(No Model.) 2 Sheets—Sheet 1.

G. UNDERHILL, Dec'd.

J. D. UNDERHILL and E. UNDERHILL, Administrators.

SPRING MOTOR.

No. 258,159. Patented May 16, 1882.

Fig. 2.

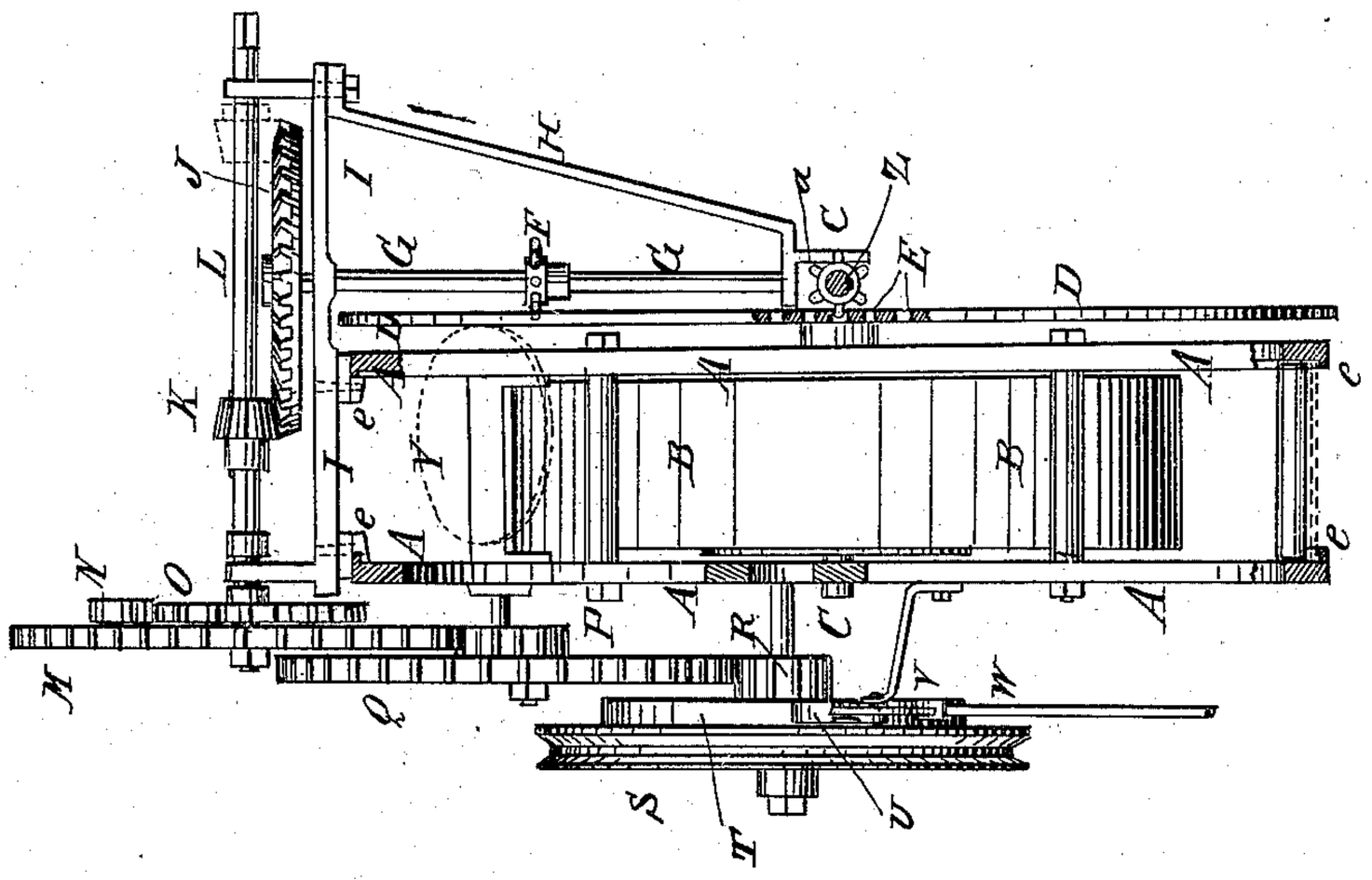
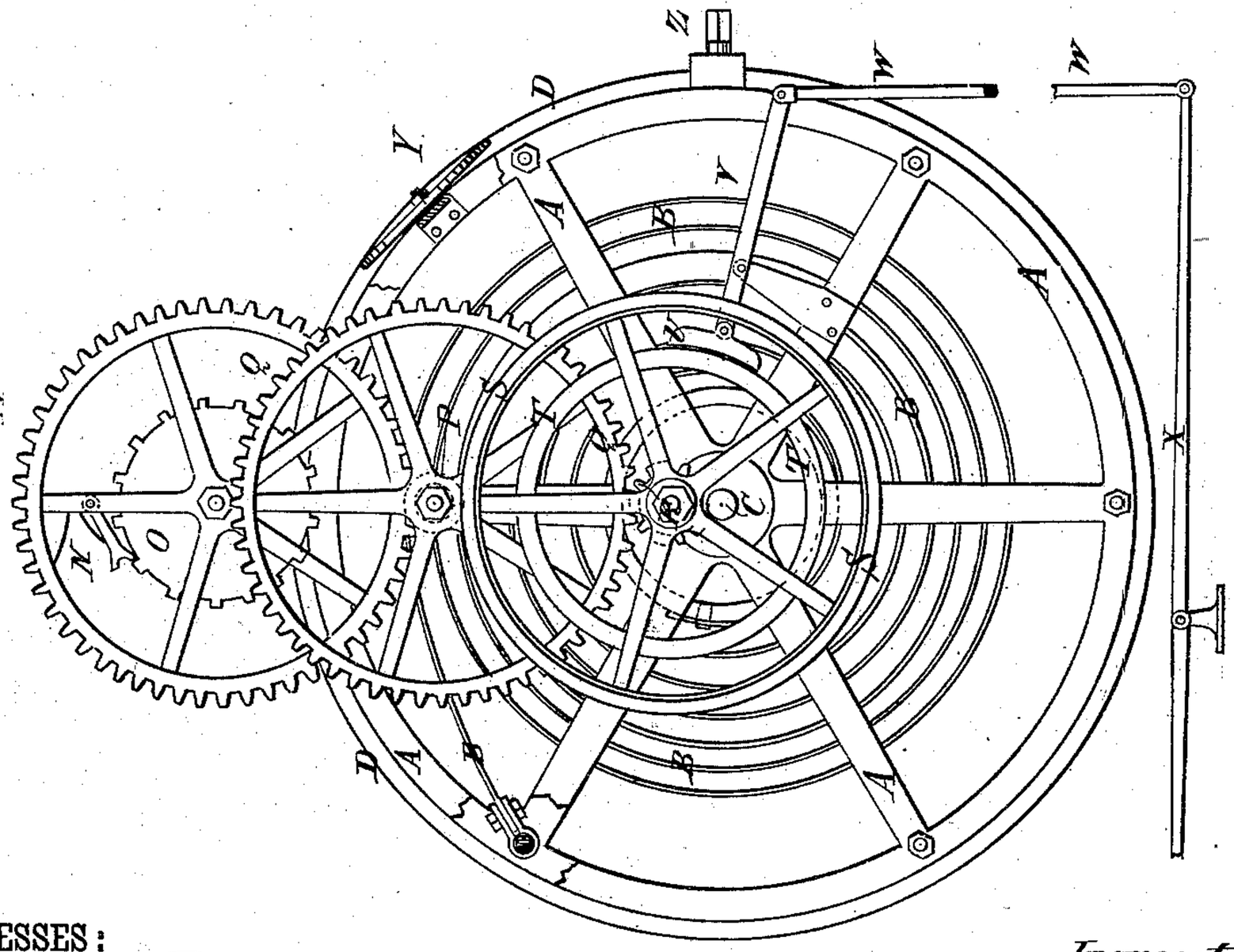


Fig. 1.



