(No Model.) 3 Sheets—Sheet 1.

A. WATKINS.

SPRING MOTOR.

No. 309,901. Patented Dec. 30, 1884.

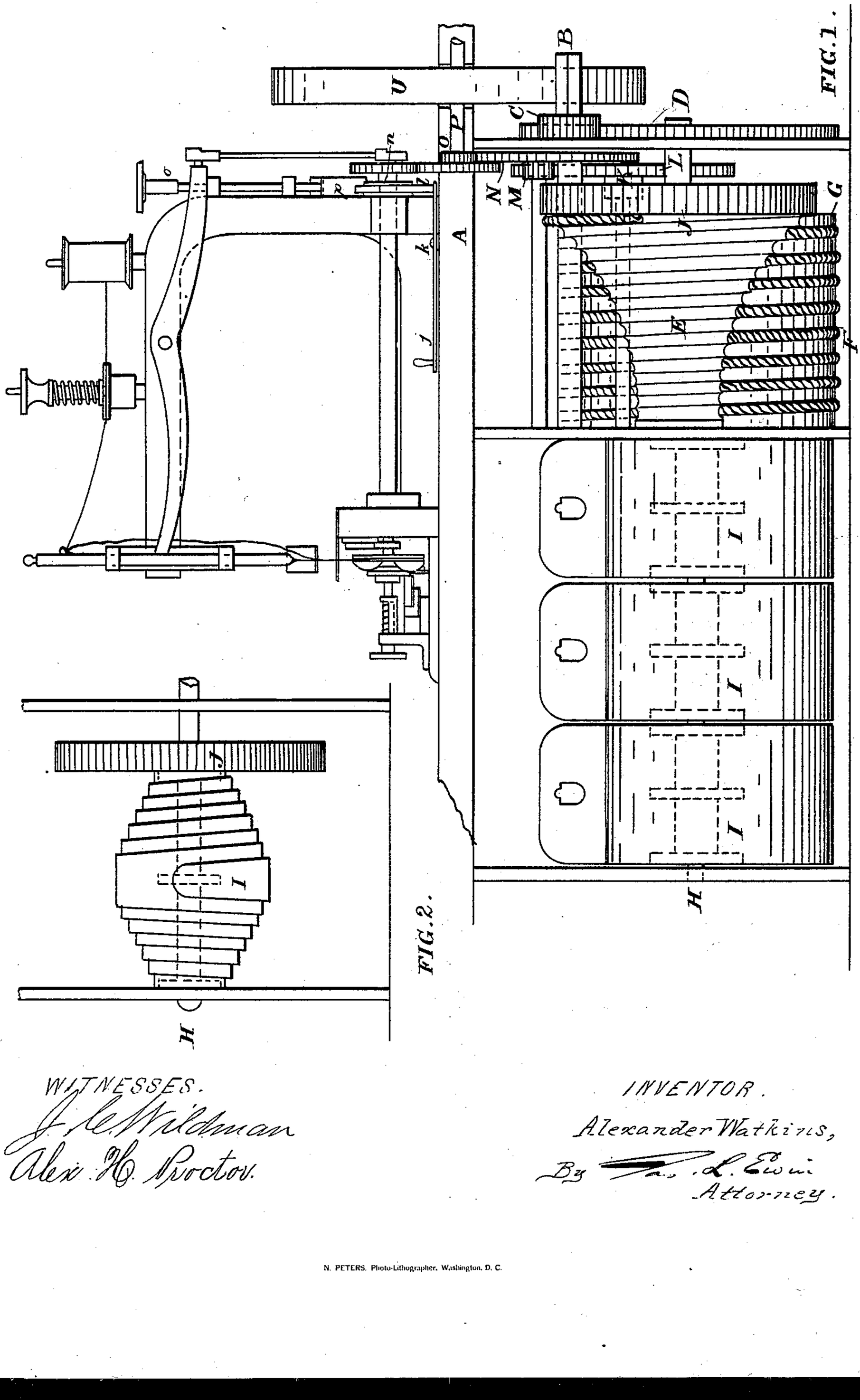

FIG. 1.

