C. ARPURTH.

SPRING MOTOR.

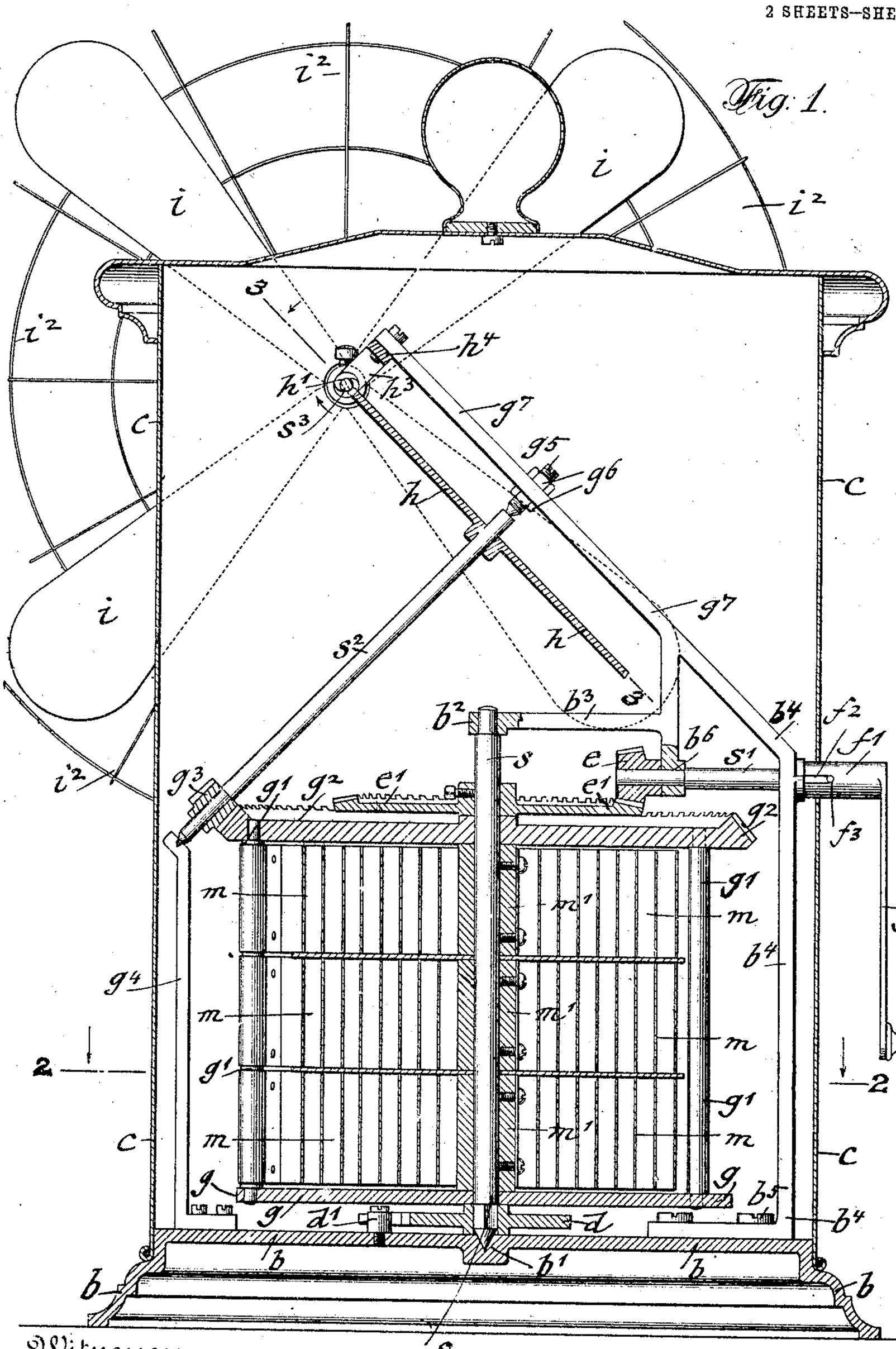
APPLICATION FILED JULY 1, 1910.

994,360.

Patented June 6, 1911.

2 SHEETS—SHEET 1.

Fig. 1.



