No. 741,483. PATENTED OCT. 13, 1903.

E. L. GARVEY.

SPRING MOTOR.

APPLICATION FILED APR. 1, 1903.

NO MODEL. 3 SHEETS—SHEET 1.

Fig. 5.

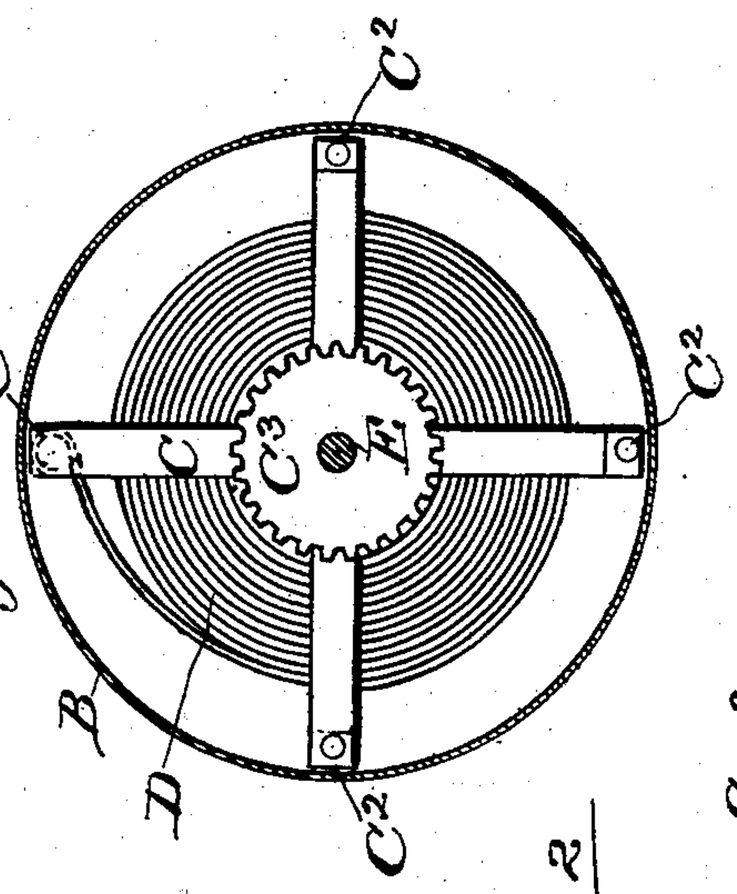

Fig. 1.

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Fig. 3.