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ATTORNEYS.

(No Model.) 2 Sheets—Sheet 2.

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SPRING MOTOR.

No. 253,159. Patented May 16, 1882.

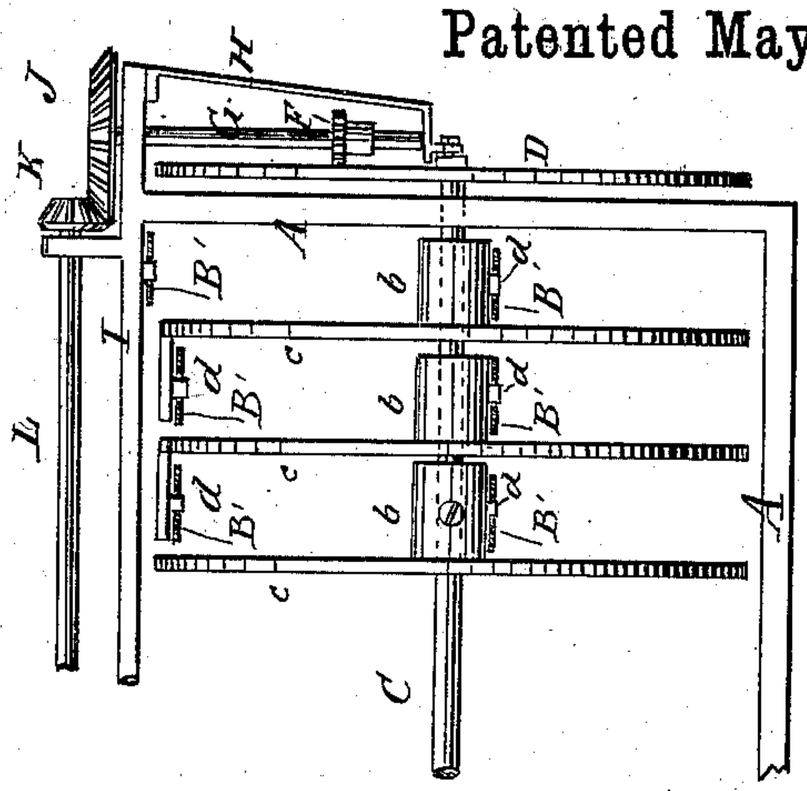

Fig: 4.

