(No Model.)

A. MARQUÉS.

SPRING MOTOR.

No. 308,419. Patented Nov. 25, 1884.

Fig. 1.

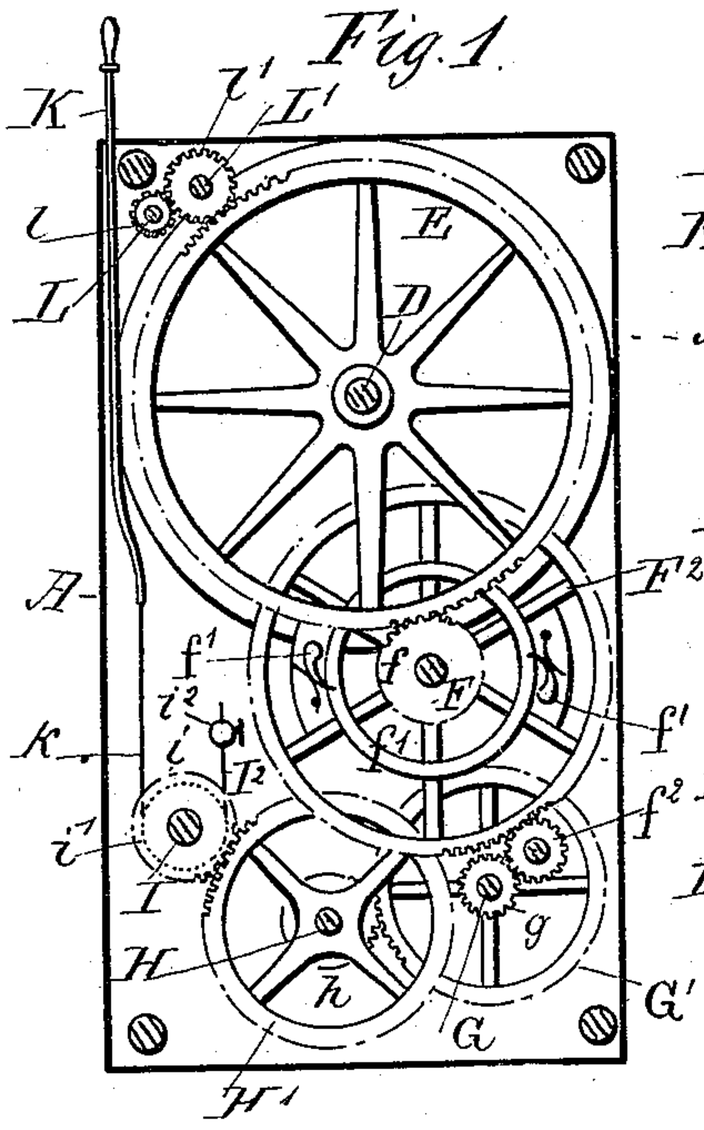


Fig. 2

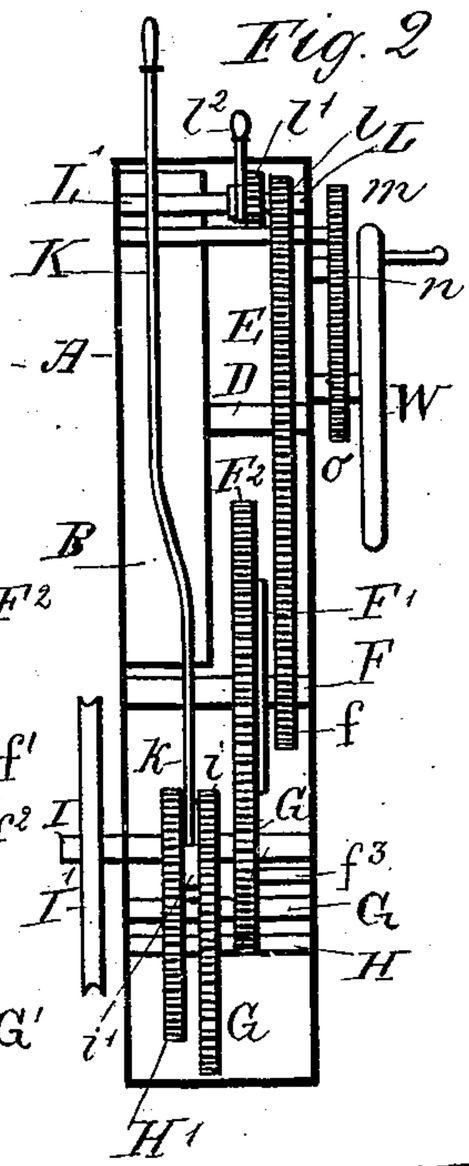


Fig. 3

Fig. 4

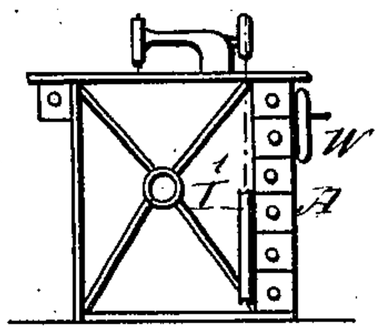


Fig. 8.

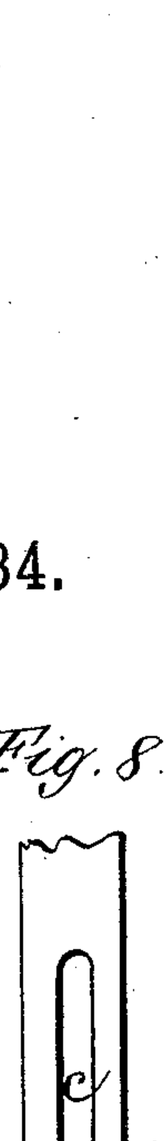


Fig. 5.

