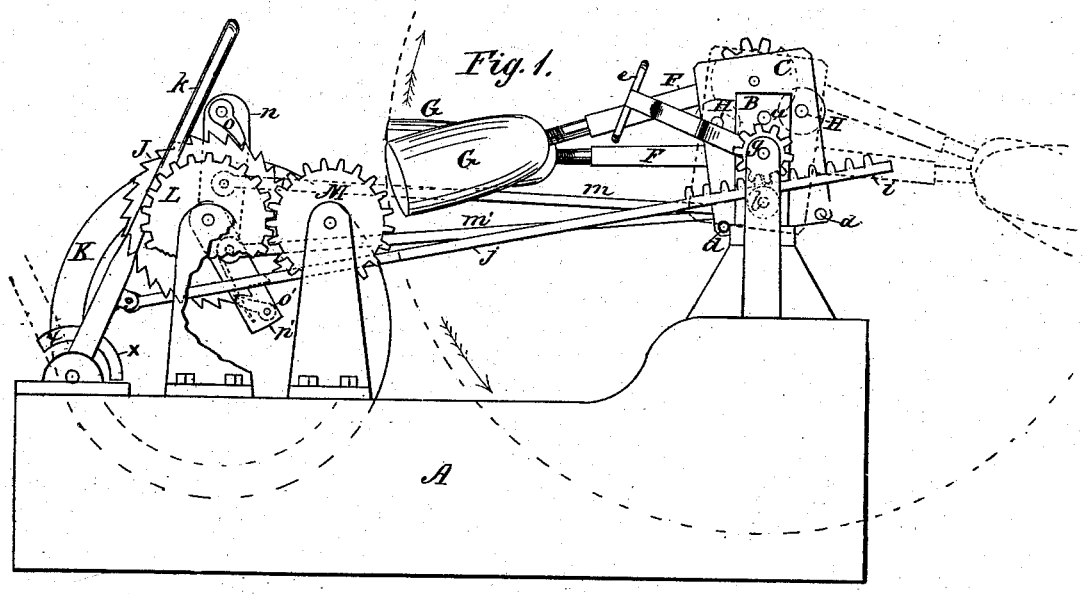


Fig. 2.

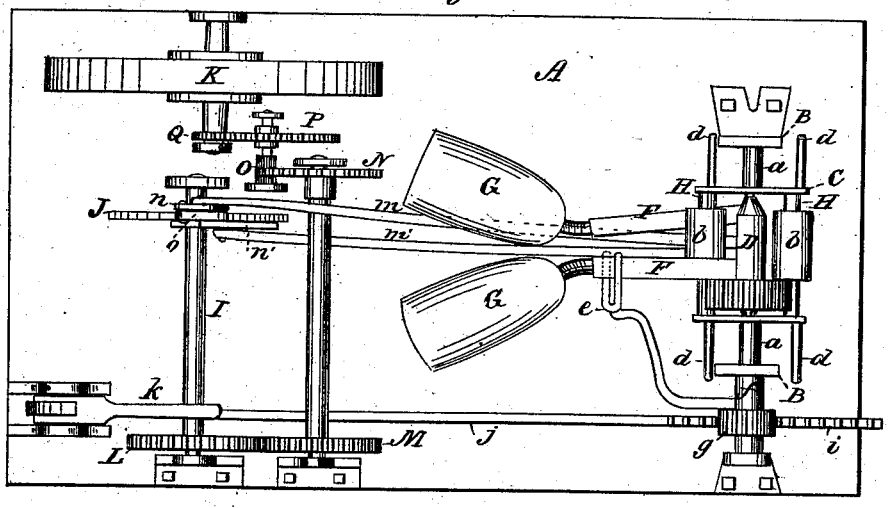
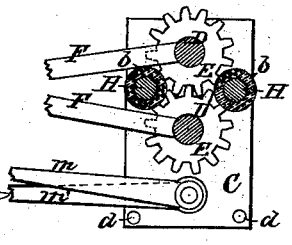


Fig. 3.



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JOHN M. CAYCE, OF FRANKLIN, TENNESSEE.

IMPROVEMENT IN WEIGHT-MOTORS.