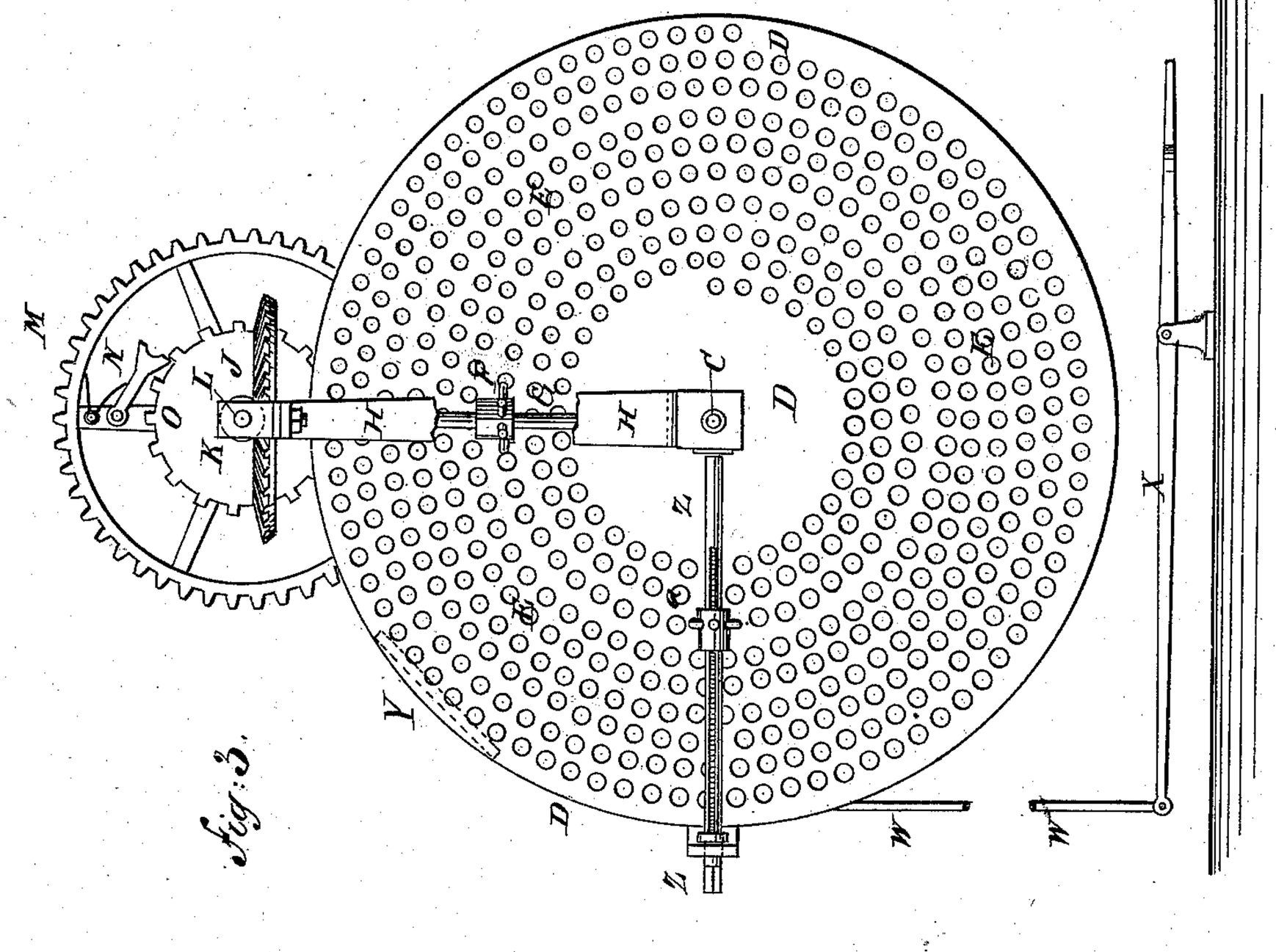

Fig: 3.

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UNITED STATES PATENT OFFICE.

JOHN D. UNDERHILL, OF HOBOKEN, NEW JERSEY, AND ELIZABETH UNDERHILL, OF NEW ROCHELLE, NEW YORK, ADMINISTRATORS OF GILBERT UNDERHILL, DECEASED.

SPRING-MOTOR.

SPECIFICATION forming part of Letters Patent No. 258,159, dated May 16, 1882.

Application filed October 6, 1881. (No model.)

To all whom it may concern:

Be it known that GILBERT UNDERHILL, deceased, late of New Rochelle, in the county of Westchester and State of New York, did invent a new and useful Improvement in Spring-Motors, of which the following is a full, clear, and exact specification.

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

Figure 1, Sheet 1, is a rear elevation of the improvement. Fig. 2, Sheet 1, is a side elevation of the same. Fig. 3, Sheet 2, is a front elevation of the same. Fig. 4, Sheet 2, illustrates a modification of the same.

The object of this invention is to equalize the driving power of a coiled spring, and thus adapt it to drive a sewing-machine or other machinery at a uniform speed.

