(No Model.)

2 Sheets—Sheet 1.

D. E. HAWKINS.

SPRING MOTOR.

No. 306,614. Patented Oct. 14, 1884.

Fig. 1.

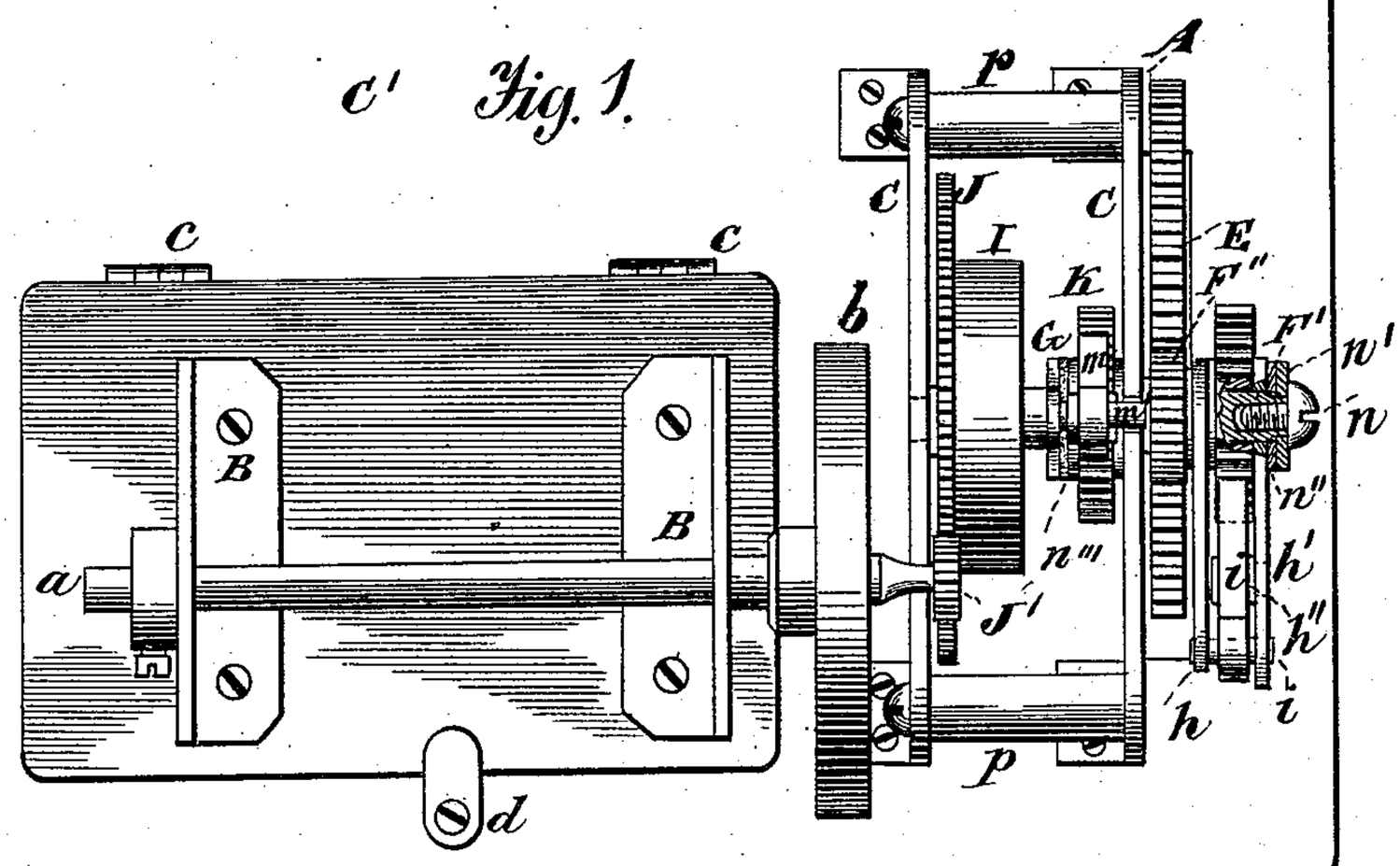
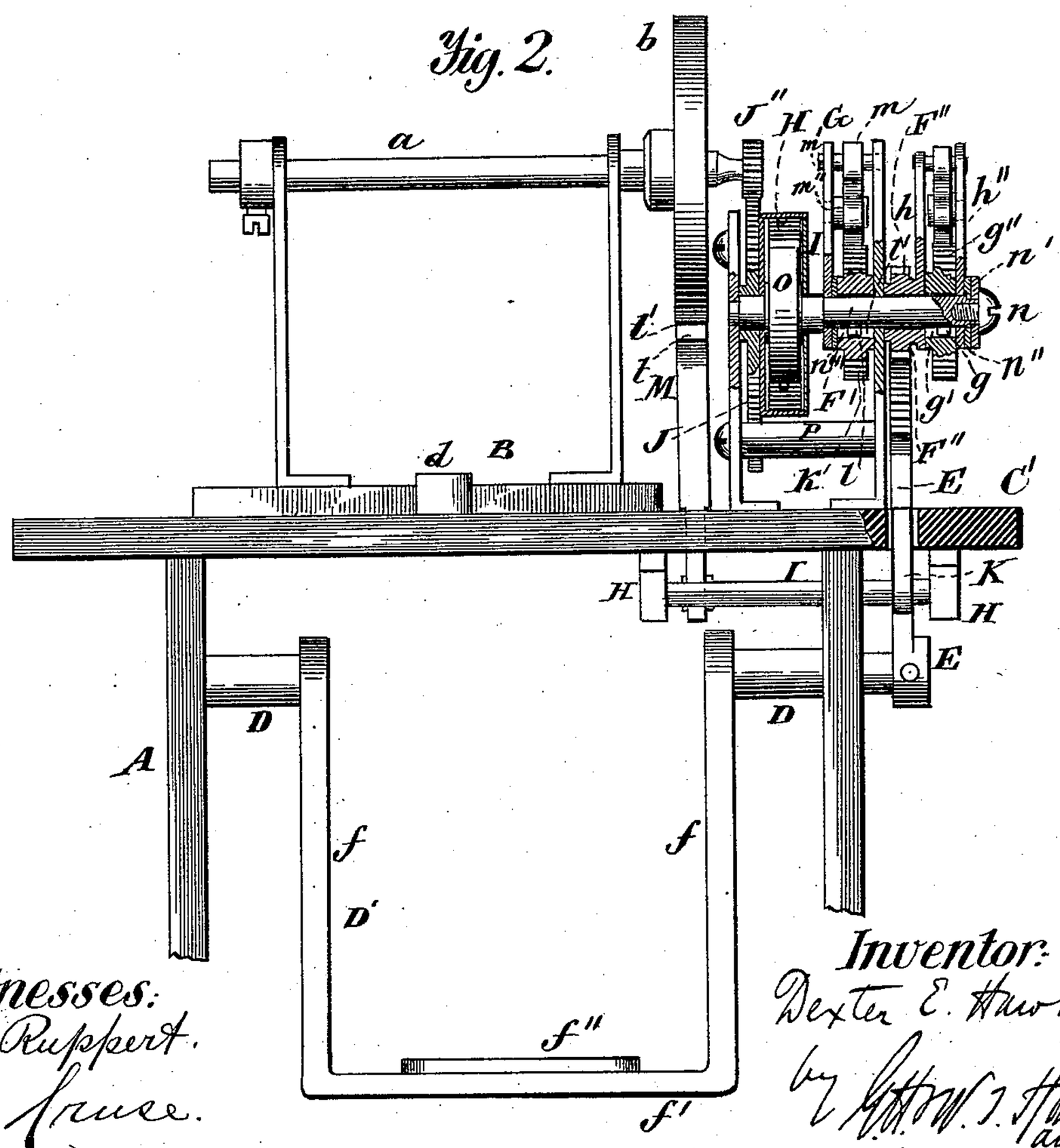


Fig. 2.



