H. BOLTON.

Spring-Motor.

No. 163,447. Patented May 18, 1875.

Fig 1.

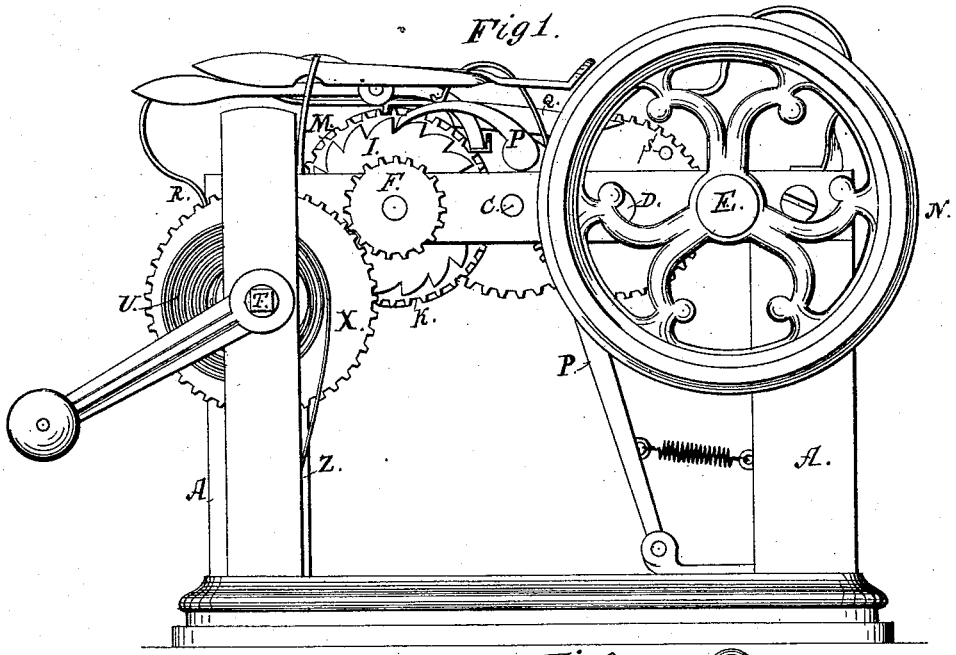


Fig 3.

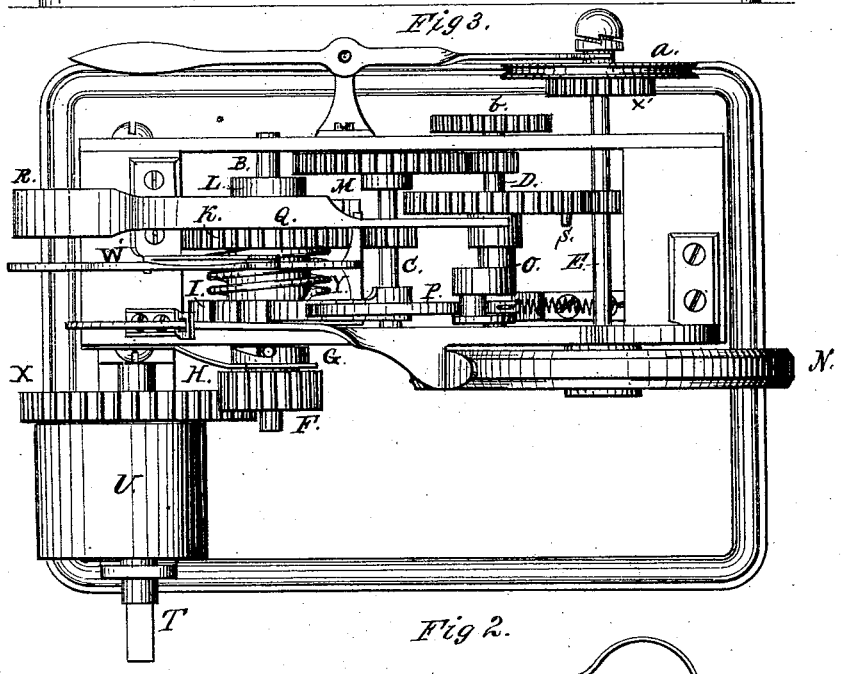
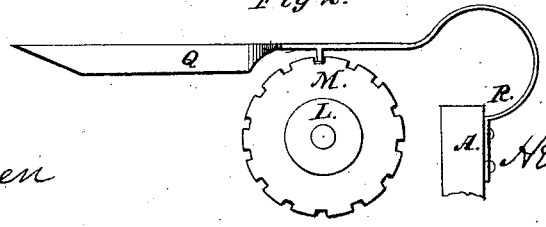