FIG. 2.

WITNESSES.

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(No Model.)

3 Sheets—Sheet 2.

A. WATKINS.

SPRING MOTOR.

No. 309,901. Patented Dec. 30, 1884.

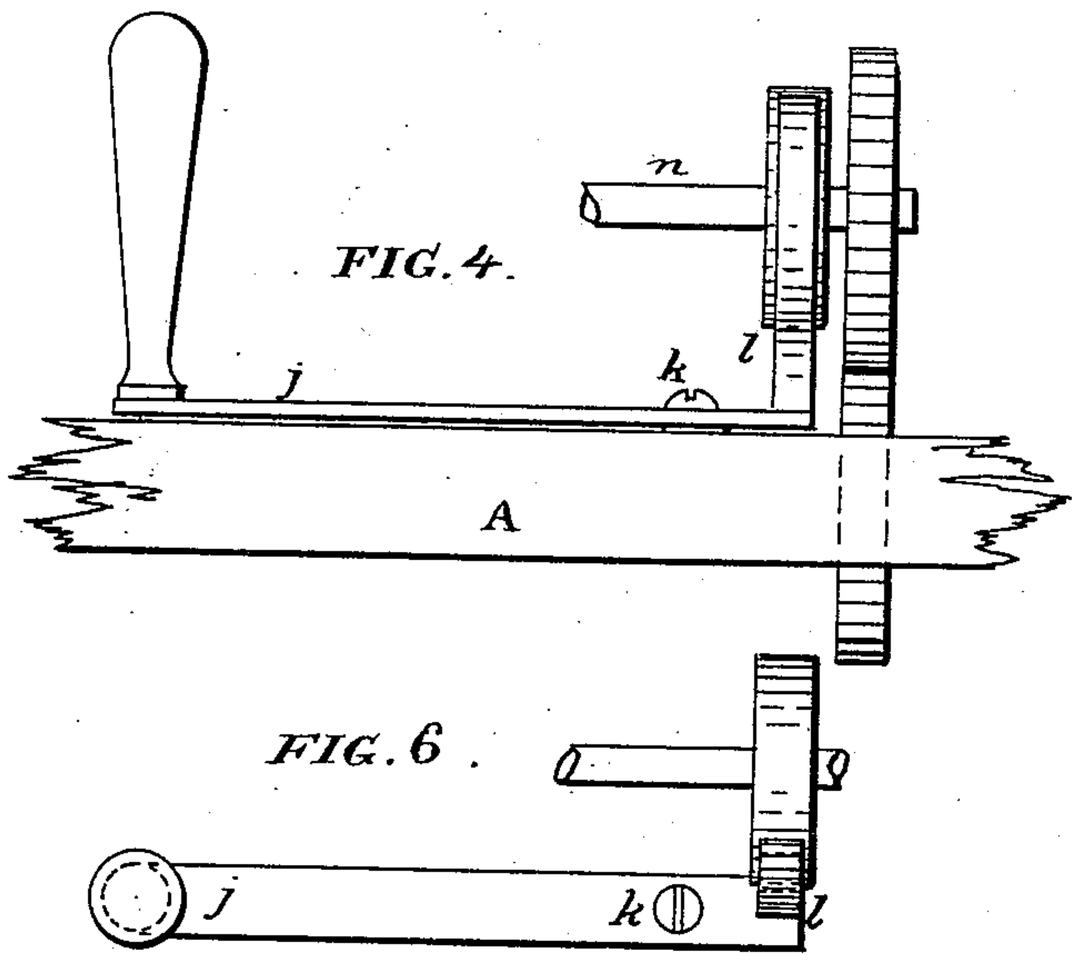

FIG. 4.