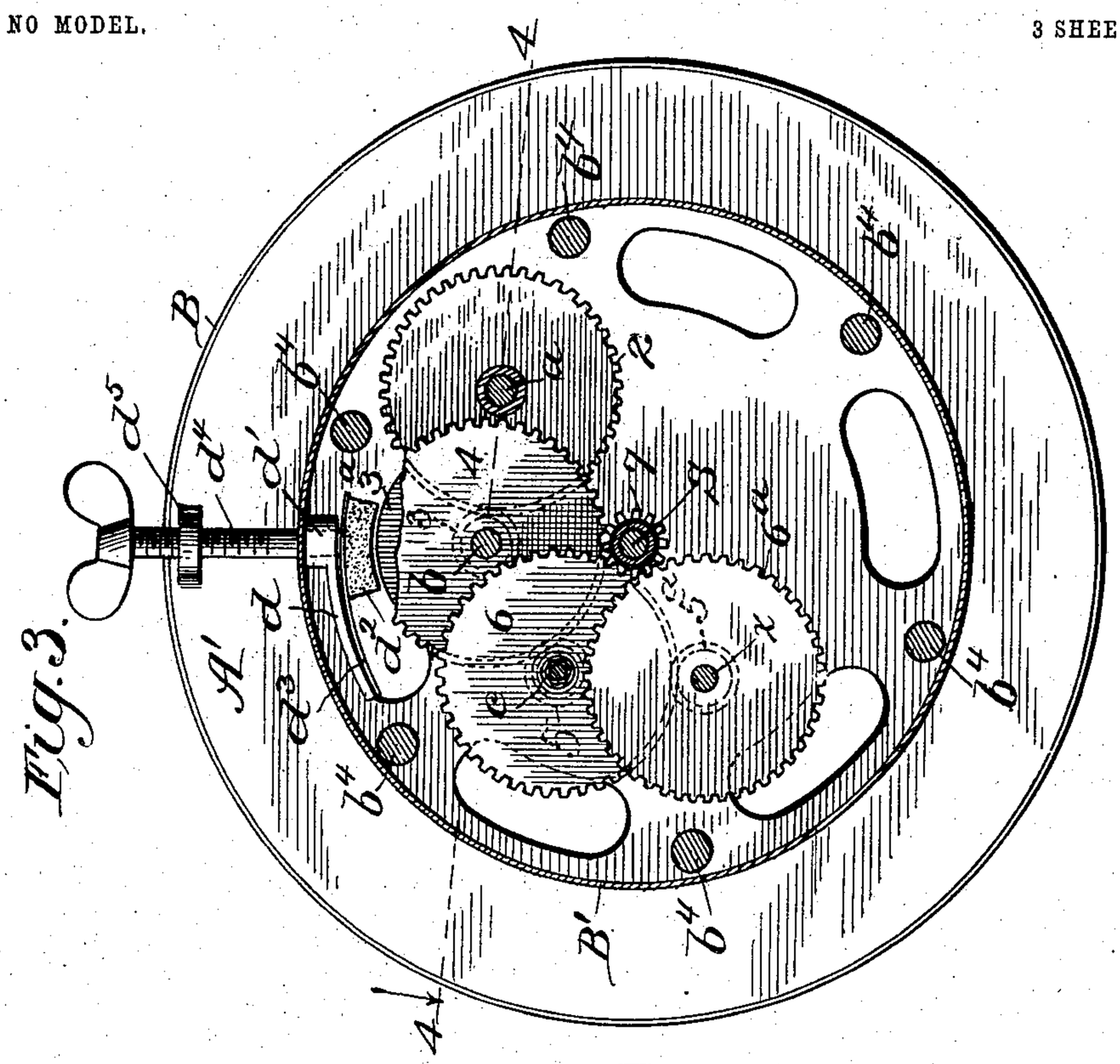