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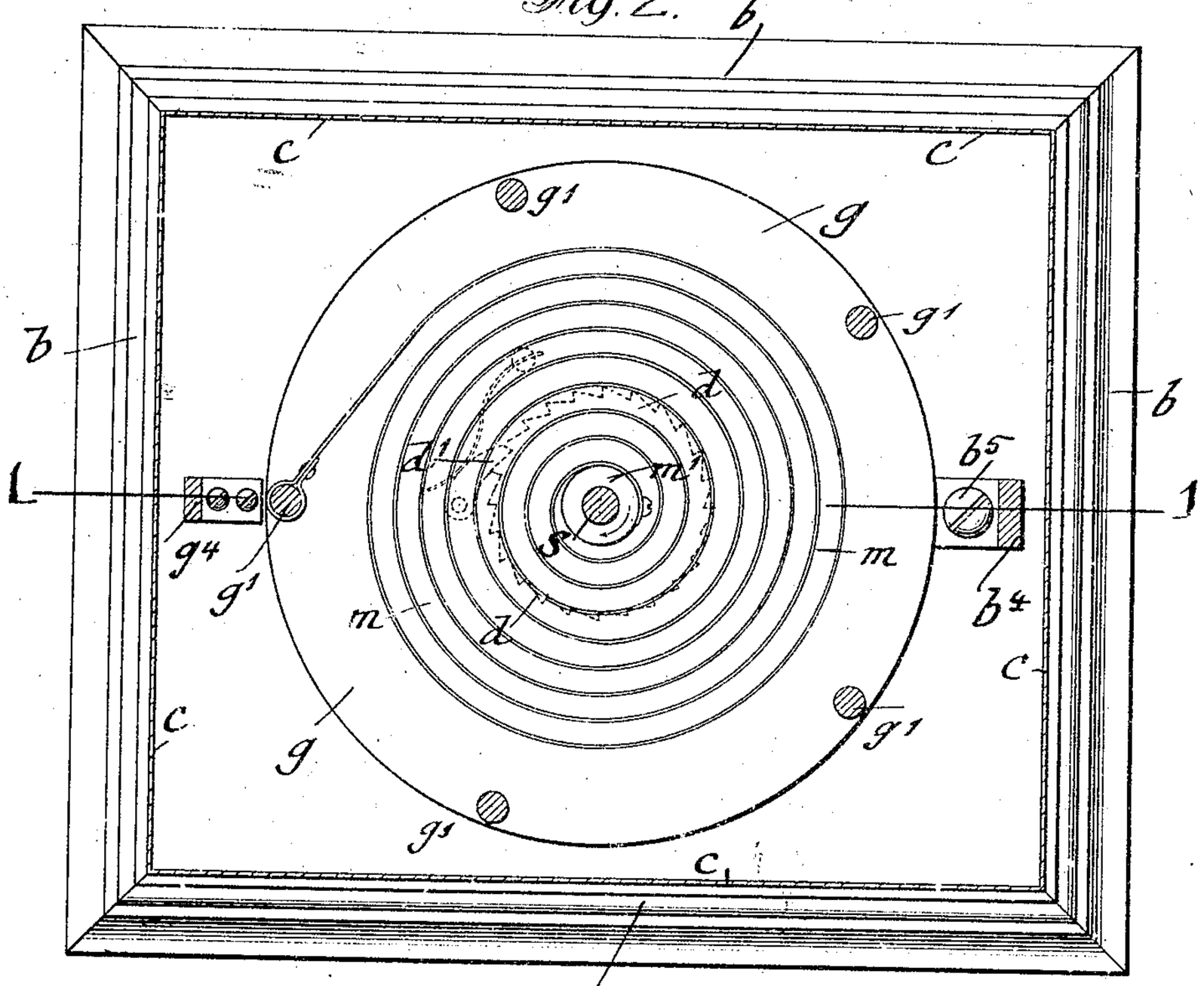
2 SHEETS—SHEET 2.

Fig. 2.



