No. 803,528. PATENTED OCT. 31, 1905.

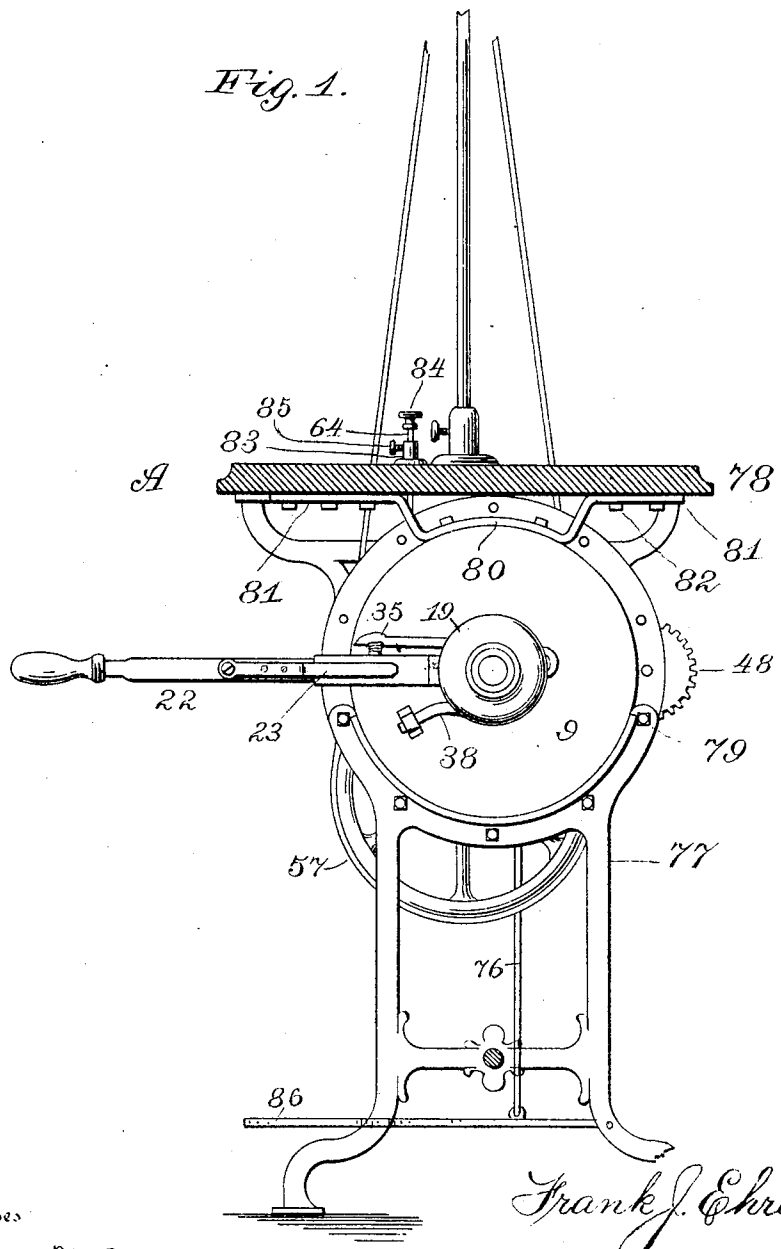
F. J. EHRENDRIECH.

SPRING MOTOR.

APPLICATION FILED DEC. 7, 1903.

4 SHEETS—SHEET 1.

Fig. 1.