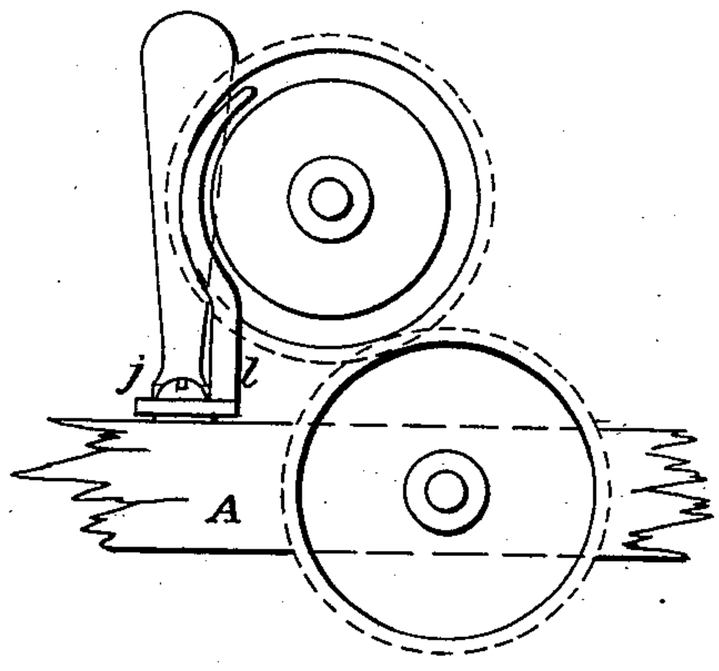

FIG. 5.

FIG. 6.