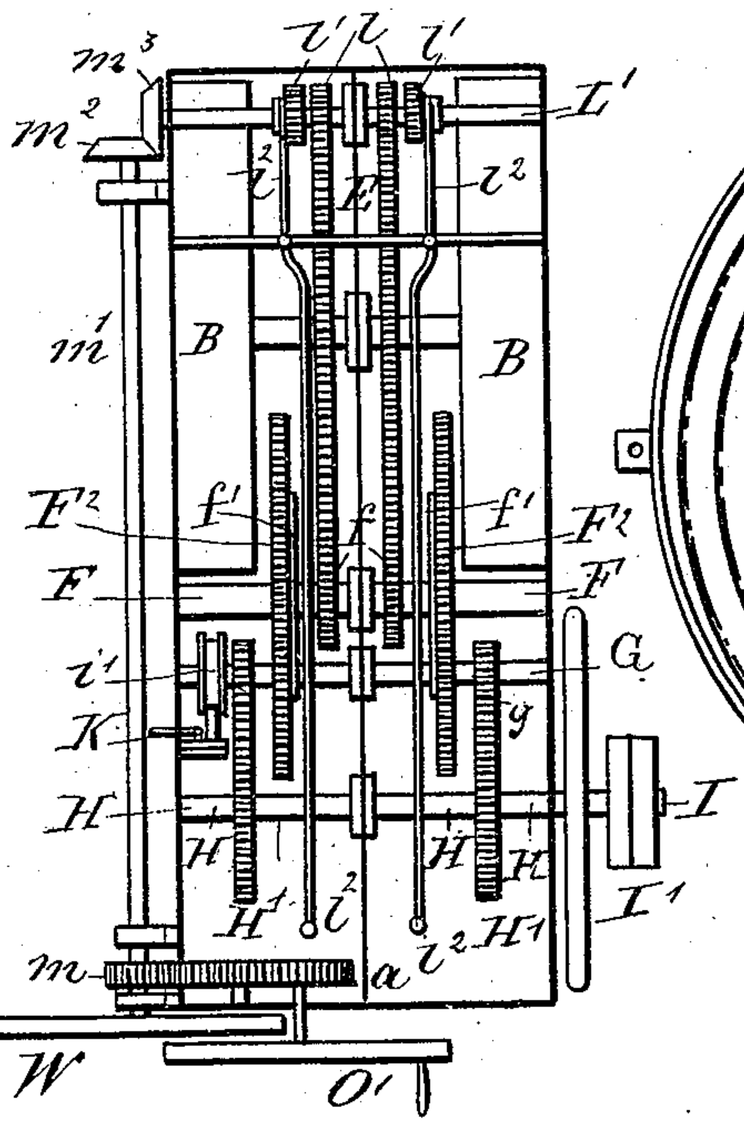


Fig. 6.