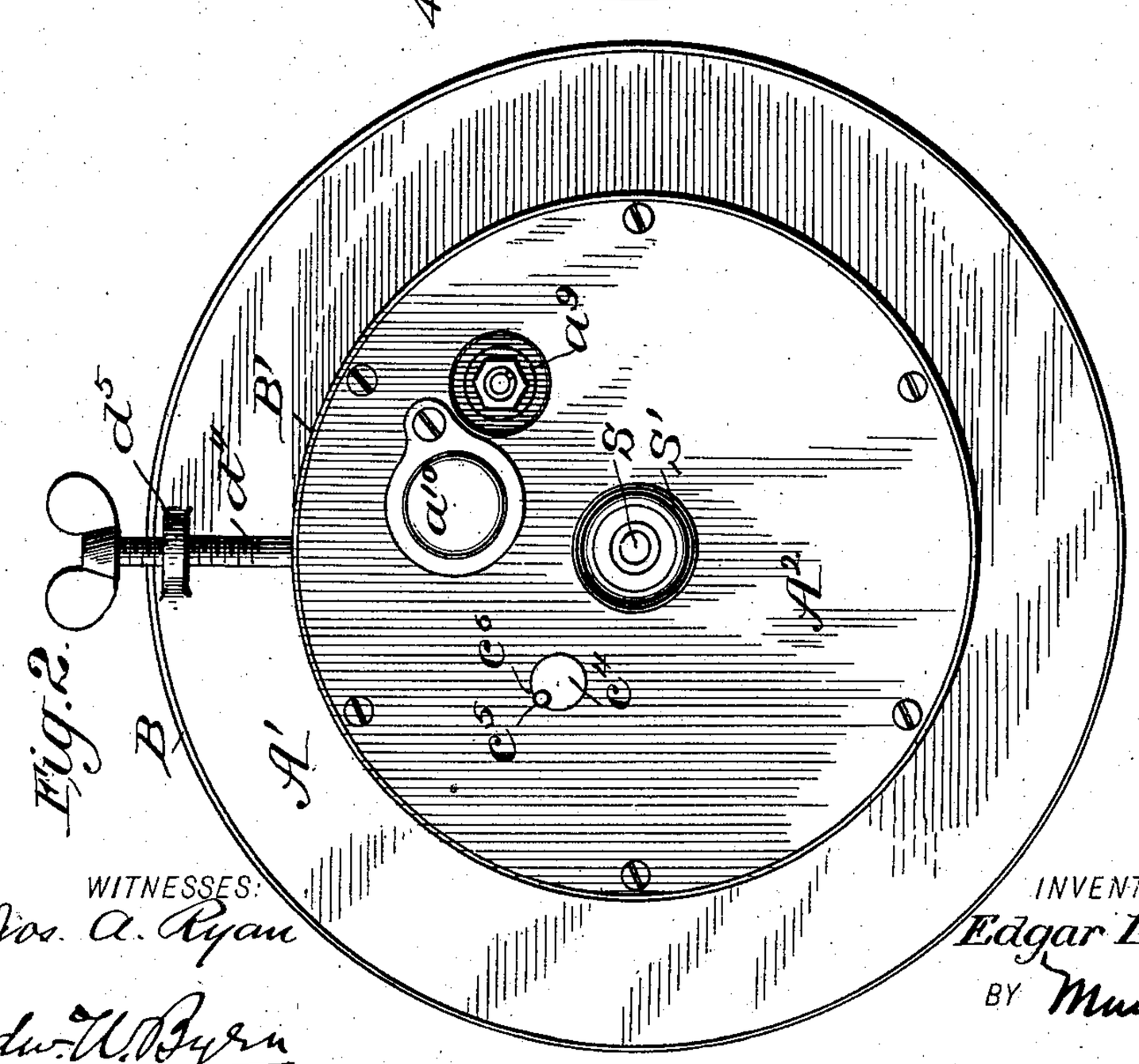