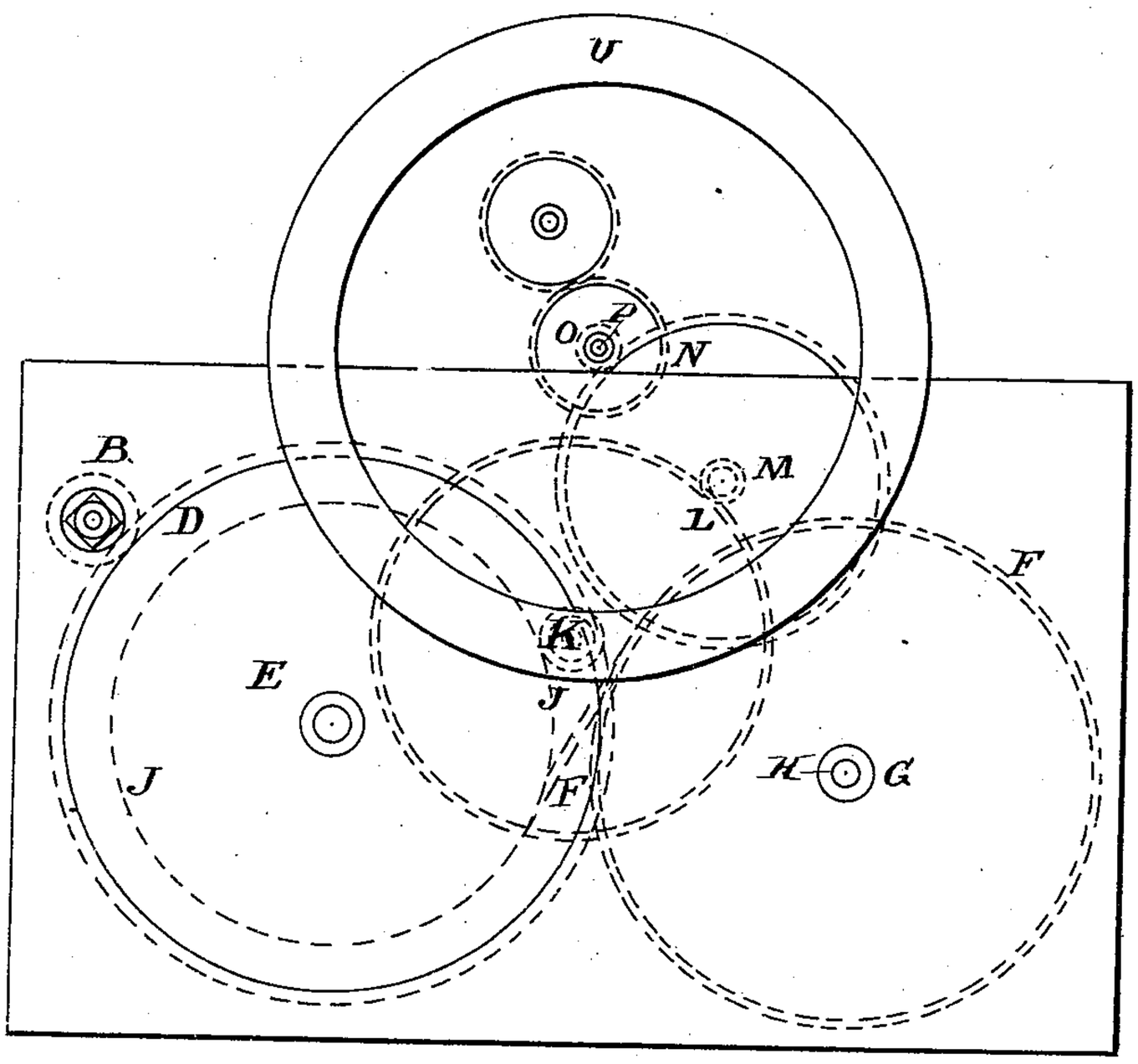

FIG. 3.

WITNESSES

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3 Sheets—Sheet 3.

A. WATKINS.

SPRING MOTOR.

No. 309,901. Patented Dec. 30, 1884.

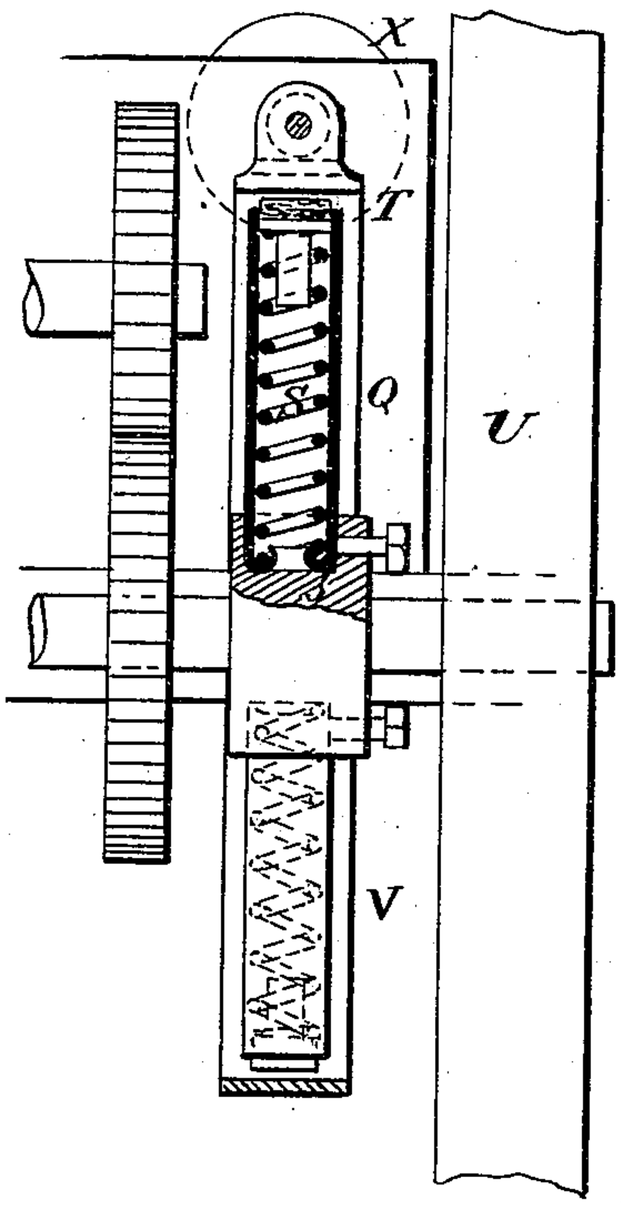

FIG. 7.