Specification forming part of Letters Patent No. **191,930**, dated June 12, 1877; application filed May 31, 1877.

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 Weight-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 part of this specification, in which—

Figure 1 is a side elevation. Fig. 2 is a plan view; Fig. 3, a sectional detail view through the rocking frame.

My invention relates to an improved weight-motor, designed to render available, as a motive power for general purpose, the gravity of falling weights. The general principle of my invention rests in the transfer of a weight from one side of a pivoted frame to the other, and the utilization of the consequent rocking movement of the frame to communicate a rotary motion to a fly-wheel through a ratchet-and-pawl mechanism.

My present improvement consists mainly in arranging two weighted levers in a frame and gearing their inner ends together by cog-wheels, so that when the two weights are to be transferred from one side of the pivoted frame to the other they move in opposite directions, and describe upper and lower semi-circles. The merit of this arrangement is that, while the two weights co-operate with each other, and impart to the frame their aggregate motive value for the given portion of their effective stroke, they also counterbalance each other while being shifted from one side to the other of the pivoted frame, so that a much less power is required to effect said transfer than is represented by the actual weight of the levers.

In the drawing, A represents any suitable frame-work for my motor, to the uprights or standards B B of which is pivoted the rocking frame C, the frame being arranged either to rock upon the pivot-studs *a a*, attached to the uprights, or the said studs being attached to the frame, so as to move with it and turn in bearings in the uprights. Between the two sides of the frame C are journaled in bearings two shafts, D D, the one above and the other below the pivots *a* of the frame, and upon these shafts are located symmetrical cog-wheels E E, arranged to gear with each other. Projecting radially from those shafts or, if desired, from the cog-wheels themselves are the levers F F, which bear upon their outer extremities the heavy weights G G, the gravity of which constitutes the effective power of the motor. These levers, by reason of the location of their respective shafts at the top and bottom of the frame, have each a free sweep in a semicircle from one side to the other of the machine, the upper lever and its weight passing over, and the lower lever passing under, the frame. The movement of these levers in thus being transferred from one to the other side of the pivot is determined by the bars H H, arranged midway between the shafts of the levers, and provided with an elastic cushion, *b*, to receive and deaden the shock. The rocking motion of the frame C is also limited by the stop-pins *d d*, which strike alternately the opposite sides of the standards, to which the frame is pivoted.

In transferring the weighted levers from one side of the frame to the other a fork, *e*, is made to embrace one of the levers, (with sufficient play to permit the free motion of the lever during its working stroke,) and the fork is connected with a shaft, *f*, carrying a cog-wheel, *g*, arranged in suitable bearings beside the rocking frame. Just below the cog-wheel *g* is a rack-bar, *i*, formed on the end of a rod, *j*, connected to a hand-lever, *k*, which rack-bar is supported and guided upon a grooved friction-roller, *l*, and is also held up thereby to its engagement with the cog-wheel, which is rigidly connected with the fork embracing the weighted lever.

Now, in transferring the weighted levers from one side of the frame to the other, to secure the rocking of the latter, all that is necessary is to operate the hand-lever back and forth, either by hand or by any other suitable means, which movement, limited by stops *x x*, it will be seen oscillates the pinion and fork through the rack-bar, and carries with the fork the weighted lever. Now, this weighted lever being connected through its cog-gearing with the other weighted lever, as they move to the opposite side of the frame they separate, and the

weight of the one in falling tends to lift the weight of the other in rising for the first half of the movement, while, after the perpendicular is passed, the weight of the upper one in falling tends to lift the weight of the lower one, which is now rising.

By this arrangement it will be seen that in transferring the levers from side to side the weight of one counterbalances the weight of the other, so that the power required to transfer the aggregate weight of the two is but little more than that necessary to overcome the friction; but, while this is true, it will be further seen that after the transfer is made the combined gravitating effect of the two levers and their weights acts with full force upon the frame to rock it, and through the same upon the driving mechanism hereinafter described.