Fig. 2.



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3 SHEETS—SHEET 3.

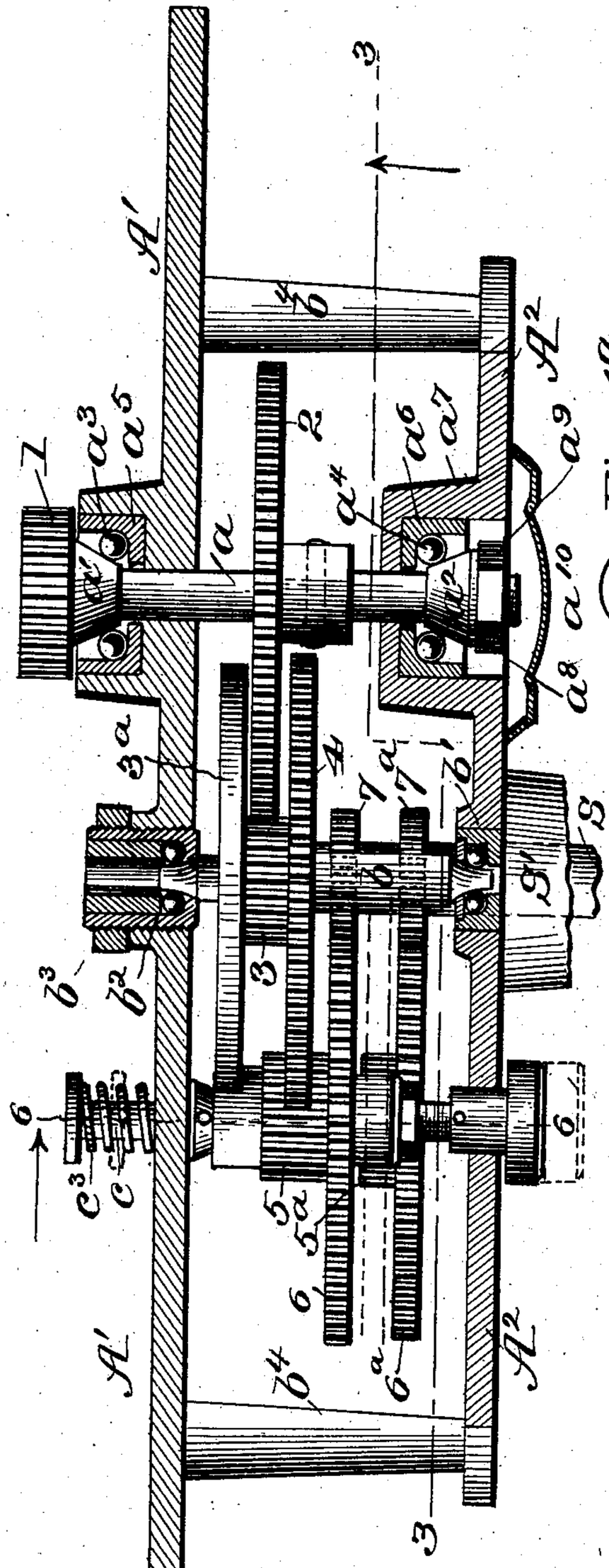

Fig. 4.

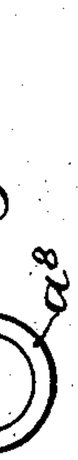

Fig. 4a.

Fig. 6.

Fig. 6a.

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No. 741,483. Patented October 13, 1903.

UNITED STATES PATENT OFFICE.

EDGAR L. GARVEY, OF ASHEVILLE, NORTH CAROLINA.

SPRING-MOTOR.

SPECIFICATION forming part of Letters Patent No. 741,483, dated October 13, 1903.

Application filed April 1, 1903. Serial No. 150,540. (No model.)

To all whom it may concern:

Be it known that I, EDGAR L. GARVEY, of Asheville, in the county of Buncombe and State of North Carolina, have invented a new and useful Improvement in Spring-Motors, of which the following is a specification.

My invention is in the nature of an improvement in spring-motors for furnishing motive power for such light uses as the running of sewing-machines, the driving of fans, the operation of churns, &c.; and it consists in such novel construction and arrangement of the various parts as will be first fully described with reference to the drawings and then pointed out in the claims.

Figure 1 is a central longitudinal section. Fig. 2 is a face view looking in the direction of the arrow 2 in Fig. 1. Fig. 3 is a sectional view on lines 3 3 of Figs. 1 and 4 looking in the direction of the arrow. Fig. 4 is an enlarged partial section on line 4 4 of Fig. 3 looking in the direction of the arrow. Fig. 4^a is a detail. Fig. 5 is a section on line 5 5 of Fig. 1, on a reduced scale, looking in the direction of the arrow. Fig. 6 is an enlarged section on line 6 6 of Fig. 4 looking in the direction of the arrow, and Fig. 6^a is an end view of the sliding axle-knob.