Witnesses

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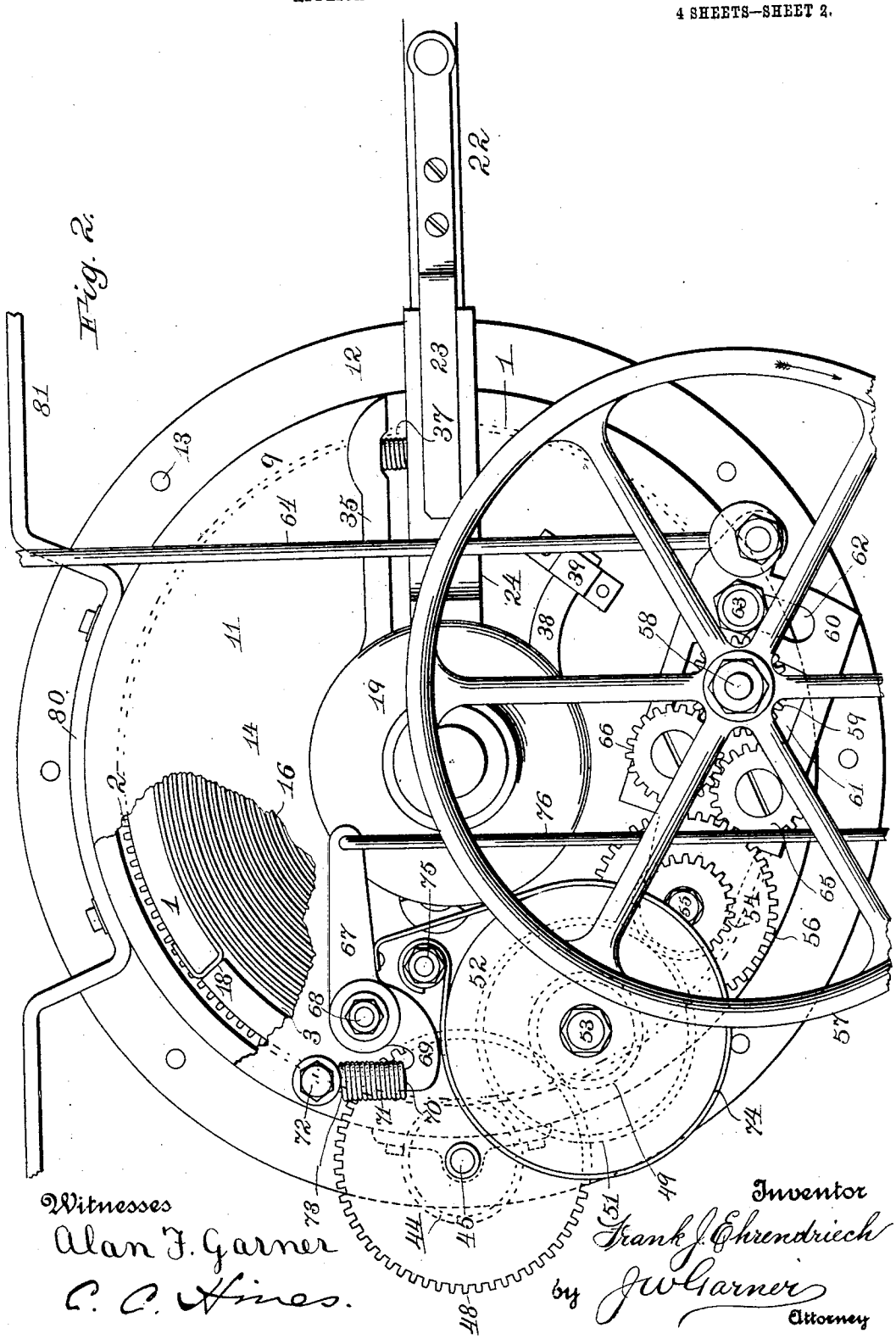
4 SHEETS—SHEET 2.

Fig. 2.



