I. M. RHODES.
Treadle-Power.

No. 209,079. Patented Oct. 15, 1878.

Fig. 1.

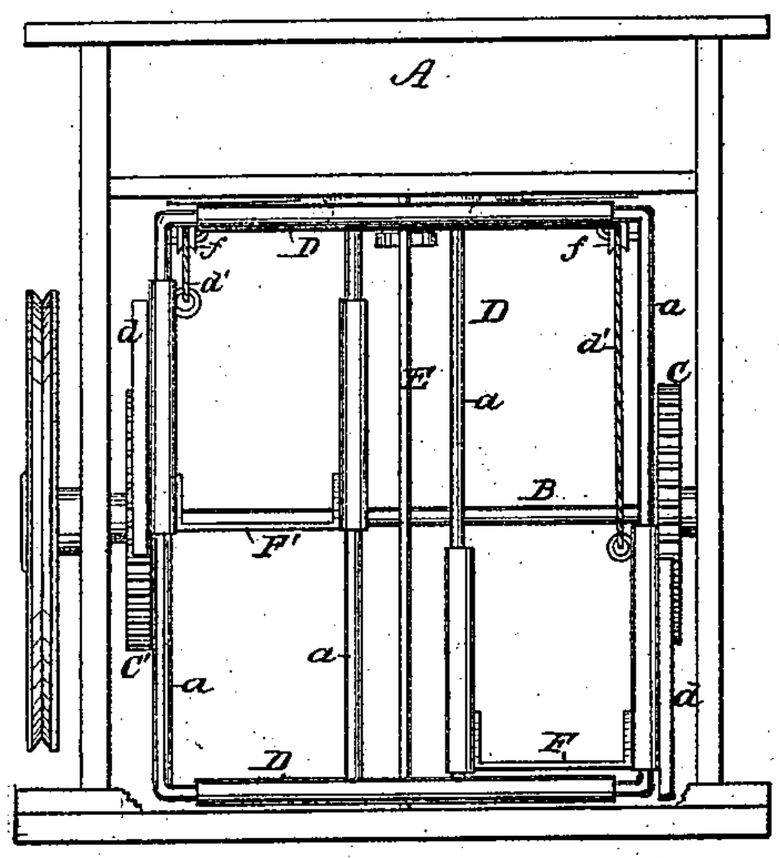


Fig. 2.

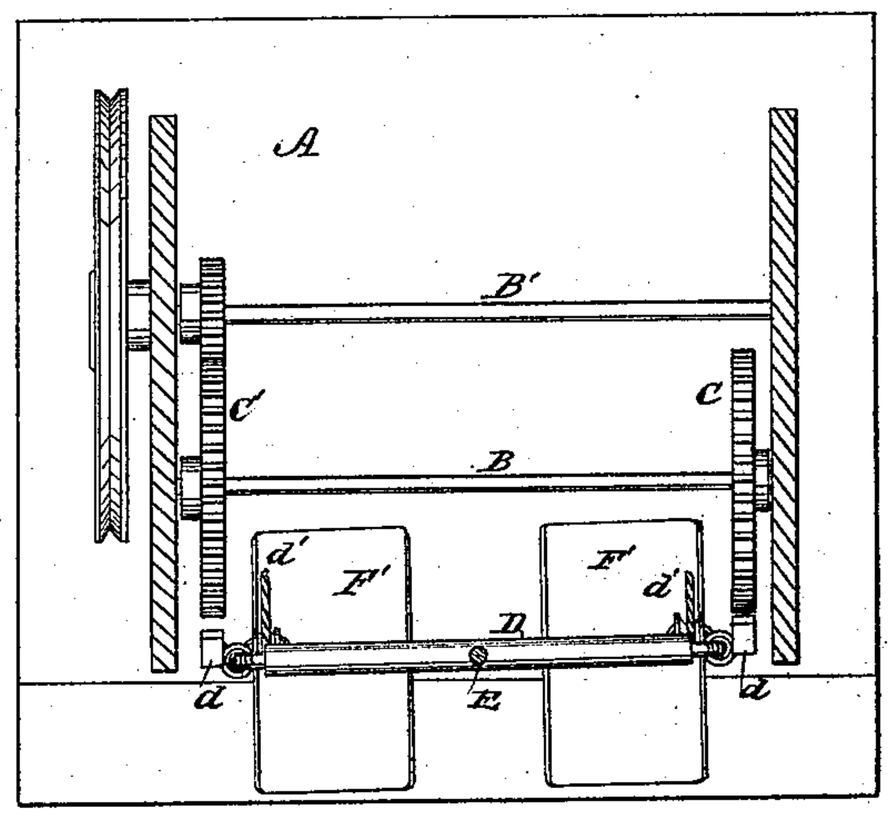


Fig. 3.