Witnesses:
A. Ruppert.
E. Louee.

Inventor:
Dexter E. Hawkins,
by Atty W. J. Hawkins
atty.

(No Model.)

2 Sheets—Sheet 2.

D. E. HAWKINS.

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Fig. 4.

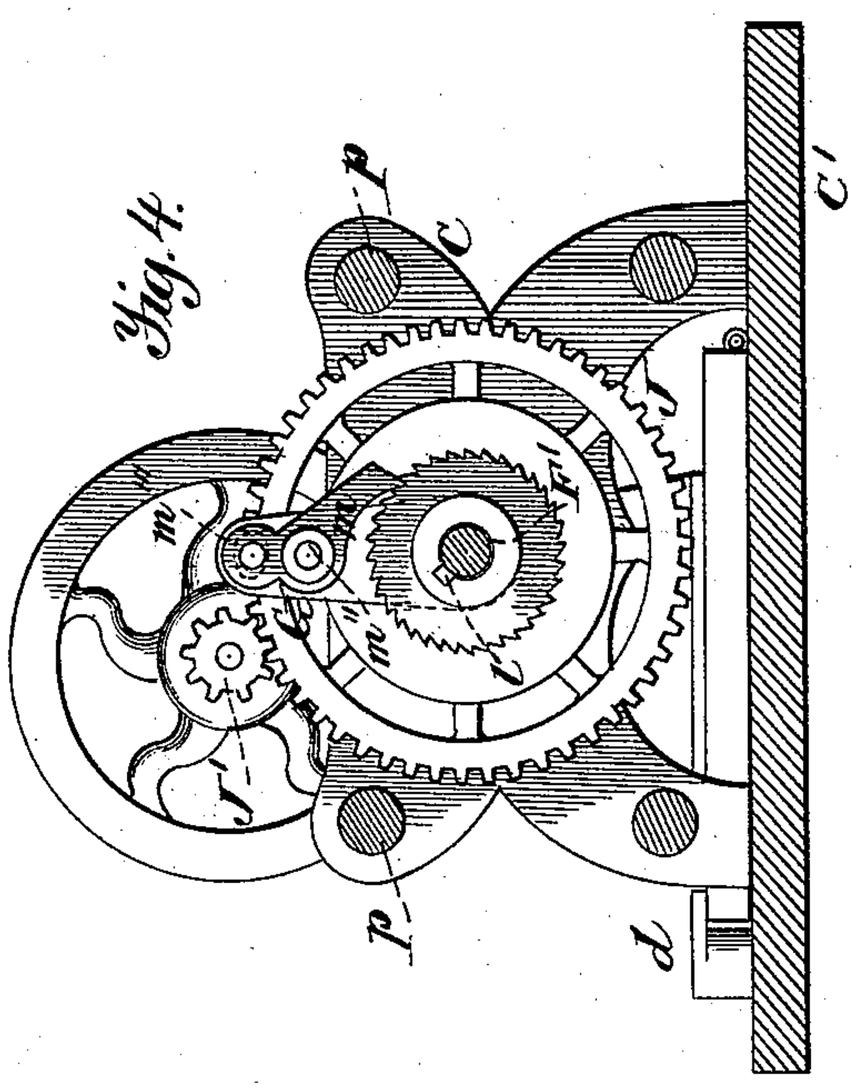


Fig. 5.

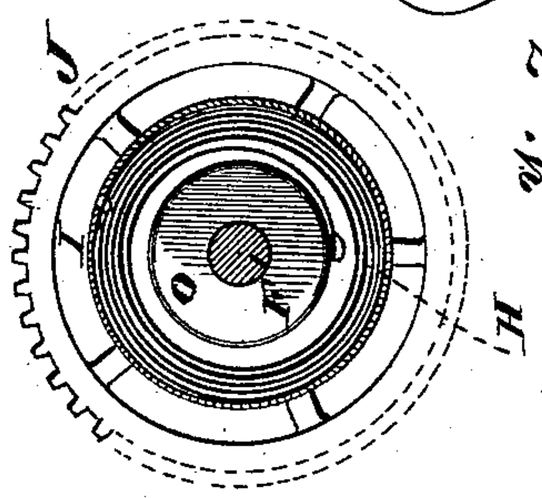


Fig. 6.