Fig 2.



Witnesses:
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UNITED STATES PATENT OFFICE.

HENRY BOLTON, OF BRANTFORD, CANADA.

IMPROVEMENT IN SPRING-MOTORS.

Specification forming part of Letters Patent No. **163,447**, dated May 18, 1875; application filed March 17, 1875.

To all whom it may concern:

Be it known that I, HENRY BOLTON, of the town of Brantford, in the county of Brant, in the Province of Ontario, Dominion of Canada, have invented certain Improvements in the Manner of Driving Sewing and other Machines, of which the following is a specification:

This invention relates to certain improvements in motors for driving sewing-machines, &c.; and it consists in a means for utilizing the power of a magazine-spring through a secondary driving-spring, the tension of which driving-spring is, relatively, constant, and which said secondary spring is intermittently wound up by the magazine-spring as fast as it spends its force, and while it is in operation, the two springs being so relatively constructed and arranged that the constant tension of the secondary driving-spring is less than the weakest tension of the magazine-spring at any stage of its operation, so that the magazine-spring can always wind up the driving-spring. A main shaft is actuated by the magazine-spring, and carries a rigidly attached ratchet-wheel, a rigidly attached stop-wheel, and a loose cog-wheel, which latter is connected with the ratchet-wheel by the secondary driving-spring, so that when the ratchet-wheel is operated by the magazine-spring, the said driving-spring is wound up and spends its force by revolving the loose cog-wheel which meshes with a train of gear-wheels and furnishes the motive power. To prevent the continuous unwinding of the magazine-spring, and keep the secondary spring from acting merely as a transmitter of its motion, a pawl is made to engage the stop-wheel and hold the main shaft stationary, except when it is raised by a pin upon one of the gear-wheels of the train, to allow the magazine-spring to take up the partially-exhausted driving-spring another notch. To make the driving-spring still more independent of the magazine-spring as to its uniform speed and tension, a second pawl, operated by an eccentric on one of the gear-wheels, is made to start the ratchet-wheel and main shaft in the direction impelled by the magazine-spring by reason of the momentum of a fly-wheel. The main driving-wheel and pinion on the main shaft, although impelled by the heavy magazine-spring, will not respond as quickly as is desirable to produce the best results, on account of the inertia and possible obstruction by foreign matter or a jam, and the second pawl, impelled by the momentum of a fly-wheel, overcomes the said inertia or obstruction, and makes the action of the magazine-spring instantaneous for winding up the driving-spring. By reason of this instantaneous and intermittent winding of the driving-spring, the action of the latter as to tension and speed is rendered almost entirely independent of the motive power of the magazine-spring.

Figure I is a view of machine embodying my invention. Fig. II is a view of ratchet or stop wheel M and pawl Q. Fig. III is a plan view.