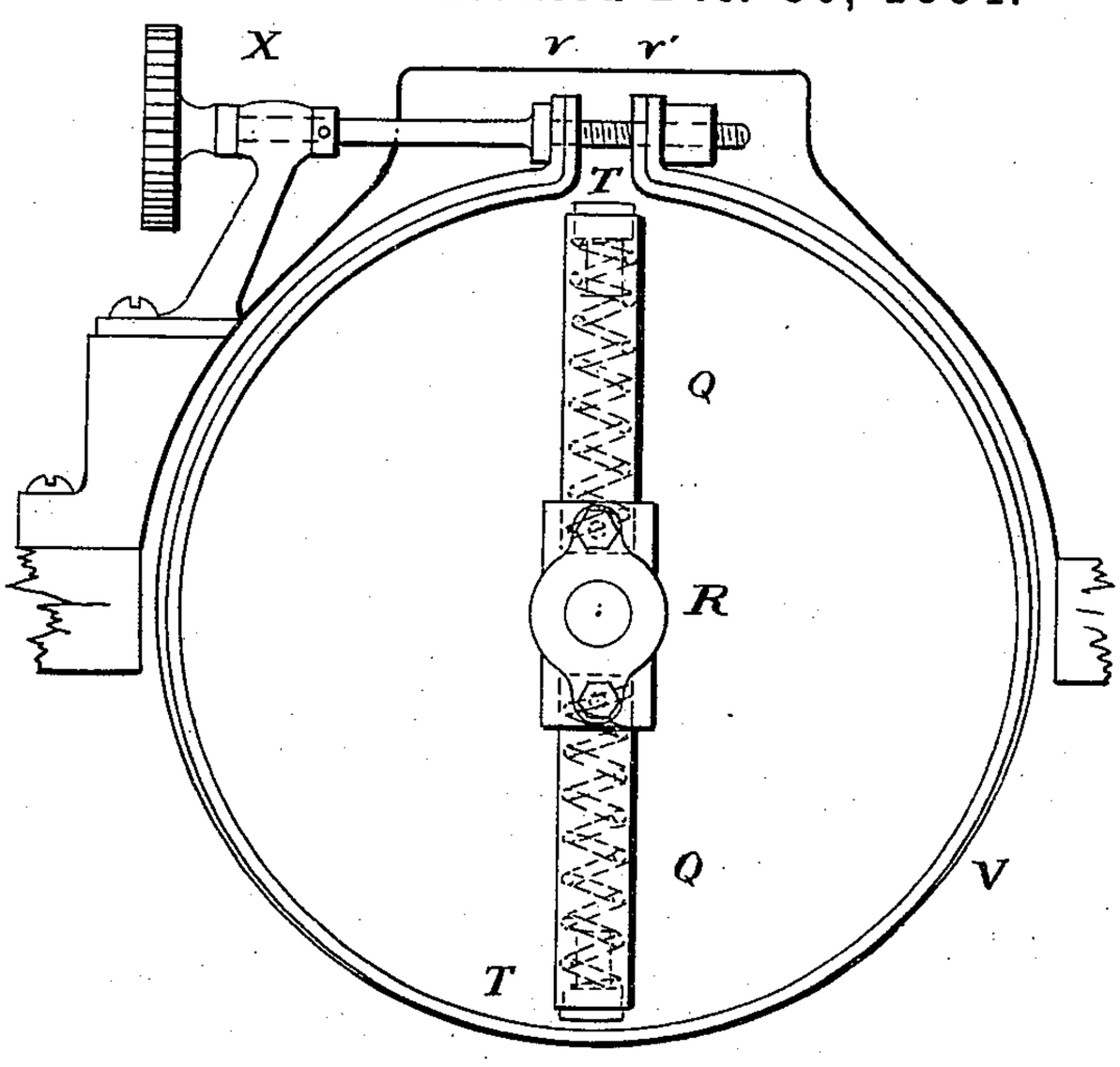

FIG. 8.

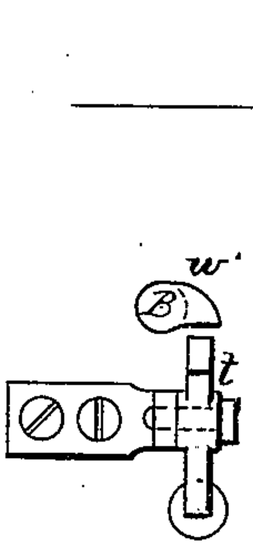

FIG. 10.