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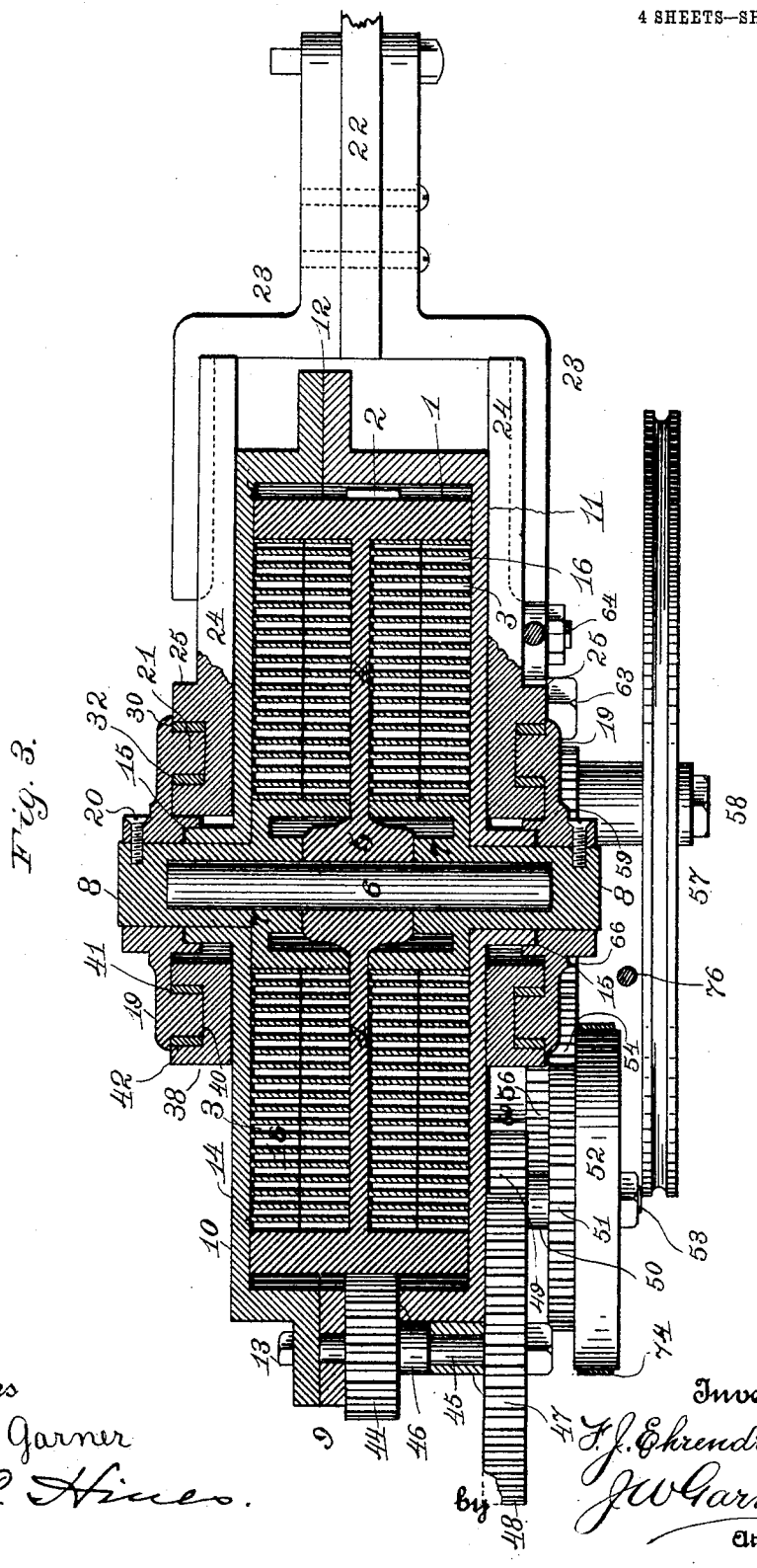
4 SHEETS—SHEET 3.

Fig. 3.



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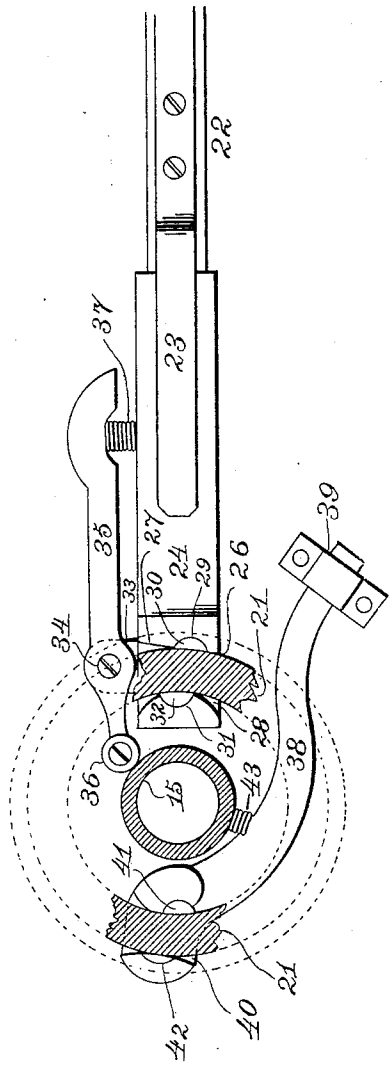
4 SHEETS—SHEET 4.

Fig. 4



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UNITED STATES PATENT OFFICE.