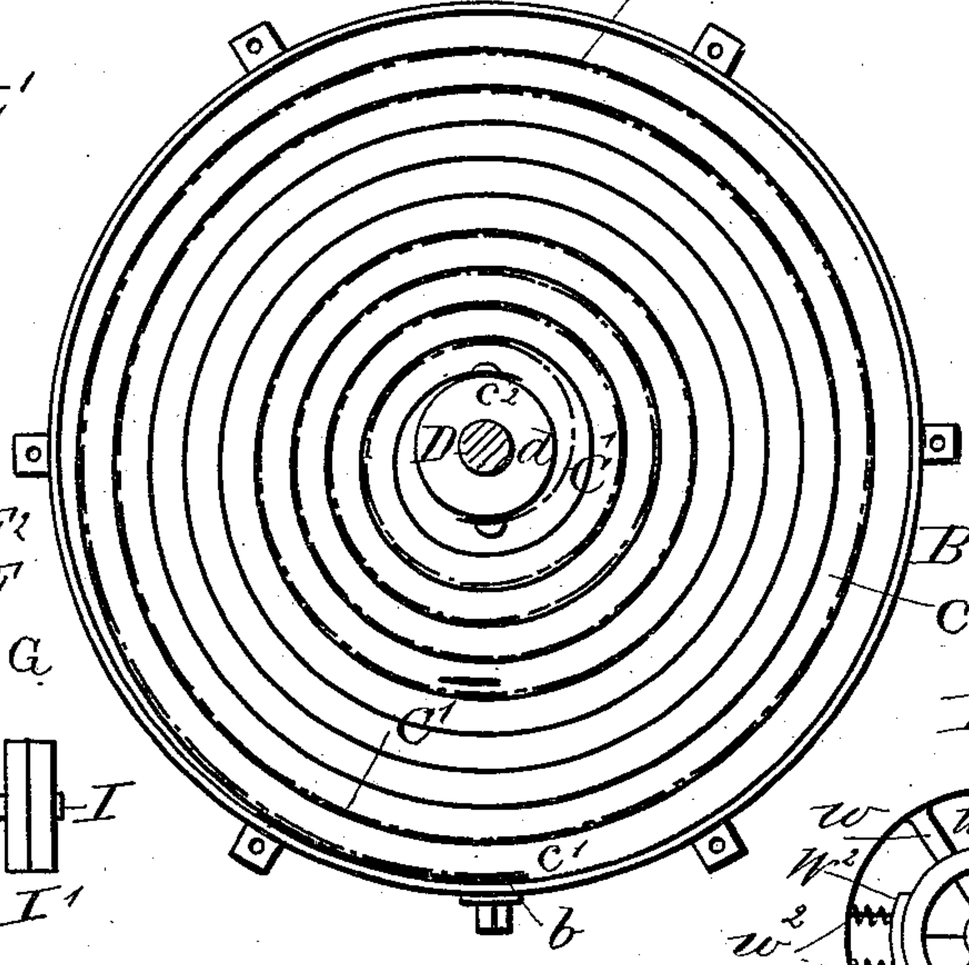
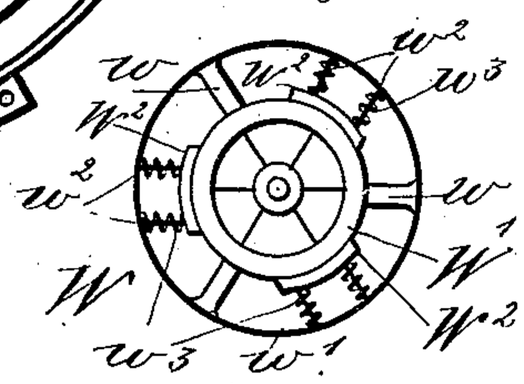