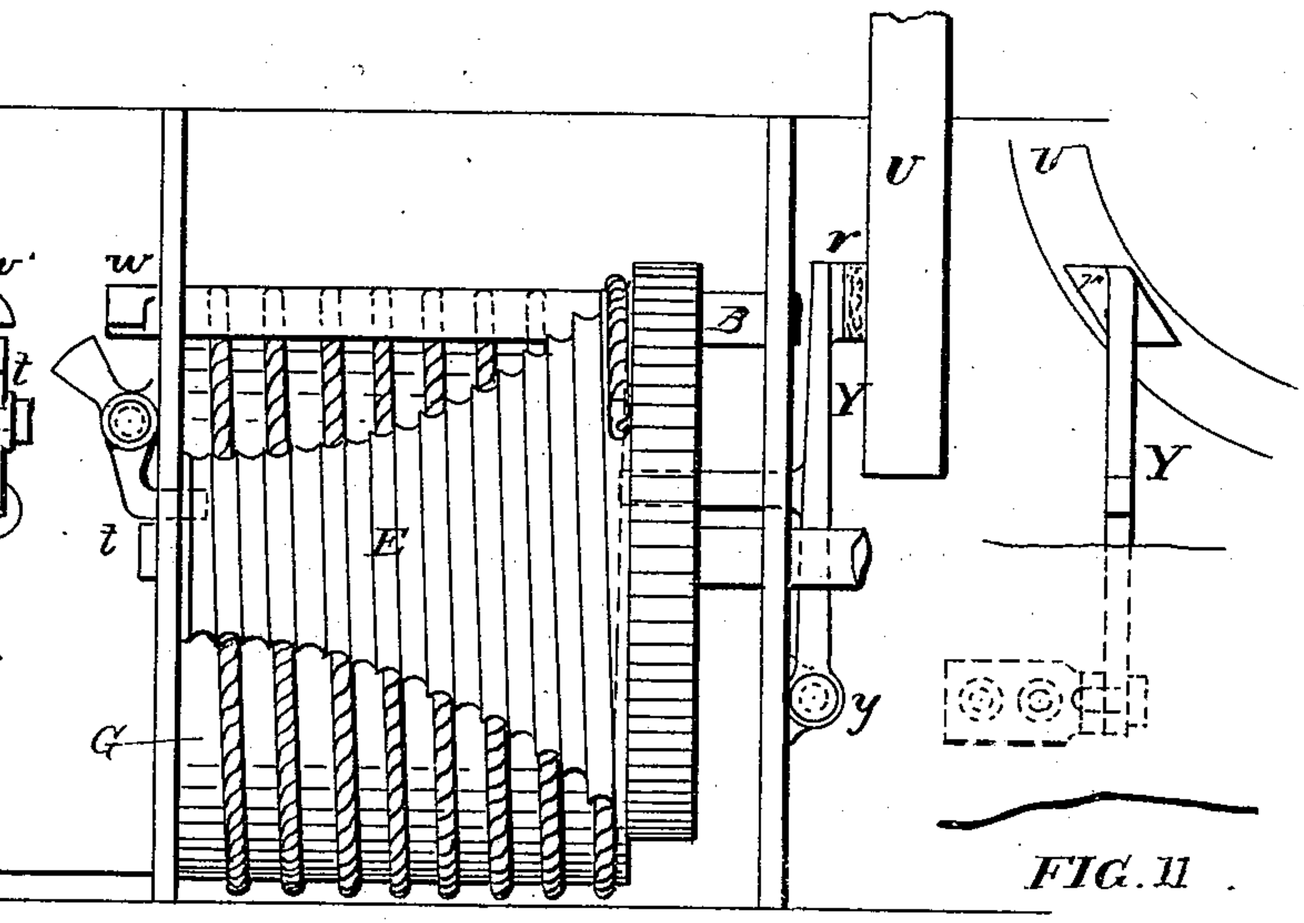

FIG. 11.

FIG. 9.

WITNESSES.

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Alexander Watkins,

By L. L. Lewis,

Attorney.