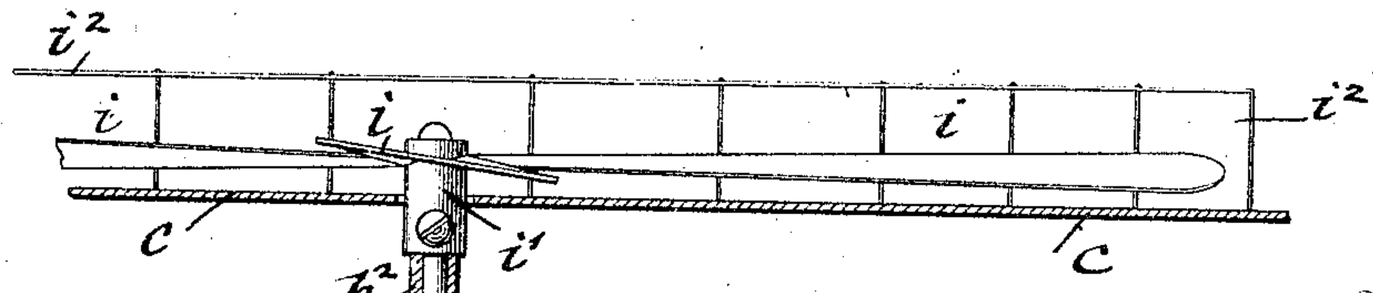


Fig. 3.

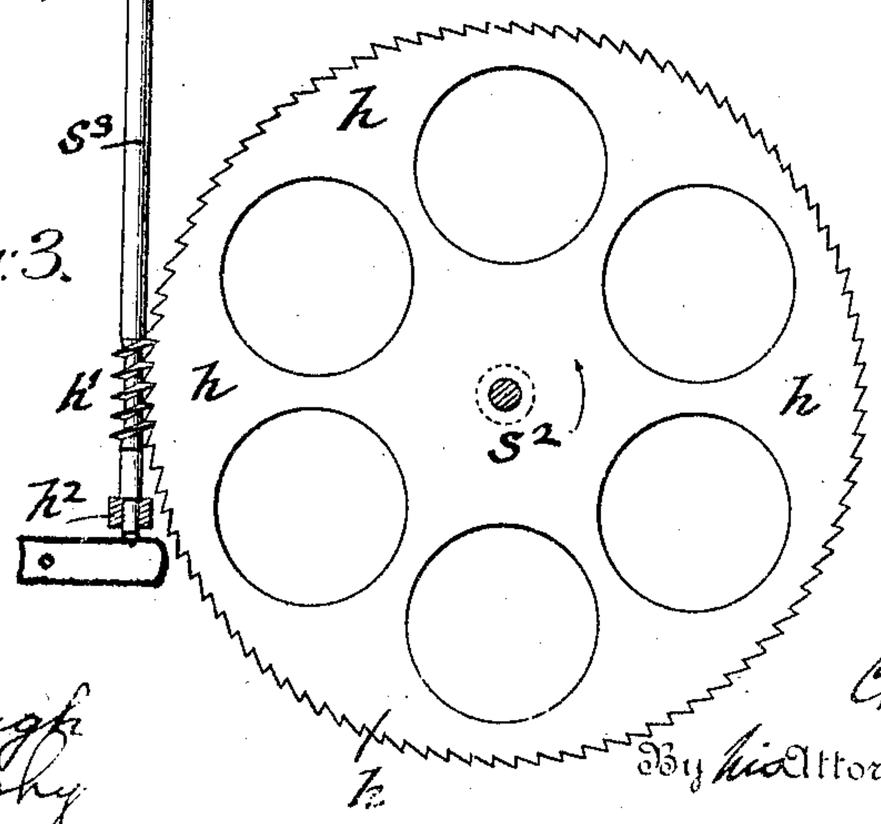
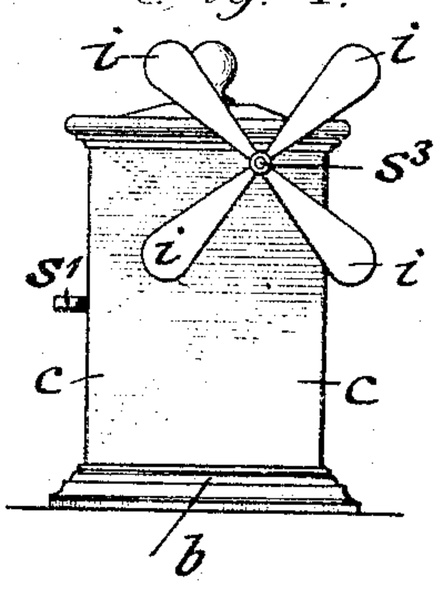


Fig. 4.