Fig. 7.



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ADOLPHE MARQUÉS, OF PARIS, FRANCE.

SPRING-MOTOR.

SPECIFICATION forming part of Letters Patent No. 308,419, dated November 25, 1884.

Application filed September 1, 1884. (No model.) Patented in Belgium April 23, 1884, No. 64,910; in Italy June 2, 1884, XVIII, 16,943, and in England June 9, 1884, No. 8,753.

To all whom it may concern:

Be it known that I, ADOLPHE MARQUÉS, a resident of Paris, in the French Republic, and a citizen of said French Republic, have invented certain new and useful Improvements in Spring-Motors; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, and to letters or figures of reference marked thereon, which form a part of this specification.

This invention relates to an improvement in a mechanical motor more especially designed for use in transmitting power to light machinery—such as sewing-machines, for instance—though the motive power may be multiplied to develop power sufficient to drive heavier machinery than that alluded to; and to these ends the invention consists, essentially, of a spring-power combined with suitable transmitting-gearing.

It further consists in the combination, with the spring-power, of means to wind the same up without thereby affecting the transmitting-gear.

It further consists in the combination, with the transmitting-gearing, of devices to control the speed thereof.

It further consists in the combination, with the winding-up mechanism, of regulator balance or fly wheel; and, lastly, it consists in the combination, with the mainspring of a motor, of an auxiliary spring or springs to facilitate the coiling and uncoiling of such mainspring where a powerful mainspring is employed, and in the construction of such mainspring to impart to the same greater elasticity, all substantially as hereinafter more fully described, and as shown in the accompanying drawings, in which—

Figure 1 is a front elevation, and Fig. 2 a side elevation, of my improved mechanical motor. Fig. 3 is a detail view thereof. Fig. 4 shows its application to a sewing-machine. Fig. 5 is a side elevation of two of my improved motors combined. Fig. 6 is a section of the spring-barrel, showing the arrangement of main and auxiliary springs. Fig. 7 is a face view of the crank-wheel for the winding mechanism, constructed to perform the functions of a governor; and Fig. 8 is a portion of the mainspring.

Like letters of reference indicate like parts wherever such may occur in the above figures of drawings.

The motor is contained and the parts thereof mounted in a suitable casing, A, or a suitable frame, according to the application of said motor, and it is composed of a spring-barrel, B, containing the motive spring C, one end of which is connected with the barrel B at *b*, and the other end with a hub, *d*, on the main driving arbor or shaft D, that passes through said barrel. When powerful springs are employed, in order to give them greater elasticity I form slots *c*, Fig. 8, in the spring-blade, thereby imparting to said blade a greater flexibility and elasticity without materially impairing its tensile strength and its power, the slots being made on a line with the direction of the power exerted thereby, as shown.

To increase the power of the spring C, I form the blade thereof tapering in cross-section, the greatest thickness being at its outer end, *c'*, where it is attached to the barrel B, and its least thickness at its inner end, c^2, where it is attached to the hub *d* of arbor or shaft D. By means of this construction the power of the spring remains nearly the same during its entire function, instead of gradually lessening, as is the case when the thickness of the spring is uniform.