UNITED STATES PATENT OFFICE.

ALEXANDER WATKINS, OF LONDON, ENGLAND, ASSIGNOR TO THE SELF ACTING SEWING MACHINE COMPANY, (LIMITED,) OF SAME PLACE.

SPRING-MOTOR.

SPECIFICATION forming part of Letters Patent No. 309,901, dated December 30, 1884.

Application filed April 23, 1884. (No model.)

To all whom it may concern:

Be it known that I, ALEXANDER WATKINS, a subject of the Queen of England, residing at London, England, have invented certain new and useful Improvements in Spring-Motors, of which the following is a full, clear, and exact specification.

My invention relates to improved apparatus in combination with any sewing-machine, whereby by the reaction of a spring or springs, after winding up, the said sewing-machine may be rendered "self-acting" at a uniform and regulated speed, as hereinafter more fully described.

Figure 1 is a side elevation of my improved spring-motor connected to and driving a sewing-machine. Fig. 2 shows an alternative form of motor, in which a tapered form of spring is used, so as to dispense with the parabolic drum. Fig. 3 is an end view showing the motor-gearing. Figs. 4, 5, and 6 are a side elevation, end elevation, and plan, respectively, of the instantaneous brake. Figs. 7 and 8 are part sectional and end elevations, respectively, of my centrifugal regulator. Fig. 9 is an elevation of the motor, showing the over-winding and overrunning-down stops in position. Fig. 10 is a detail of the over-winding-stop, and Fig. 11 is a detail of the overrunning-down stop.

Like letters refer to similar parts in each of the different figures.

A, Fig. 1, is the base plate or board on which the sewing-machine rests, underneath which plate the driving apparatus is inclosed within a box or casing, (only partially shown in the figure.)

B is a shaft, on which is a pinion, C, gearing with a wheel, D, on the axis of the parabolic spiral E, to which is connected one end of a line or chain, F, the other end of which is fixed to a block or solid cylinder of wood, G, mounted so as to turn in journals, and having a shaft, H, on which is fixed the roller with flanges, (shown by dotted lines,) to which are fastened one end of each of the volute springs I I, the other end of each spring being fastened to the back of the box or casing, or to a horizontal bar or rod provided with suitable hooks for the purpose.

By means of the foregoing arrangement of parts, on applying a key to the square end of the shaft B the parabolic spiral will be turned on its axis, and thereby caused to take up the line or chain F as it is unwound from the block or solid cylinder G, which will be turned so as to give motion to the roller with its flanges, to which one end of each spring I is fastened, and thereby cause all the springs to be simultaneously wound up, the requisite amount of mechanical force being thus stored up in readiness to work the machine by the gradual reaction of the springs I I through the gearing, by which motion is conveyed from the parabolic spiral to the main shaft of the machine. This gearing consists of the toothed wheel J, working in the pinion K, on the shaft of which is the wheel L, working in the pinion M, the shaft of which carries the wheel N, which transmits motion to the pinion O on the driving-shaft P of the machine, thereby giving motion to the several working parts of the sewing-machine. U is the fly-wheel for equalizing the momentum of the moving parts. The brake, Figs. 4, 5, and 6, is a band, *l*, pressing the shaft *n*, operated by the lever *j*, pivoted on pin *k*. It will thus be seen that by periodically winding up the springs the combined machine can be made to perform the work of a sewing-machine, the speed of which can be regulated as required by the following means, as illustrated in Figs. 8 and 9.

My regulating device consists of one or a number of hollow arms or tubes, Q, projecting radially from a boss, R, the said boss being keyed securely upon one of the revolving shafts of the motor mechanism, preferably on the one revolving at the highest speed.