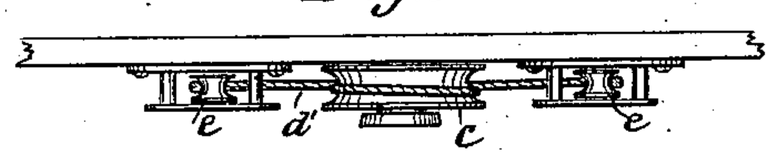
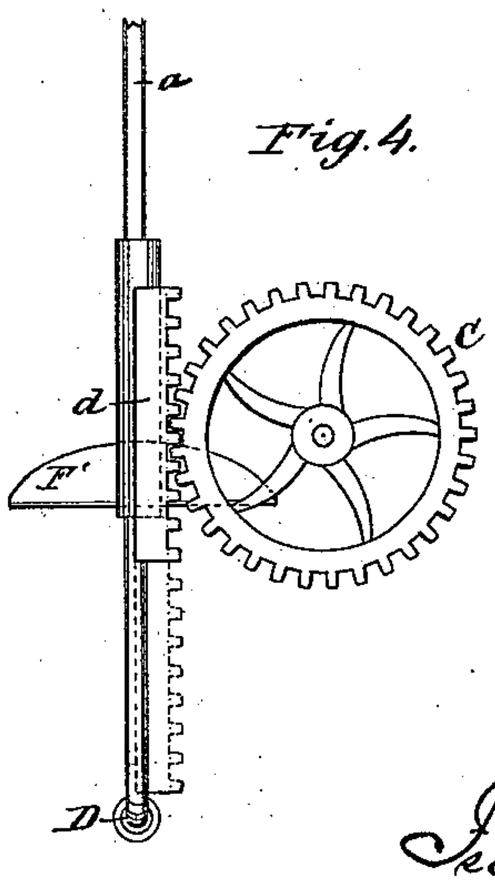


Fig. 4.



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ISAAC M. RHODES, OF HANCOCK, MICHIGAN.

IMPROVEMENT IN TREADLE-POWERS.

Specification forming part of Letters Patent No. **209,079,** dated October 15, 1878; application filed September 19, 1878.

To all whom it may concern:

Be it known that I, Dr. ISAAC M. RHODES, of Hancock, in the county of Houghton and State of Michigan, have invented a new and Improved Treadle-Power; 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 front elevation. Fig. 2 is a horizontal section through the frame or case, looking down upon the operating parts. Fig. 3 is a detail view of the tension device. Fig. 4 is a detail view, showing engagement of the rack and its gear-wheel.

My invention relates to an improvement in treadle-powers, designed to utilize the full effective force of the body in a treadle movement.

In the ordinary treadle movement, in which the force is applied through a connecting-rod and crank, there is not only no transmission of power in passing the two dead-centers, but the transmission of the power is at a constantly-varying leverage for the different parts of the revolution of the crank. This causes such reduction in the transmission of the power that only about one-fourth of the weight of the body can be realized in useful effect. Furthermore, when the machinery is driven at a high rate of speed the feet of the operator cannot be moved beyond a given speed, and this necessarily limits the speed of the machinery to the driver.

The object of my invention is to obviate these difficulties, so that nearly if not all of the muscular power exerted shall be utilized, the motion rendered uniform, and the treadle made independent of the mechanism driven, so that it need not, for all parts of its movement, follow with equal rapidity the movements of the machine.

To this end the improvement consists in combining two wheels, located upon a shaft, and an oscillating frame, having sliding binding-surfaces, which move upon guides on the oscillating frame tangentially to the wheels, and from the oscillation of the frame alternately engage the wheels to drive the shaft with a constant leverage, as hereinafter more fully described.