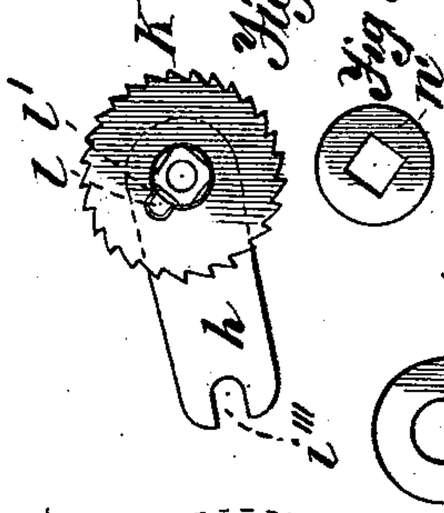


Fig. 8.

Fig. 7.

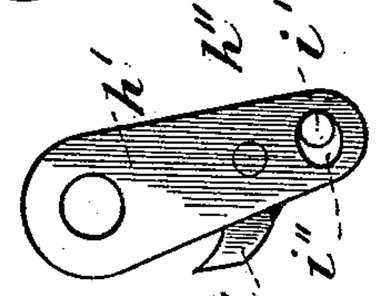
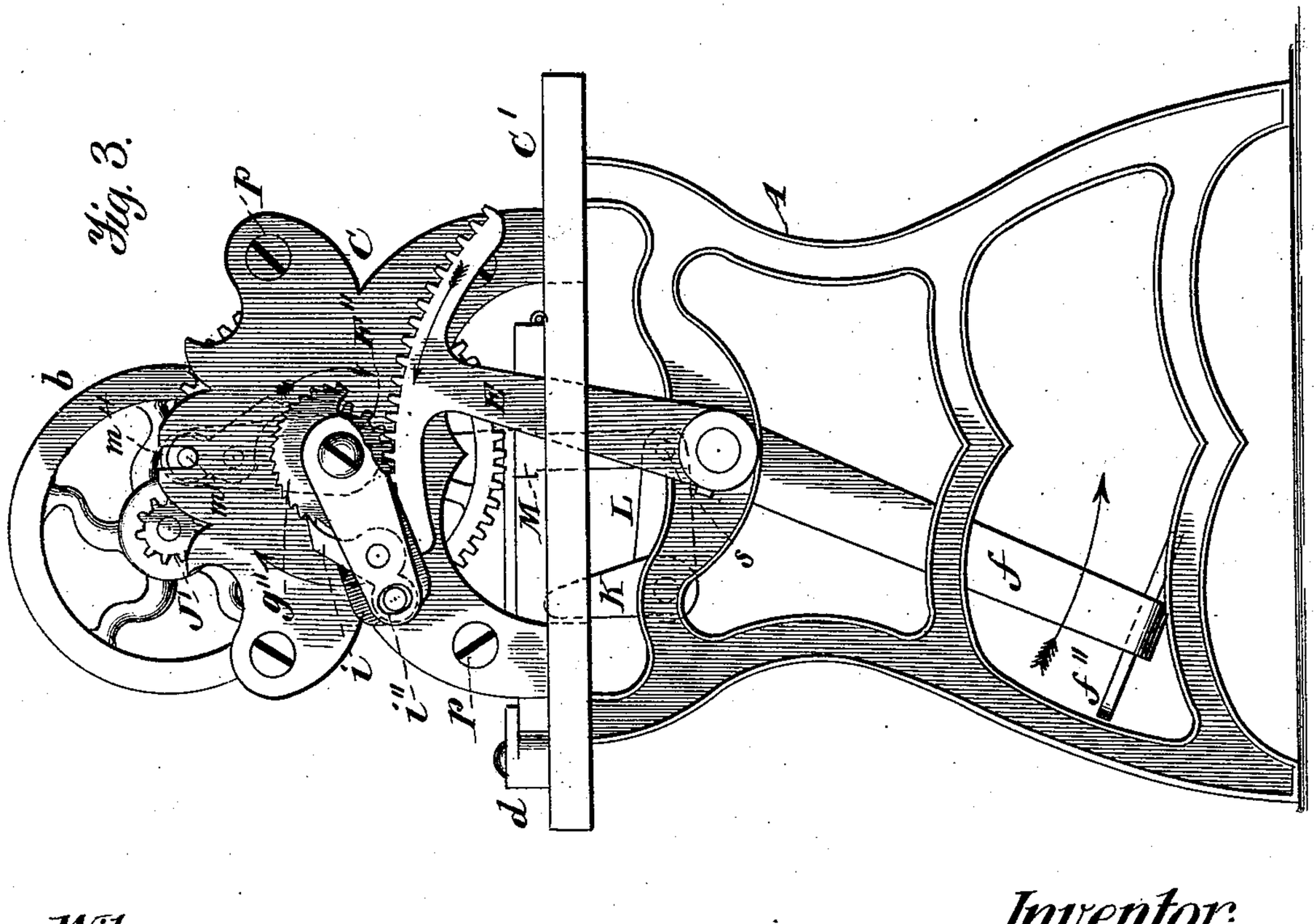