The invention consists in a spring-motor constructed with a frame, a coiled spring or springs, a regulating-wheel driven by the coiled spring and provided with a spiral row of perforations, a spur-wheel engaging with the regulating-wheel and sliding upon a shaft, and a train of gear-wheels, whereby power will be applied to the gear-wheels with a gradually-increasing advantage of leverage as the force of the uncoiling spring decreases; also, in the combination, with the frame and the regulating-wheel, of a stay-wheel, whereby the said regulating-wheel is held against the push of the spur-wheel; also, in the combination, with the belt-pulley, of the brake-wheel, the brake-shoe, the connecting-rod, and the treadle, whereby the motor can be readily stopped; and, also, in the combination, with the regulating-wheel, of the extra spur-wheel and the extra shaft, whereby the said regulating-wheel can be readily turned back to coil the spring, as will be hereinafter fully described.

A represents the frame of the motor, which is designed to be attached to the frame of the machine to be driven or to some other suitable support.

B is a spring coiled around a shaft, C, to which the inner end of the said spring is attached. The outer end of the spring B is attached to the outer part of the frame A. The shaft C revolves in bearings in the middle part of the frame A, and to it, near its end and at the outer side of the frame A, is attached a large disk, circular plate, or wheel, D, in which is formed a spiral row of small holes, E, as shown in Fig. 3, to receive the spurs of the spur-wheel F, placed upon the vertical shaft G. The lower end of the shaft G revolves in a bearing in the lower part of the bracket H, the lower end of which rides upon the end of the shaft C. The upper part of the shaft G revolves in a bearing in a cross-bar, I, attached to the top of the frame A, and to the projecting outer end of which is attached the upper end of the bracket H. The spur-wheel F is connected with the shaft G by a tongue and groove, so that it will carry the said shaft with it in its revolution, but will slide up and down upon the said shaft freely.

To the upper end of the shaft G is attached a large beveled-gear wheel, J, into the teeth of which mesh the teeth of a small beveled-gear wheel, K, placed upon the shaft L, and connected with the said shaft L by a set-screw or other suitable means, so that the said gear-wheel K can be detached and replaced in a reversed position to engage with the teeth of the gear-wheel J at the other side of its shaft G when it is desired to drive the machine in the opposite direction. A loose gear-wheel can be placed upon the shaft L at the opposite side of the shaft G from the gear-wheel K to engage with the teeth of the gear-wheel J, and thus hold it against any side strain. In this case the direction of motion in the machine to be driven can be changed by releasing the gear-wheel K and making the other gear-wheel fast to the said shaft L. The shaft L revolves in bearings in studs attached to the cross-bar I, and its outer end is squared to receive a crank for turning the said shaft back to coil the spring B.

Upon the rear end of the shaft L is placed a loose gear-wheel, M, to which is pivoted a pawl, N, to engage with the teeth of the ratchet-wheel O, rigidly attached to the shaft L, so that the said shaft, when turned forward, will carry the gear-wheel M with it, but can be turned back to re-coil the spring B without turning the said gear-wheel. The pawl N is made reversible, as shown in Figs. 1 and 3, and the teeth of the ratchet-wheel O are so formed

that the said pawl N, when turned in either direction, will engage with them, so that the said pawl and ratchet-wheel can properly connect the shaft L and gear-wheel M in whatever direction the said shaft and gear-wheel may be revolved. The teeth of the gear-wheel M mesh into the teeth of a small gear-wheel, P, journaled to the frame A, and to which is attached, or with it is rigidly connected, a large gear-wheel, Q. The teeth of the gear-wheel Q mesh into the teeth of the small gear-wheel R, journaled to the frame A, and with which is rigidly connected the pulley S to receive the belt by means of which motion is given to the machinery to be driven.

Upon the side of the pulley S is formed, or to it is attached, a flange or brake wheel, T, against the face of which rests the brake-shoe U. The brake-shoe U is hinged to the end of a lever, V, which is pivoted to the frame A, or to a support attached to the said frame A.