FRANK J. EHRENDRIECH, OF JACKSON, TENNESSEE.

SPRING-MOTOR.

No. 803,528. Specification of Letters Patent. Patented Oct. 31, 1905.

Application filed December 7, 1903. Serial No. 184,040½.

To all whom it may concern:

Be it known that I, FRANK J. EHRENDRIECH, a citizen of the United States, residing at Jackson, in the county of Madison and State of Tennessee, have invented a new and useful Spring-Motor, of which the following is a specification.

My invention relates to improvements in spring-motors for driving dental engines and other light machinery; and it consists in the construction, arrangement, and combination of devices hereinafter described and claimed.

The object of my invention is to provide an improved machine of this character which may be readily attached to a dental engine or other machine for operating it, which may be readily wound and kept in operating order by one hand and which may be controlled by the foot of the operator, which will need only occasional rewinding when in use, so as to leave both hands of the operator free for the performance of his work on the dental engine or other machine, and which is entirely efficient for furnishing the motive power to drive the engine or other machine.

A further object of my invention is to effect improvements in the construction, combination and arrangement of the spring-driven gears for furnishing the motive power.

A further object of my invention is to effect improvements in the construction of the casing in which the springs and master-gear are inclosed.

A further object of my invention is to effect improvements in the construction of the brake mechanism for controlling the speed of the motor.

A further object of my invention is to effect improvements in the construction of the reversing mechanism.

A further object of my invention is to effect improvements in the construction of the winding mechanism.

A further object of my invention is to effect improvements in the means for attaching the motor to the table and frame of the dental engine or other machine in connection with which my improved spring-motor is employed.

In the accompanying drawings, Figure 1 is a vertical sectional view of a dental engine, showing my improved spring-motor attached thereto. Fig. 2 is a detail elevation, partly in section, of my improved spring-motor. Fig. 3 is a horizontal central sectional view of the same, the plane of its section being indicated by the line *a a* of Fig. 2. Fig. 4 is a detail sectional view taken on the plane indicated by the line *b b* of Fig. 3.

The master-gear 1 is provided with peripheral spur-teeth 2 and is hollowed on opposite sides to provide a pair of circular chambers 3 for the reception of the springs which furnish the motive power and rotate the master-gear. The web 4, which divides the spring-chambers, is provided with a hub 5, which projects from opposite sides thereof. An axle 6 extends through the center of the hub, and on the axle, on opposite sides of the hub, are winding-arbors 7, which are free to revolve independently of the master-gear and are provided with outwardly-projecting portions 8 of reduced diameter, forming hubs. The ends of the axle 6 are covered by these hubs 8, as shown in Fig. 3. The winding-arbors form the bearings for the axle of the master-gear. The latter and the winding-arbors are inclosed in a circular casing 9, which comprises a pair of circular separable sections 10 11 of unequal depth, the section 11 being the deeper. The said sections are provided on their inner mutually-contacting sides with flanges 12 of suitable size, which flanges are secured together by means of bolts 13, thereby securing the sections of the casing together so that they may be readily separated by removing the bolts. The outer sides 14 of the sections are continuous webs, forming closures for the outer sides of the spring-chambers in the master-gear. At the centers of the webs 14 are outwardly-projecting hubs 15, through which the hubs 8 of the winding-arbors extend, said hubs 15 forming bearings for the hubs of the winding-arbors. I employ four springs 16, which are coiled in the chambers of the master-gear, two in each chamber thereof, and have their inner ends attached to the winding-arbors, as at 17, and their outer ends attached to the peripheral rim of the master-gear, as at 18.

On the outer ends of the hubs of the winding-arbors are winding-disks 19, which are secured thereto, as by screws or other suitable devices 20, and are spaced from the outer sides of the casing-sections a suitable distance. Each winding-disk has an annular concentric flange 21 on its inner side.