Fig. 3.



Witnesses:
A. Ruppert
E. Kruse.

Inventor:
Dexter E. Hawkins,
by Geo. W. J. Howard.
Attys.

UNITED STATES PATENT OFFICE.

DEXTER E. HAWKINS, OF NORTH ATTLEBOROUGH, MASSACHUSETTS.

SPRING-MOTOR.

SPECIFICATION forming part of Letters Patent No. 306,614, dated October 14, 1884.

Application filed August 26, 1884. (No model.)

To all whom it may concern:

Be it known that I, DEXTER E. HAWKINS, of North Attleborough, in the county of Bristol and State of Massachusetts, have invented certain new and useful Improvements in Spring-Motors, of which the following is a specification.

This invention is intended more particularly to be used as a motor for sewing-machines, but is equally applicable for use with other kinds of small machinery.

The object of the invention is to obviate the necessity of the employment of a foot-treadle and pitman-rod in the propelling of sewing or other machinery. The use of the foot-treadle is considered by many competent authorities to be injurious to the health of the operator, and, in addition, many inconveniences attend the use of such appliances. Attempts have been made to obtain an efficient, reliable, and cheap substitute for the treadle movement, and of such substitutes have been several which have had embodied therein a spring for storing up power, to be subsequently expended in the rotating of the main driving-shaft of the machine. The objection to such class of motors has been in the length of spring necessary to be used for storing up sufficient power to run the machine for a given length of time, and that the spring has to be wound up by the operator before beginning the use of the machine.

My invention aims, chiefly, to dispense with the use of a long spring and to substitute therefor a short spring, which, by a movement of the foot of the operator, may be maintained at such tension as will keep the main shaft of the machine in rotary motion with sufficient force to perform the work required of the machine. I may, however, use, in connection with the spring and its adjuncts, a device whereby a certain amount of power may be conveniently stored up by the spring.

In the accompanying drawings, Figure 1 is a plan view, partly in section, of my invention as applied to the main shaft of a sewing or other machine. Fig. 2 is a side elevation, partly in section. Fig. 3 is an end elevation. Fig. 4 is a longitudinal section through the upper part of the device. Figs. 5, 6, 7, and 8 are detached details, as hereinafter described.

Similar letters of reference indicate similar parts in the respective figures.