To facilitate the uncoiling of the spring when a very powerful spring is employed, I apply one or more auxiliary springs, C', which are attached at one end to the hub *d*, and at the other end to the mainspring, or to said mainspring and the barrel, said auxiliary spring or springs being also preferably made tapering in thickness from their points of attachment to the mainspring to their points of attachment to the hub *d*, as shown in Fig. 6, or to the mainspring and barrel. The power of these auxiliary springs will necessarily depend upon that of the mainspring. The main arbor or shaft D carries the driving-wheel E, that meshes with a pinion, *f*, on an arbor or shaft, F, which latter also carries a ratchet-

wheel, F′, with which engage pawls *f′*, Fig. 1. The ratchet-wheel F′ and pinion *f* are loosely mounted on arbor F, for purposes presently explained, and the pawls *f′* are pivoted upon the face of a gear-wheel, F^2, keyed on shaft F. This gear-wheel F^2 meshes with a pinion, f^2, on a shaft, f^3. The latter pinion meshes with a pinion, *g*, on a shaft, G, to which is also keyed a gear-wheel, G′, that meshes with a pinion, *h*, on a shaft, H, upon which is also keyed a gear-wheel, H′. The latter wheel meshes with a pinion, *i*, on a shaft, I, that carries the transmission-pulley I′, which is belted to the driven pulley of the machine to be operated from the motor.

From an inspection of the drawings and from the description of the gearing connecting the driving with the driven shaft it will be seen that the rotation of the driving-wheel is multiplied, the gearing being so proportioned as to form a multiplying gearing to increase the velocity of the driven shaft. The pinion *i* is secured to or formed on a drum, *i′*, and I^2 is a spring-brake adjustable vertically by means of a set-screw, i^3, in a suitable bearing, i^2, or stud secured to the casing A. By adjusting the brake so as to bear more or less upon the drum *i′* the velocity of the latter may be regulated. A brake-lever, K, projecting from the casing is arranged to move vertically toward or from the drum *i′*, its spring-arm or brake proper, *k*, bearing against the periphery of the drum on the side opposite to that of the spring-brake I^2.

It is obvious that by pushing the brake-lever K down or moving the same up its brake-arm *k* will bear with greater or less force upon the drum *i′* and regulate the speed thereof, and consequently that of the transmission-pulley I′, mounted on the same shaft. When the spring motor has run down, it is wound up by the following devices: *l* is a pinion mounted on a shaft or arbor, L, and *l′* is a pinion mounted on an arbor or shaft, L′, and adapted to slide longitudinally on said shaft by means of the usual spline or feather.

To the hub of pinion *l′* is secured a lever, l^2, by means of which the pinion is moved longitudinally on the shaft L′ and into engagement with the pinion *l* and the main driving-wheel E. Upon the arbor or shaft of pinion *l* and outside of the casing A is mounted a pinion, *m*, that meshes with an idler, *n*, and the latter with a driving-pinion, *o*, on a shaft, O, that carries the crank fly-wheel W, hereinafter more fully described. From an inspection of Figs. 1 and 3 it will be readily seen that when the pinion *l′* is moved into gear with the pinion *l* and main driving-wheel E and the crank-wheel W rotated in the proper direction the rotation of said wheel will be communicated to the main driving-wheel and the spring caused to be wound up, and as the ratchet-wheel F′ and pinion *f* are loosely mounted on their shaft or arbor F the gear-wheel F^2 will not be rotated, as the pawls *f′* will then ride over the teeth of the ratchet; hence the remaining portion of the driving mechanism will remain stationary.

In Fig. 4 I have illustrated the application of the motor to a sewing-machine, the casing A being constructed in imitation of a tier of drawers.

W is the winding-up wheel, and I′ is the transmission-pulley belted with the fly-wheel of the sewing-machine.