The winding-lever 22 has a pair of fork-arms 23, bolted or otherwise detachaby secured to opposite sides thereof at its inner end. The fork-arms are disposed astride one side of the casing 9, and on their inner sides are secured grip-bars 24, which operate on

opposite sides of the casing and have outwardly-projecting enlargements 25 at their inner ends recessed transversely, as at 26, to receive the annular flanges 21 of the winding-disks. The outer side or face 27 of each recess 26 is tangential to the outer side of the flange 21, with which it coacts, and the inner side 28 of each of said recesses is semicircular or segmental in form where it is opposed to the inner side of the said flange 21, and its radius is considerably less than that of said flange. In the tangential face of each of said recesses is a segmental seat 29 for a grip-block 30 of hardened steel, the friction-face of which is tangent to the flange 21, and a similar seat 31 in the segmental face 28 of each of said recesses receives and retains a grip-block 32 of hardened steel, the working face of which is convex, as shown. The grip-blocks 30 32 are out of line with each other, the former being lower than the latter, so that the grip-blocks will engage the outer and inner sides of the flanges 21 of the winding-disks at each downstroke of the winding-lever and will release said flanges at each upstroke thereof. Each grip-bar is provided on its upper side near its inner end with a lug 33, to which is pivoted, as at 34, a shoe-bar 35. Each shoe-bar has at its inner shorter arm a roller or other antifriction device 36, that bears on the upper portion of the hub 15 of one of the casing-sections. A spring 37 bears between each grip-bar and the under side of the longer arm of its shoe-bar. It will be understood by reference to Fig. 4 of the drawings that the shoe-bars form, in connection with the hubs of the casing and the springs 37, yielding supports for the inner ends of the grip-bars, which are extensions of the inner end of the winding-lever.

Retaining-levers 38 coact with the grip-bars of the winding-lever to lock the winding-disks during the upstrokes of the winding-levers to cause the winding-disks, and hence the winding-arbors, with which they are connected, to be rotated by a step-by-step movement in one direction only to wind the springs 16. Each retaining-lever has its outer end loosely mounted for slight pivotal and longitudinal movement in a keeper 39 on one side of the casing and has at its inner end on its outer side a recess 40 to receive the flange 21 of one of the winding-disks at a point diametrically opposite its companion grip-bar. The faces of said recess are convex and are provided with seats similar to those of the grip-bars for the reception and retention of grip-blocks 41 42 to engage the inner and outer sides of the flange 21, respectively. The faces of said grip-blocks are convex, as shown, and said grip-blocks are out of line with each other. Springs 43 bear between the retaining-levers and the under sides of the hubs of the casing to retain the grip-blocks of the retaining-levers in frictional engagement with the annular flanges of the winding-disks during the upstrokes of the winding-lever to prevent retrograde rotation of the said disks and the winding-arbors and permit the disengagement of the said grip-blocks from said annular flanges during the downstrokes of the winding-lever and the step-by-step movement of the said disks and arbors.

A pinion 44 on a shaft 45 projects through an opening 46 in the periphery of the casing and engages the spur-teeth of the master-gear. Said shaft has its inner end journaled in a bearing-opening in the casing-flanges 12, and a block 47, bolted on the periphery of the casing-section 11, also forms a bearing for said shaft. At the outer end of said shaft is secured a spur-gear 48, which engages a pinion 49 on a sleeve or tubular shaft 50, which also carries a spur-gear 51 and a brake-disk 52. A stub-axle 53, which is secured to and projects from the casing-section 11, forms the bearing for the tubular shaft 50. The gear 51 engages a pinion 54 on a stub-axle 55, which also projects from the casing-section 11. A spur-gear 56 is fast to and rotates with said pinion.

A belt-wheel 57 for conveying power to the dental engine or other machine driven by the motor is mounted on a stub-axle 58, which projects from the casing-section 11. A spur-gear 59 rotates with the belt-wheel. A shifting arm 60 is pivoted on the stub-axle 55, has an opening 61 to clear the stub-axle 58, and is also provided with a curved slot 62, which is concentric with the stub-axle 55. A stop-bolt 63 in the said slot is secured to the casing-section 11 and, in coaction with the ends of the slot, serves to limit the angular movement of the shifting arm. A rod 64 for shifting said arm is attached thereto and is here shown as extending upwardly therefrom. The shifting arm carries a pair of gears 65 66, which engage each other, the gear 65 engaging the gear 56 at all times and being driven thereby through the train of gears hereinbefore described, which connect it to the master-gear. When the shifting arm is moved to the position shown in Fig. 2 to engage the gear 66 with the gear 59, the belt or power wheel is driven in the direction indicated by the arrow. When the shifting arm is moved to disengage the gear 66 from the gear 59 and engage the gear 65 directly therewith, the belt or power wheel is driven in the reverse direction, as will be understood.