A represents the stand of a sewing or other machine, and B its frame-work. The main shaft of the machine is shown by *a*, and the fly-wheel by *b*.

The sewing or other machine may be permanently or removably attached to the main stand A in any suitable manner. As here shown, it is hinged at *c* and additionally held by the pivoted button *d*.

Mounted in the main stand, and under the top or table C′ thereof, are the two parts of the shaft D, from which depends the swinging foot-rest or lever D′, consisting of the vertical portions *f f* and the horizontal portion *f′*, which is provided with a suitable rest, *f″*, to receive the feet of the operator.

To the outer end of one of the sections of the shaft D is secured a toothed sector, E, which engages with a toothed pinion, F″, loosely mounted upon the main shaft F′ of the motor. The frame of the motor is represented by C, it being mounted upon the table C′ of the stand A.

Upon the shaft F′ is a feather or key, *g*, which fits within a key-seat, *g′*, of a ratchet-wheel, *g″*, the ratchet-wheel having a slight longitudinal movement upon the shaft, but rotating with it. The toothed pinion F″ is loose upon the shaft F′, but attached rigidly to an arm, *h*, a similar arm, *h′*, being placed loosely upon the shaft F′ at the other side of the ratchet-wheel *g″*. The arm *h′* carries a pawl, *i*, pivoted thereto at *h″*, said pawl having in its short arm a pin, *i′*, one end of which fits in the slot or elongated hole *i″* of the arm *h′*, the other end of the pin resting in the recess *i‴* of the arm *h*. The recess *i‴* is of a width equal only to the diameter of the pin *i′*, so that no lateral movement of the pin in the recess is permissible, whereas a certain amount of play of the other end of the pin is allowable within the elongated hole or slot *i″* of the arm *h′*. (See Figs. 6 and 7.) A ratchet-wheel, *k*, is placed upon the shaft F′, and adapted to have a slight longitudinal movement thereon, but to turn with the shaft F′ by means of the connection made between the shaft and ratchet-wheel by the key *l* of the shaft and key-seat *l′* of the ratchet-wheel. An arm, G, which

is placed loosely upon the shaft F′, carries a pivoted pawl, *m*, the short arm of which is provided with a pin, *m′*. The pivot of the pawl is at *m″* in the arm G. One end of the pin *m′* fits in an elongated slot, *m‴*, in the arm G, similar to that *i″* of the arm *h′*, while the other end of the pin *m′* rests in a recess, m^4, formed in the frame-work C of the motor, the recess being of a width only equal to the diameter of the pin. The outer end of the shaft F′ is provided with a threaded hole, in which is fitted a screw, *n*. A metallic washer, *n′*, and a leather or elastic washer, *n″*, are placed upon the outer end of the shaft, the washer *n′* having a square hole, as shown in Fig. 6. An elastic washer, *n‴*, is interposed between the inner side of the arm G and the side of the ratchet-wheel *k*.

Rigidly mounted upon the shaft F′, or forming a part thereof, is a large hub or drum, *o*, to which is secured one end of a short flat helical spring, H. The other end of the spring is secured to a barrel, I, which turns loosely upon the shaft F′, the barrel being of a well-known construction. To one side of the barrel is secured the main toothed wheel J, which wheel turns with the barrel, but loosely on the shaft. (See Fig. 5.) The main bearings of the shaft F′ are found in the two parts C of the main frame-work of the motor, which are tied together by screws and thimbles *p*. The main toothed wheel J gears with a toothed pinion, J′, rigidly secured to the main shaft *a* of the sewing or other machine.