The degree of movement of the frame, and the time of the effective operation of the weighted levers, is regulated by the play or movement permitted by the stop-pins *d* in the frame, and this movement may be varied, as desired. It will be seen, however, that this movement of the weights of the lever takes place near the horizontal line, at which the best leverage is obtained, and that the momentum of the two levers in coming together upon opposite sides of the stop-bar H is completely neutralized, the one by the other, so that in the stoppage of the weight at the end of its transfer there is no shock, noise, or breaking strain produced upon the frame, to interfere with its uniform working.

Instead of having the bars H to effect the stoppage and neutralization of the momentum of the two levers, cushions may be placed upon the weights or levers themselves, and the weights be thus allowed to strike together, to produce the same result.

As the weights are transferred from side to side, the frame C correspondingly tilts toward the weights so long as they continue to be shifted; and in transmitting and utilizing this tilting or rocking movement of the frame two pitmen, *m m'*, are pivoted to the lower portion of the frame at one end, and at their other ends are pivoted to two arms, *n n'*. These arms are arranged loosely upon a shaft, I, and upon opposite sides of a ratchet-wheel, J, rigidly attached to said shaft. Said arms carry spring-pressed pawls *o o'* at their extremities, which, upon opposite sides of the ratchet-wheel, engage alternately with the teeth of the latter.

Now, as the tilt of the frame C causes the pitmen to move simultaneously and together toward the ratchet-wheel, the lower pawl *o'* engages with the ratchet-wheel and rotates it a given distance by a pushing movement, while the upper pawl is pushed back to a new position. Now, upon the reverse tilt of the frame C, the pitman *m* and pawl *o* operate with a pulling movement, while pawl *o'* is pulled forward to a new position.

By this means it will be seen that the rocking movement of the frame C is converted into a continuous rotary movement of the ratchet-wheel J and its shaft I, which is transmitted to a fly-wheel, K, through the speeding-gear L M N O P Q.

As the movements of the pitmen *m m'* is comparatively small any slack between the pawls and the teeth of the ratchet would be objectionable, and, if the ratchet-wheel were made small, such slack movement would be proportionately great, in consequence of the failure of the pawls to always register nicely with the said teeth in securing a hold; and hence I attach the pitmen to arms *n*, at a point near the center, and enlarge the ratchet-wheel, so as to transfer the movement of the pitman to the shaft I, to the best advantage of leverage, and at the same time diminish by the increased number of teeth the slack movement in the engagement of the pawl with the teeth, which slack movement involves not only a loss of power, but an injurious shock and wear to the machine.

In relation to the scope of my invention, I would state that I do not confine myself to the details of the same, as shown and described, as these may be varied without departing from the principles of the invention. Thus, for instance, I do not limit myself to cog-wheels to gear the weighted levers together for securing the principle of the counterpoise, as friction-pulleys and other mechanical devices may be used in this connection. I may also modify the construction of the rocking frame, or the arrangement of the devices for transferring the weighted levers. In making use of my improved motor, also, I may employ it in single form, as shown; or I may arrange two or more in the form of a series to operate conjointly.

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

1. Two weighted levers, geared together, and combined with a pivoted frame, substantially as described, whereby the aggregate weight of the levers is transmitted to the frame, and the levers made to counterbalance each other, to permit their transfer from side to side with a power less than that represented by their actual weight.

2. Two weighted levers, combined with a pivoted frame, and geared together to permit the shock or momentum of one to be met and neutralized by the shock or momentum of the other, substantially as described.

3. The pivoted frame, having stop-bars H with elastic cushions, in combination with the weighted levers, arranged upon opposite sides of said stop-bars, and geared together, as described.

4. The combination of the weighted levers, geared together, as described, the pivoted frame C, having stop-pins *d d*, and the supporting-standards B, substantially as and for the purpose described.

5. The combination, with the weighted levers, geared together so as to counterbalance each other, of a fork, *e*, cog-wheel *g*, guide-roller *l*, rack-bar *i*, rod *j*, and hand-lever *k*, substantially as described, and for the purpose of operating said weighted levers.

6. The diametrically-arranged arms *n n'*, carrying pawls *o o'*, in combination with the enlarged ratchet-wheel J, the rocking frame C, and with the two pitmen *m m'* pivoted at one end to the rocking frame, and at their others to the bars *n n'* between the pawls and the center of the wheel, substantially as described, and for the purpose set forth.

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