A brake-lever 67 is pivotally mounted, as at 68, and has a short arm 69, provided with a vertical stud 70. A coiled extensile spring 71 bears between the said arm and a stud-bolt 72, that projects from the casing-section 11, the ends of the said spring being seated, respectively, on the stud 70 and a similar stud 73, with which the stud-bolt is provided. A friction brake-band 74 passes around the periphery of the friction brake-disk, and has one end secured to a stud-bolt 75 and the other

end secured to the brake-lever. The tension of the spring 71 on the latter causes said lever to draw the friction-band so tightly on the friction brake-disk as to normally prevent the latter from rotating, and hence locking the master-gear and the train of gears which it operates and preventing the operation of the motor. A rod 76 is attached to the brake-lever and depends therefrom, and by drawing downwardly on said rod to depress the brake-lever against the tension of its spring the friction brake-band may be slackened to permit operation of the motor at any desired rate of speed, as will be understood.

In Fig. 1 of the drawings I show my improved spring-motor attached to a dental engine A, to drive the same. The lower side of the casing fits in an opening in a standard 77 of the engine table or frame, of which 78 is the table-top. Bolts 79, which enter threaded openings in the flange of the casing, detachably secure the latter, and hence the motor, to said standard. On the upper side of the casing is secured a bracket 80, having arms 81, which are secured by screws or bolts 82 to the under side of the table-top. The shifting-rod 64 of the reversing-gear passes through and is free to operate in a tubular standard 83, the base of which is screwed on the table-top, and said shifting-rod has a head 84, adapted to be conveniently grasped for manual operation of the shifting-rod and the reversing-gear controlled thereby. A set-screw 85 in the standard 83 is provided to lock the shifting-rod when adjusted. The brake-rod 76 is attached to a treadle 86, which may be depressed by one foot to control the operation of the motor and of the engine driven thereby.

Having thus described my invention, I claim—

1. In a spring-motor, the combination of a casing having an outwardly-projecting hub, a winding-arbor having its bearing in the hub and projecting outwardly therefrom, a master-gear, revoluble independently of the arbor, a spring attached to said gear and arbor, a winding-disk attached to and revoluble with the latter and having an annular flange on its inner side, a winding-lever having fork-arms at its inner end, detachably secured to opposite sides thereof and disposed on opposite sides of the casing, grip-bars on the inner sides of said fork-arms, having friction devices to engage and disengage opposite sides of the winding-disk flange and provided on their upper sides with lugs, shoe-bars, pivoted to said lugs and bearing on the hub of the casing, springs between the shoe-bars and the grip-bars, and means, independent of the shoe-bars to prevent retrograde rotation of the winding disk and arbor, substantially as described.

2. A spring-motor comprising a casing, having an opening in its peripheral portion, a master-gear mounted for rotation in said casing, a spring connected to the master-gear and also disposed in said casing, means to wind the spring, a shaft mounted at one side of the peripheral portion of the casing, carried thereby, and having a spur-gear 48 disposed on one side of the casing and a pinion extending through the peripheral opening in the casing and engaging the master-gear, a stub-axle projecting from one side of the casing, a belt-wheel on said stub-axle, a train of gears connecting the belt-wheel and the gear 48, and including a reversing mechanism, said train of gears and reversing mechanism being mounted on one side of and carried by the casing, and a brake mechanism also mounted on and carried by the same side of the casing and including a brake-disk connected to and revoluble with one of the gears of the said train, substantially as described.

3. In a machine of the class described, a table having a spring-motor on the under side of its top, said motor having a reversing-gear including a shifting arm, a tubular standard secured on the top of the table, a shifting-rod attached to the shifting arm, extending upwardly and through the said tubular standard and having a head, and means to lock the shifting-rod to the standard, to secure the shifting arm when adjusted.

4. In combination with a table having a standard provided with an opening at its upper end, a motor, having a casing fitted in said opening, and secured to the standard, and a bracket secured to the upper side of the casing and to the under side of the table-top, substantially as described.

In testimony whereof I have hereunto signed my name in the presence of two subscribing witnesses.

FRANK J. EHRENDRIECH.

Witnesses:

W. T. HARRIS,

W. C. DUCKWORTH.