In the drawings, Fig. 1, A A′ A^2 represent three parallel disk-shaped metal plates, of which A and A′ are of the same diameter and are inclosed by a circumferential shell B, while A^2 is of less diameter and is secured to the ends of posts b^4, offsetting laterally from the plate A′ and cast thereon. The space between the smaller plate A^2 and the adjacent one A′ is inclosed by a separate circumferential shell B′. Within the drum or casing formed by the two larger disks A A′ and the shell B there is contained two spider-frames C C′, whose arms are connected at their outer extremities by cross-pieces C^2 and whose hub portions turn loosely on the shaft E. Within this double spider-frame is contained a powerful coil-spring D, which is large enough to nearly fill the drum and which furnishes power to run the motor. The outer end of this spring is connected to one of the cross-pieces of the spider-frame, and the inner end of said spring is secured to a hub *e*, rigidly connected to a central shaft E, that passes through the back plate A of the casing and carries a rigidly-attached bevel-gear F of large size, into which there meshes a small bevel-pinion *f* on a shaft F′, arranged parallel to the plane of the back plate A and turning in bearings f' f^2 thereon and having a squared end to receive a wrench by which the mainspring may be wound up. On the inner side of the spider frame and between it and the middle plate A′ there is rigidly attached to said spider a gear-wheel C^3, and beside it and rigidly attached to the main shaft there is a ratchet-wheel E′, which after the shaft is wound up is caught and held by a spring-pawl E^2, pivoted to the adjacent side of the middle plate A′. After the shaft has been wound and the spring constricted the shaft remains stationary, being held by the pawl, while the spring turns the spider-frame and with it the gear-wheel C^3, through which latter the power is transmitted to a train of wheels located between the plates A′ A^2. All of these wheels are on shafts having special bearings in the two plates A′ A^2. The train of wheels (see Fig. 4) comprises pinion 1 on same shaft *a* with gear 2; but pinion 1 is between the plates A and A′ and meshes with and receives motion from the gear C^3 on the spider-frame. Pinion 3 and gear 4 are rigidly fixed on another shaft, *b*, and lie between plates A′ and A^2, pinion 3 being in mesh with large gear 2. Pinion 5 and gear 6 are rigidly fixed to another shaft, *c*, and pinion 5 is in mesh with larger gear 4, while gear 6 meshes with pinion 7 on the main driven shaft S. This shaft has also another rigid pinion 7^a beside 7, which pinion 7^a is in mesh (see Fig. 4) with a large gear 6^a on the same shaft *x*, Fig. 3, with another rigid pinion 5^a. The pair of gears 5 6 are adjustable along the line of their axis, as seen in dotted lines in Figs. 4 and 6, so that gears 5 6 may transmit power directly from gear 4 to pinion 7 or indirectly from gear 4 to pinion 7^a by way of pinion 5^a and gear 6^a, which latter make a further multiplication and a different speed for the driven shaft S. To accommodate the lateral adjustment of gears 5 6 along the line of their common axis, the pinion 5 is made long enough so as to not pass out of mesh with gear 4 in this adjustment. I will now describe the bearings of the various shafts of this train of gear-wheels.

Pinion 1 and gear 2 are rigidly fixed to a shaft a, (see Fig. 4,) extending through the middle plate A′ and the smaller face-plate A^2, the pinion being made fast to one end of the shaft and the gear being pinned to the shaft about its middle. Both ends of this shaft have case-hardened cones a' a^2, which rest and work on balls a^3 a^4 in cups a^5 a^6, seated, respectively, in the opposite faces of middle plate A′ and outer plate A^2. The outer face-plate is formed with a recess a^7 to receive its cup, and the cones are held up tightly against the balls by a teat-washer a^8 and a screw-nut a^9 on the threaded end of the shaft, by which the parts may be tightened to take up wear. These parts are accessible through the open outer side of the recess a^7 in the face-plate, which recess is covered by a pivoted guard a^{10}, which is swung aside in gaining access to the nut. Gears 3 and 4 are mounted on a shaft b (see Figs. 1 and 4) with cone ends similar to shaft a, each end of the shaft resting in ball-cases, one being pressed into the face-plate at b' and the other, b^2, screwed into the middle plate, thus giving means for taking up wear from the back of the middle plate, the screw-cup being held in proper adjustment by jam-nut b^3. Gears 5 6 are fixed on a sliding axle for changing speed. They are mounted on a longitudinally-adjustable axle c. (See Fig. 6.) This gear and pinion are rigidly connected to a hub with ball-bearings c' c^2 at the ends, and the axle is movable longitudinally through the plates with the hub to change the planes of gears 5 6 by means of a spring c^3 behind the middle plate for holding the axle in and a knob c^4 on the outside of the face-plate A^2 for pulling the axle out. This axle is held out (see Figs. 6 and 6^a) by a lug c^5 on the face-plate and a slot c^6 in the knob. When the axle is in, the lug drops in the slot, and when the axle is pulled out and turned so that the lug is out of registration with the slot the axle is held out. The two positions of this axle determine whether gears 5 6 shall directly connect with and drive the shaft S by pinion 7 or whether gears 5 and 6 shall transmit their power through pinion 5^a and gear 6^a to pinion 7^a on the shaft for giving a different speed. The shaft x of gears 5^a 6^a is equipped with ball-bearings and screw-cup similar to those shown in Fig. 4 for shaft b. The drive-shaft S, Fig. 1, is also made with cones s s' and balls s^2 s^3, turning in cups s^4 s^5 in the ends of a sleeve S′, cast on and projecting from the face-plate A^2. Said drive-shaft receives the wheel, pulley, or the hub of fan-arms to be driven, and said shaft at the end is slotted at s^6 to receive a safety-pin to prevent the attached part from slipping even if the set-screw, which is supposed to hold it in place, is not fast.