In Fig. 5 I have illustrated the motor as duplicated and arranged in the same casing, A, the shafts or arbors, except those hereinafter specified, being supported at their inner ends from bearings M, secured to a central partition, *a*, that divides the casing into two chambers, A′ A′, in which are located the motors. The arbor or shaft L′, that carries the pinions *l′*, to connect the main driving-wheels with the winding-up mechanism, extends from side to side of the casing A, and so does the arbor or shaft that carries the transmission-pulley I′.

The winding-up devices are here slightly modified, the pinion *m* being mounted upon an arbor, *m′*, that extends longitudinally and outside of the casing, and carries a bevel-pinion, m^2, at its opposite end, which pinion meshes with a like pinion, m^3, on the end of shaft L′.

Instead of employing a governor crank-wheel to operate the winding mechanism, a separate crank-wheel, *o′*, is here employed, and the governor is mounted on the transmission-arbor *m′*, as shown.

In order to facilitate the winding of such motors where powerful springs are employed, and also to uniformly wind the same up, I provide a centrifugal governor, W, composed of an ordinary fly-wheel, W′, provided with radial arms *w*, formed on or secured to the periphery of the wheel and to a rim or tire, *w′*. Between said arms or spokes are secured in pairs guide-rods w^2, on which are loosely mounted weights W^2 and coiled springs w^3.

It is obvious that when the governor is rotated at a given speed the weights W^2 will not recede from the wheel W′, being held in contact therewith by the springs w^3; but as the velocity of the governor increases these weights will be caused to recede from the wheel W′ by the centrifugal force, and regulate the rotation of the parts as well as increase the power of the wheel in assisting in the winding up.

When a duplicate motor is employed, a continuous power may be obtained by using the motors alternately—that is to say, by using one of the motors at a time, and previous to the running down thereof setting the other motor in operation and winding up the one run down, and so on.

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

1. The combination, in a mechanical motor,

of a spring-barrel, a main driving-wheel, and a power-transmitting shaft, and the transmitting multiplying gearing *f* F² *f*² *g* G *h*, for the purposes stated.

2. The combination, in a mechanical motor, of a spring-motor, a driving-shaft, a driven shaft, and a multiplying gearing connecting said shafts with a winding mechanism to wind up the spring-motor without affecting the driving-gearing.

3. The combination, in a mechanical motor, of a spring-motor, a driving shaft and wheel, E, a driven shaft, a multiplying gearing connecting said shafts, and the winding mechanism consisting of the fly-wheel W, pinion *o*, idler *n*, pinions *m* and *l*, with the pinion *l'* arranged to be thrown in and out of gear with the pinion *l* and driving-wheel E, for the purposes stated.

4. The combination, in a mechanical motor, of a spring-motor, the drive-wheel E, pinion *f*, transmission-wheel F², and ratchet-wheel T', connecting said wheel F² with pinion *f* by pawls *f'*, the described transmitting-gearing, the driven shaft, and the winding mechanism W, *o*, *n*, *m*, and *l*, with the pinion *l'* arranged to be thrown in and out of gear with the pinion *l* and drive-wheel E, for the purposes specified.

5. The combination, in a mechanical motor, with the spring-motor, and a winding mechanism to wind up the same when run down, of a centrifugal governor W, for the purposes specified.

6. The combination, in a mechanical motor, with the spring-motor and a winding mechanism therefor, of crank winding-wheel constructed to perform the function of centrifugal governor, for the purpose stated.

7. The combination, in a mechanical motor, of two spring-motors, two driving-shafts, a single driven shaft, and intermediate transmitting-gearing connecting each spring-motor independently with the driven shaft, whereby said motors may be employed simultaneously or successively and alternately for the purposes specified, and a supporting-frame or inclosing-case common to both motors.

8. In a spring-motor, a motive spring provided with a series of slots in a line with the direction of its tension to impart to said spring a higher degree of elasticity.

In testimony that I claim the foregoing I have hereunto set my hand this 8th day of April, 1884.

ADOLPHE MARQUÉS.

Witnesses:
ROBT. M. HOOPER,
M. KOUSKI.