The operation of the motor is as follows: Supposing the front of the machine to be at the left-hand side of Fig. 3, the operator having taken his seat at that side of the machine, (supposing it to be a sewing-machine,) and the pawl *i* to be in engagement with the ratchet-wheel *g″*, he pushes the swinging lever D forward, causing the toothed sector E to move toward him to the entire length of its stroke, which is regulated by the end of the sector striking the table C′, or by any other suitable mechanism. Less than the entire stroke may, however, be used. The movement of the sector causes the revolution of the pinion F″ in the direction indicated by the arrows in Fig. 3, and a winding action upon the spring H. As soon as the return movement of the swinging lever is begun the back rotary movement of the pinion F″, which is communicated to the arm *h*, rigidly secured thereto, acts to unship the pawl *i* from the ratchet-wheel *g″*. This is accomplished by the shifting of that end of the pin which is in the slot *i″* of the arm *h* to the opposite end of said slot, as shown in Fig. 7, the pawl being pivoted at *h″* in the arm *h′*. The arm *h′* is held stationary during the movement of the pin through its slot by the friction of the elastic washer *n″* against the side surface of the arm. Thus the fulcrum of the pawl is stationary during the movement of the pin *i′* through the slot *i″*. The return of the swinging foot-lever having been effected, as soon as foot-pressure is again applied to the swinging lever, in order to push it forward in the direction indicated in Fig. 3, the arm *h′* being temporarily retarded by the friction of the washer *n″*, and the arm *h* moving promptly with the pinion F″, the pin *i′* of the ratchet is moved to the end of the slot *i″* remote from that occupied by it in Fig. 7, the other end of the pin being held within the recess *i‴* of the arm *h*, which is of a width equal to the diameter of the pin. The pawl, therefore, is instantly caused to engage with the ratchet-wheel, the engagement of the pawl with the said ratchet-wheel *g″* causing the motion of the sector, (in the direction indicated by the arrow in Fig. 3,) which is of course communicated to the toothed pinion F″ to rotate the shaft F′ and coil the spring. The pawl *m* is during this action free from engagement with its ratchet-wheel *k*. The pawl *m*, at the beginning of the forward movement of the swinging lever, is promptly freed from engagement with its ratchet *k* by the forward movement of the arm G consequent upon the frictional action of the elastic washer *n‴*, the arm carrying the fulcrum or pivot *m″* of the pawl, and the outer end of the pin *m′* being laterally confined in the recess *m‴* of the stationary frame-work C, while the inner end of the pin has lateral play in the slot *m″* of the arm G. It will be seen, however, that upon the beginning of the return movement of the swinging lever the pawl *m*, by the back movement of the arm *h* to the limit of its slot, produced by the friction of the washer *n‴*, is immediately thrown into engagement with its ratchet *k*, and coincidently with the unshipping of the pawl *i* from its ratchet-wheel *g″*.

By a movement of the swinging lever in the manner described the helical spring is kept coiled to a degree or tension sufficient to keep up the rotation of the main shaft of the machine with the desired degree of force. It is not necessary, however, that a full stroke shall be given to the foot-lever, or that its movement be constant, as the length and frequency of the stroke or movement of the foot-lever will be determined by the operator to suit the exigencies of the work to be performed by the sewing or other machine.

As hereinabove described, the machine is designed to be used by a constant or substantially constant movement of the swinging or foot lever, and a short spring is provided, not specially designed for storing up power, to run the machine for a considerable length of time, as in other motors of this class. However, this result can be partially effected by the operator placing his hand upon the fly-wheel *b* and keeping up the foot movement; but I have provided for producing this result in a more effective manner by the following devices: A shaft, I, is supported in two bearings, H H, under the table C′, to which are rigidly fixed two levers, K and L, K being vertical, and L horizontal. The lever L is slotted at its end, a vertical rod, M, being fitted into it and held in place by a bolt, *s*. The top of the vertical

rod M is provided with a brake-shoe, *t*, having a rubber facing, *t'*, which, when pressed against the fly-wheel *b*, will stop the main shaft *a* of the sewing or other machine. The lever K stands in the vertical plane of the movement of the sector E, and by giving the swinging lever its full movement, so as to throw it forward to its fullest extent, it will strike the vertical lever K, and thus bring the brake-shoe against the fly-wheel, causing the stop movement referred to. The vertical rod and attached brake, when released, fall by gravity, the vertical rod M being caught by the shoulders *v*, which strike the table C', through a slot in which the rod works.