A is the frame of the machine, which may be made of any form required. B, C, D, and E are the shafts of the machine. B is the main shaft, on the end of which is the pinion F, which runs loose on shaft, but is connected to shaft by pins and clutch G. There is also a groove turned in the boss of pinion F for a spring or fork, H, to work in and keep pinion against clutch on shaft B. A ratchet-wheel, I, having a heavy boss cast on it, is fastened to shaft B. The wheel K runs loose on shaft B, and another boss, L, which is fastened to shaft, keeps it in proper position. Round the boss of ratchet-wheel I a strong spring, Y, is coiled, one end of which is fastened to ratchet-wheel I, and the other to wheel K. On boss L, attached to the main shaft, a ratchet or stop wheel, M, is firmly fastened. Wheel K has forty-eight teeth working in a pinion of twelve teeth on shaft C, and shaft C carries a wheel of forty-eight teeth working in a pinion of twelve on shaft D. Shaft D carries a wheel of forty-eight teeth working in a pinion of twelve on shaft E. On shaft D an eccentric, O, is formed by which a pawl, P, is made to work the ratchet-wheel I, which has sixteen teeth, thus moving the ratchet-wheel one tooth each revolution of shaft D. Q is a pawl working in ratchet-wheel M, which keeps ratchet-wheel I stationary when not under the influence of pawl P and magazine-spring. The one end of pawl is fastened to frame at R, and the other is lifted by a pin, S, in the wheel on shaft D. T is the shaft that carries the coiled spring U,

and on which spring U is wound a wheel, X, having seventy-two teeth, and, working in pinion F, is keyed on shaft T. Z is a bar or stud on which the end of spring is fastened. Shaft E on the one end carries the fly-wheel N, and on the other the pulley *a* for transmitting the power of the machine. *b* is a wheel on the end of shaft D.

In applying my motive power, the strong driving-spring Y coiled on the boss of ratchet-wheel I is wound up, and the pawl Q working in ratchet-wheel M keeps it so. The coiled spring U is then wound up, and also retained in position by means of pawl Q and ratchet-wheel M. The wheels and pinions must be so calculated that when the shaft D, which carries the eccentric O, makes one revolution, the pawl P will have moved the ratchet-wheel I one tooth; and spring Y being the driver of the machine, and connecting ratchet-wheel I and wheel K, the wheel on shaft D is driven sixteen times faster than the wheel K on shaft B. Shaft E carrying fly-wheel N moves four times faster than shaft D, and the momentum of fly-wheel carries over the eccentric O, which drives pawl P to move ratchet-wheel I. Ratchet-wheel I being connected by spring Y to wheel K, another ratchet or stop wheel, M, on the same shaft with ratchet-wheel I, having the pawl Q worked by a pin S in the wheel on shaft D, is used to keep ratchet-wheel I stationary when not under the influence of pawl P. The coiled spring U, which is attached to and coiled round shaft T, which carries wheel X to work in pinion F, is a magazine of power to assist pawl P in throwing up ratchet I.

When more power is required, a lever, W′, is used to lift pawls P and Q, and the united power of both springs Y and U is applied. A movable pulley, A, to transmit the power of the machine, is placed on shaft E, and on it is fastened a wheel, *x*′, of equal size with a wheel, *b*, on shaft D, so that when the wheels are in gear the speed of the pulley is reduced. When the machine is at its ordinary speed, the pulley is attached to the shaft by a clutch on the end of it, and when between clutch and wheel *b*, the motion of the pulley is stopped. The speed of the machine is regulated by a brake on fly-wheel N.

I claim as my invention—

1. The combination of the magazine-spring U with the secondary constant-tension driving-spring I, rigidly attached at one end to a ratchet-wheel upon the main-shaft, and at the other to a loose gear-wheel, substantially as and for the purpose described.

2. The combination, with the magazine-spring U and the driving-spring I, rigidly attached to the shaft at one end, and to the loose gear-wheel at the other, of a stop-wheel, M, rigidly attached to the main shaft, a pawl, Q, and the pin S upon the gear-wheel, substantially as described, for the purpose of rendering the action of the magazine-spring upon the driving-spring intermittent.

3. The combination, with the ratchet-wheel I upon the main shaft, of the pawl P, the eccentric O, and the fly-wheel N, for the purpose of rendering the intermittent action of spring U upon I instantaneous, substantially as set forth.

4. The combination, with pawls P and Q, of a lever W′, for the purpose of allowing the machine when nearly run down to operate with both springs and continuously.

5. The combination, with a shifting-lever, of a loose pulley, *a*, having a clutch upon one side and a gear-wheel upon the other, to reduce the speed, substantially as described.

HENRY BOLTON.

Witnesses:

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