To the outer end of the brake-lever V is hinged the upper end of a connecting-rod, W, the lower end of which is hinged to the inner end of the foot lever or treadle X. The treadle X is pivoted to a support attached to the floor or to the frame A, and its outer end projects into such a position that it can be readily reached and operated by the attendant with his foot to apply the brake and stop the motor.

The perforated wheel D is held in a vertical position against the side pressure of the spur-wheel F by a wheel, Y, journaled to a cross-bar of the frame A in such a position as to bear against the inner or rear side of the said wheel D.

To the lower end of the bracket H is pivoted the inner end of a horizontal shaft, Z, the outer end of which is pivoted to a support attached to the frame A. Upon the shaft Z is placed a spur-wheel, *a*, the spurs of which engage with the spiral row of perforations in the regulating-wheel D. The spur-wheel *a* is connected with the shaft Z by a tongue and groove, so that it will be carried around by and with the shaft Z, but can slide freely upon the said shaft. The shaft Z is made of such a length that its outer end will project beyond the rim of the regulating-wheel D. The projecting outer end of the shaft Z is squared to receive a crank for turning the shaft Z and spur-wheel *a* to turn the wheel D and coil the spring B. The shaft Z and spur-wheel *a* enable the operator to coil the spring B very quickly, but require a greater outlay of power than when the crank is applied to the end of the shaft L.

Instead of a single long spring, B, several short springs, B′, can be used, and connected with each other and with the shaft C and frame A in such a manner as to act as a single long spring in communicating power to the wheel D and through it to the gear-wheels. To do this the outer end of the first short spring B′ is attached to the frame A, and its inner end is attached to a hub, *b*, running loosely upon the shaft C.

To the inner end of the hub *b* is attached a disk, *c*, which has an inwardly-projecting flange or arm, *d*, attached to or formed upon its rim.

To the flange or arm *d* is attached the outer end of the second short spring B′, the inner end of which is attached to a second loose hub, *b*. Two or more short springs B′ can be used, and the hub *b*, to which the inner end of the last short spring B′ is attached, is secured to the shaft C by a set-screw or other suitable means. The last hub *b* can have a disk attached to it to keep its spring in place. By this arrangement the series of short springs B′ will act as a single long spring, so that the effect of a single spring of any desired length can be obtained by using short springs.

The side parts of the frame A can have flanges or lugs *e* formed upon them to serve as guards to receive a casing and keep it in place.

Having thus described the invention of G. UNDERHILL, deceased, we claim as new and desire to secure by Letters Patent—

1. A spring-motor constructed substantially as herein shown and described, and consisting of the frame A, the coiled spring or springs B, the regulating-wheel D, having spiral row of perforations E, the sliding spur-wheel F, the train of gear-wheels J K M P Q R, and the belt-pulley S, as set forth.

2. In a spring-motor, the regulating-wheel D, constructed, substantially as herein shown and described, with a spiral row of perforations to receive the spurs of a spur-wheel, as set forth.

3. In a spring-motor, the combination, with the spring B and the train of gear-wheels J K M P Q R, of the regulating-wheel D, having spiral row of perforations E, substantially as herein shown and described, whereby the power will be applied to the gear-wheels with a gradually-increasing advantage of leverage as the force of the uncoiling spring decreases, as set forth.

4. In a spring-motor, the combination, with the frame A and the regulating-wheel D, of the wheel Y, substantially as herein shown and described, whereby the said regulating-wheel is held against the push of the spur-wheel, as set forth.

5. In a spring-motor, the combination, with the regulating-wheel D, of the extra spur-wheel *a* and the extra shaft Z, substantially as herein shown and described, whereby the said regulating-wheel can be readily turned back to coil the spring, as set forth.

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Administrator.
ELIZABETH UNDERHILL,
Administratrix.

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J. H. SCARBOROUGH.

Witnesses to signature of Elizabeth Underhill:
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