The spring where the brake is used may be longer than where it is not employed, in order to store up a certain amount of power to be expended in running the machine.

It will be observed that by unshipping the pawls in the manner described, when they are intended to be inoperative, they travel over the teeth of the ratchet without contact therewith, and that wear upon the ratchet-wheels is therefore lessened.

My invention is found to be simple, reliable, and effective in operation, and to fully perform the duty of providing power for a sewing or other similar small machine.

Having described my invention, I claim—

1. The combination of a helical spring, a spring-barrel surrounding a rotary shaft, a swinging foot-lever, and mechanism for transmitting rotary movement to the spring-shaft from the swinging foot-lever, substantially as set forth.

2. The combination of a helical spring surrounding a rotary shaft, a spring-barrel, a swinging foot-lever having a toothed sector, a toothed pinion upon the spring-shaft adapted to engage with the toothed sector, and ratchet-and-pawl mechanism, substantially as set forth.

3. A helical spring surrounding a rotary shaft, a spring-barrel, a gear-wheel attached to said barrel and adapted to engage a toothed pinion of the main shaft of the sewing or other machine, combined with a swinging foot-lever, means for transmitting rotary movement to the spring-shaft from a swinging movement of the foot-lever, and ratchet-and-pawl mechanism, substantially as set forth.

4. In a motor, a frame-work, a helical spring surrounding a rotary shaft, a barrel loose upon said shaft and attached to the spring, and a main gear-wheel attached to said barrel, combined with a swinging foot-lever, a toothed sector mounted upon the shaft of said swinging lever, a pinion loose upon the spring-shaft and adapted to engage the teeth of the sector, a ratchet-and-pawl mechanism for imparting the movement of the sector to the spring-shaft, and a ratchet-and-pawl mechanism for preventing the return movement of the spring, substantially as set forth.

5. The combination, in a motor, of the shaft F', recessed arm *h*, ratchet-wheel *g''*, slotted arm *h'*, pawl *i*, pin *i'*, washers *n' n''*, and screw *n*, substantially as set forth.

6. In a motor, the slotted arm *h'*, carrying the pawl *i*, having its fulcrum at *h''*, and provided with the pin *i'*, combined with the ratchet-wheel *g''* and arm *h*, having the recess *i'''*, substantially as set forth.

7. In a motor, a ratchet-and-pawl mechanism consisting of a ratchet-wheel mounted upon a rotary shaft, a pivoted pawl, a slotted arm loose upon said shaft and furnishing the fulcrum of the pawl, a recessed arm, also loose upon said shaft, a pin running transversely through the short arm of the pawl, and having one end resting and playing in the slot of one arm, and the other end resting in the recess of the other arm and incapable of lateral movement therein, the slotted arm being adapted to be temporarily retarded during a radial movement of the other arm, whereby the pawl is shipped and unshipped, substantially as set forth.

8. In a motor, a ratchet-and-pawl mechanism consisting of a ratchet-wheel mounted upon a rotary shaft, a pivoted pawl, a slotted arm loose upon said shaft, a pin running transversely through the short arm of the pawl, and having one end resting and playing in the slot of said arm, and the other end resting in a recess of the stationary frame and incapable of lateral movement therein, the slotted arm being adapted to be radially moved to the limit of its slot by frictional action, whereby the pawl is shipped and unshipped, substantially as set forth.

9. In a motor, the combination of a swinging foot-lever, a toothed sector mounted on the shaft of said lever, a brake mechanism having a shoe adapted to bear upon the fly-wheel of the sewing or other machine run by the motor, and levers and arms adapting said brake to be applied to the fly-wheel by contact with the toothed sector during its movement, the brake being removed from contact with said wheel by gravity, substantially as set forth.

In testimony whereof I hereunto set my hand and seal.

DEXTER E. HAWKINS. [L. S.]

Witnesses:
OLIVER STANLEY,
JOHN E. SHERMAN.