On the same shaft b with the gears 3 4 there is a rigid disk 3^a, Fig. 4, lying beneath a flange d, cast on the middle plate A′, and having a hole d' through it and a brake-shoe d^2 beneath it, which brake-shoe is mounted upon the end of a spring d^3 and is forced down into contact with disk 3^a by a set-screw d^4, tapped through lug d^5 on the middle plate and passing through a guide-hole in the flange. This set-screw has a thumb-piece which is accessible from the outside of the casing and serves when turned to stop the motor at any time by simply pressing the brake-shoe into contact with the disk.

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

1. A spring-motor comprising a circular back plate, a middle plate of equal diameter to the back plate having laterally-projecting posts, a front plate of smaller diameter than the back and middle plates mounted upon the laterally-projecting posts from the middle plate, a cylindrical shell for the back and middle plates, and a smaller cylindrical shell for the front plate, a spring and transmitting gear arranged between the back and middle plates, and a train of gear-wheels connecting therewith and arranged between the middle and front plates, and a central driven shaft substantially as described.

2. In a spring-motor, the combination of a case having a face-plate with extended sleeve and two sets of ball-bearings, a drive-shaft with cones arranged in said sleeve and having two pinions on its inner end, a middle plate, a mainspring and driving-gears, and a spring-held sliding axle journaled in the middle plate and face-plate and provide with ball-bearings and gear-wheels 5, 6, a second set of gear-wheels 5^a 6^a, the said sliding axle being arranged beside the drive-shaft and adapted to be adjusted longitudinally as described, whereby its gears are placed in the train of wheels between the same and the second pinion of the drive-shaft substantially as described.

3. In a spring-motor of the kind described, the combination with the mainspring, the gear-wheels and the casing having middle plate A′ having a recess and face-plate A^2 with a recess a^7 on the outside; of a shaft a extending through the middle plate and having a gear-wheel back of the middle plate, a gear-wheel in the middle and cones at both ends, balls a^3 a^4 bearing against the cones, cups a^5 a^6 for holding the balls seated in oppositely-facing recesses of the middle and face plate, a screw-nut for the end of the shaft extending through the face-plate and a pivoted guard-plate a^{10} for the recess in the face-plate substantially as and for the purpose described.

4. In a spring-motor of the kind described, the combination with the mainspring, the connecting gear-wheels and the casing; of the sliding axle c bearing rigid cones and a loose hub having rigidly-attached gear-wheels and ball-cups and balls at each end of said hub bearing against the cones of the axle, a spring for holding the axle in, and a knob or handle

at the front end of the axle with locking devices for pulling and holding the axle to the front, and the drive-shaft with two pinions arranged to be acted upon alternately through the gears on the sliding axle substantially as described.

5. In a spring-motor of the kind described, the combination of the plate A′ having a flange *d* with a guide-hole through it, a spring brake-shoe inside the flange and overlapping the guide-hole, a perforated lug d^5 formed on the same side of the middle plate, a set-screw d^4 extending through the lug and perforated flange and having outside the case a turning-handle, and a train of gears having a brake-disk arranged in the plane of the set-screw substantially as and for the purpose described.

EDGAR L. GARVEY.

Witnesses:
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J. B. CAIN.