As an example of my invention, A in the drawing represents any suitable frame-work, in which is journaled the shaft B, carrying two rigid gear-wheels, C C′. D is an oscillating frame, pivoted upon a vertical axis, E, and carrying the treadles F F′, which slide upon the guide-rods *a* of the frame. To each of these treadles is rigidly attached a rack, *d*, each of which is arranged in the plane of its gear-wheel, and which alternately, from the oscillation of the frame D on its axis E, are brought into engagement with the periphery of the wheel, to act upon and drive it. The amplitude or range of movement of each of these racks is such that when they are at their lowest point their upper edges are out of contact with their respective wheels. This arrangement permits the treadle, after having done its work, to tarry an instant and give the operator time to lift his feet without producing the backlash on the machine caused by the instantaneous rising of the treadle against the weight of the foot, (which the operator has not time to lift,) when the connection of the treadle with the machinery is rigid, as is the case with the connecting-rod and crank.

It will thus be seen that the full force of the foot can be exerted in the quick downward stroke, leaving an interval of time in which to recover and force down the other treadle, thus obviating the necessity of operating the feet as rapidly as the oscillations of a connecting-rod would require.

In order to oscillate the frame D simultaneously with the depression of one of the treadles, to render unnecessary anything but a vertical pressure upon the treadle, I arrange about the middle of the frame-work a tension device, *c*, consisting of a pulley, around which is wrapped a cord, *d′*, which pulley is made to revolve with greater or less friction by a central binding-screw. The ends of the cord *d′* are extended from the pulley around friction-pulleys *e e*, and thence around friction-pulleys *f f*, located upon the oscillating frame at right angles to *e*, and said ends are then attached to the upper portion of the treadles, or a part connected therewith.

Now, it will be seen that when a downward pressure is exerted upon a treadle the tension

which the tension-pulley *c* puts upon the cord *d'* causes a pull upon that end of the oscillating frame, which makes said end move with its rack into engagement with its wheel.

It will thus be seen that the descent of any one treadle throws the attached rack into engagement with its wheel for said downward movement, and at the same time throws the rack at the other end away from its wheel, so that said other rack can rise freely.

This arrangement of tension devices for alternately throwing the opposite ends of the frame into engagement with the wheels I prefer to employ; but they may be dispensed with in some cases, as the treadles may be so arranged that a diagonal pressure will serve both to depress the treadle and oscillate the frame.

By means of the above-described devices it will be seen that the power is continuously applied to the shaft B with a leverage equal to the radius of the gear-wheels by the movement of the racks tangentially to the same. This not only permits the full power exerted to be utilized to drive the machine, but also renders the transmission of motion more uniform. The disconnected character of the treadle also does not compel the strokes to follow in regular and quick succession, as in a crank movement, but gives the operator time to recover his feet in preparing for the quick downward movement which a high speed may necessitate.

This treadle-power I propose to apply generally to any uses for which it may be applicable.

As a modification of the invention, I may, instead of toothed wheels C C', use disks or wheels having a plain frictional periphery, and employ in connection therewith smooth binding-surfaces in the place of the racks.

The power developed by the rotation of the shaft B may be received and transmitted through a second shaft, B', provided with pinion and balance wheel; or it may be taken from a band-pulley located directly on the shaft B; or any other suitable means of carrying it to the desired point may be employed.

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

1. The combination, with a shaft carrying two wheels, of an oscillating frame carrying sliding treadles provided with binding-surfaces, arranged to reciprocate in the plane of the wheels tangentially to the same, and to be alternately brought into contact therewith by the oscillation of the frame, substantially as and for the purpose described.

2. The combination, with a shaft carrying two wheels, of an oscillating frame carrying sliding treadles provided with binding-surfaces, arranged to reciprocate in the plane of the wheels tangentially to the same, together with a tension device, substantially as described, whereby the depression of the treadle effects the oscillation of the frame, as set forth.

3. The combination, with the gear-wheels C C', of the reciprocating racks *d d*, provided with treadles, and arranged to slide upon an oscillating frame, as described.

4. The oscillating frame D, arranged as described, and having friction-rollers *f*, in combination with the cord *d'*, friction-rollers *e*, and tension-pulley *c*, substantially as described.

The above specification of my invention signed by me this 16th day of September, 1878.

ISAAC M. RHODES.

Witnesses:
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SOLON C. KEMON.