Each radial tube Q contains a spiral spring, S, made fast by solder or otherwise at the inner end of the tube, and provided at its outer end with a weighted pad or "foot," T, wholly or in part of metal, soldered fast or otherwise attached to the outer end of the spring, and sliding freely within the outer end of the tube, so as to project therefrom under centrifugal force when the tube revolves with the shaft. The spring may instead be loose, with a heavy ball or sliding weight behind its inner end,

connected with a pad or foot at the outer end, the escape of the spring being in this case prevented by an internal flange or collar at the outer end of the tube, screwed in or otherwise attached; and elastically-resisting material, or springs other than spiral springs, may be substituted for the latter. When the machine is at rest, said pads or feet occupy their retracted positions. Under speed each pad or foot is projected more or less by centrifugal force against the retracting energy of its spring, and at a given speed comes in contact with the inner periphery of a non-rotary surrounding ring, V, held stationary with the framing of the machine, and by frictional coaction with the latter tends to confine the machine to this speed. The exterior surface of the radial feet or pads and the inner circumference of the said ring may be covered, if desired, with wood, leather, or any other desirable substance, or they may have polished metallic faces. The external retarding ring V is preferably not a complete ring, but has its two extremities turned outward, as lugs *v* and *v'*. Through these two lugs I pass a thumb-screw, X, tapped into the farther lug, *v'*, with a collar upon its spindle pressing on the nearer lug, *v*, or fitted in any other known manner so that the lugs are drawn closer together, and the ring V thereby reduced in diameter when the thumb-screw is rotated in one direction, and, vice versa, the ring is expanded when the movement of the thumb-screw is reversed.

In order to insure that the said external ring shall close in such a manner over the greater part of its circumference as to maintain its true circular shape, I may make the ring of varying section either as regards its width or thickness, so as to prevent distortion at those points nearest to the adjusting-screw. This device enables the operator to vary at will the maximum speed at which the retarding feet come into contact with the external ring by the opening or closing of said ring, as described.

The rotating tubular arms may be inclosed by a suitable case, and the adjustable ring may be attached thereto in such a way as not to interfere with its closing and expanding movement.

To prevent overwinding, I add a lever, *t*, rocking on a pivot fixed in the frame. The lower end of the said lever, being thrust outward by the last length of the chain as it is wound up upon the fusee, throws the upper end of the lever against a stop, *w*, on the winding-axle, which will check the winding up at the desired point. There is also a stop, Y, added to the machine to prevent the overrunning down of the chain. The last length of the chain as it unwinds from the fusee presses against the lever Y, working on a pivot, *y*, which, by the friction of the pad *r* on the fly-wheel U, stops the motor.

For quickly stopping the motor or checking the motion of the machine by hand, I add an "instantaneous brake." (Shown in position in Fig. 1 and detached in Figs. 4, 5, and 6.) This brake consists of a horizontal lever, *j*, pivoted near one end by a vertical screw, and having at this end an upwardly-projecting curved finger, *l*, which coacts with the periphery of a brake wheel or flange, *n*, on the sewing-machine shafts. For more permanently stopping or locking the machine when the driving-springs are wound, a vertical brake-screw, *o*, may press a pivoted brake-shoe, *p*, into holding contact with the same brake wheel or flange *n*, as shown in Fig. 1.

Having now described my invention and the manner of its performance, be it known that what I claim as my invention, and desire to secure by Letters Patent of the United States, is—

1. In a spring-motor, the combination of a spiral parabolic drum, E, and an elastic spring or springs, chain, and gearing, with a centrifugal and adjustable regulator, Figs. 7 and 9, to produce uniform rotation upon the driven mechanism, the speed being adjustable at will, substantially as described.

2. In a spring-motor containing a spiral parabolic drum and chain, the combination, with a winding-shaft having a stop-lug thereon, of an overwinding-stop, *t*, Figs. 9 and 10, constructed and arranged substantially as shown, for the purpose set forth.

3. In a spring-motor containing a spiral parabolic drum and chain, the combination, with the balance-wheel, of an overrunning-down stop, Y, carrying a friction-pad, *r*, and operated by the chain on said drum, substantially as herein specified.

4. The combination of a spring-motor containing a spiral parabolic drum and chain, and provided with overwinding and overrunning-down stops, with a sewing-machine provided with an instantaneous brake, as illustrated by Fig. 1.

London, this 7th day of March, A. D. 1884.

ALEXANDER WATKINS.

Witnesses:

WILLIAM O. HEWLETT,

SAMUEL P. WILDING.