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CHARLES ARPURTH, OF HOBOKEN, NEW JERSEY.

SPRING-MOTOR.

994,360. Specification of Letters Patent. **Patented June 6, 1911.**

Application filed July 1, 1910. Serial No. 569,947.

To all whom it may concern:

Be it known that I, CHARLES ARPURTH, a citizen of the German Empire, residing in Hoboken, in the county of Hudson and State of New Jersey, have invented certain new and useful Improvements in Spring-Motors, of which the following is a specification.

This invention relates to an improved ventilating fan to which motion is imparted by a spring-motor.

Many attempts were made heretofore for driving ventilating fans by a spring-motor, but without success, for the reason that a disproportionately large spring-motor was required, for overcoming the frictional resistance of the gearing by which power was transmitted from the motor to the fan and keeping the fan going at the required speed for a certain length of time.

The object of this invention is to furnish a ventilating fan in which the transmitting gearing between spring-motor and fan-shaft is simplified to such an extent that the friction in the bearings of the transmitting gearing is reduced to such an extent that the fan can not only be driven for a considerable length of time, but also in a substantially noiseless manner, so as to be capable of being used in place of electric fans, without the expense connected with the current required by the same; and for this purpose the invention consists of a ventilating fan which comprises a spring-motor, a fan, and intermediate bevel gear and worm-gear transmissions between the housing of the spring-motor and the fan-shaft, so that rotary motion is imparted to the fan for a considerable length of time in an effective and noiseless manner, as will be fully described hereinafter and finally pointed out in the claims.

In the accompanying drawings, Figure 1 represents a vertical central section of my improved ventilating fan taken on line 1, 1, Fig. 2, Fig. 2 is a horizontal section on line 2, 2, Fig. 1, Fig. 3 is a detail plan view partly in section on line 3, 3, Fig. 1, showing the worm-gear transmission for the fan-shaft, and Fig. 4 is a front-elevation of my improved ventilating fan, drawn on a smaller scale.

Similar letters of reference indicate corresponding parts throughout the different figures.

Referring to the drawings, m represents a spring-motor of any approved construction. The motor shown in the drawings is constructed of three spiral springs which are attached at their inner ends to sleeves or hubs m^1 that are secured to the shaft s of the motor, said shaft s being preferably supported by its conically-tapering lower end in a step-bearing b^1 located in the base-plate b of the fan-casing, as shown clearly in Fig. 1. To the lower end of the motor shaft s is keyed a ratchet-wheel d the teeth of which are engaged by a spring-actuated check-pawl d^1, for holding the motor-shaft s in position when winding up the springs. The upper end of the motor-shaft s is supported in a bearing b^2 that is supported in a bracket b^3 which projects from an upright post b^4 which is attached at its lower end by means of fastening screws b^5 to the base-plate b. The upright standard b^4 is also provided with bearings b^6 for a horizontal winding shaft s^1 to the inner end of which is keyed a bevel pinion e which meshes with a bevel gear-wheel e^1 that is mounted on the upper end of the motor-shaft s, while to the opposite or outer end of the shaft s^1 is applied the sleeve f^1 of a hand-crank f, said sleeve being provided with a slot f^2 for engaging a pin f^3 on the winding shaft s^1. By turning the hand-crank, the bevel pinion e, the bevel gear-wheel e^1 and the upright shaft s of the motor are rotated and thereby the spring or springs m^1 connected to the same wound up to the full extent.

A circular plate g is located below the lowermost spring, which plate is connected by upright posts g^1 with a bevel gear-wheel g^2 that is mounted on the motor-shaft s below the bevel gear-wheel e^1, the bottom-plate g, upright posts g^1 and gear-wheel g^2 forming the housing of the spring-motor. The outer ends of the coil-springs of the spring-motor are applied to one of the upright posts g^1, as shown in Figs. 1 and 2, so that the motor is started as soon as the hand-crank is removed from the winding-up shaft s^1 in a direction opposite to the winding-up motion of the springs. The rotary motion of the bevel gear-wheel g^2 is transmitted to a bevel-pinion g^3 which is keyed to an inclined shaft s^2 which is supported in a step-bearing of an upright post g^4 that is attached to the base-plate b of the fan-casing, and in a neck-bearing which is formed of a conical seat at the upper end of the shaft s^2 and the pointed end of a set-screw g^5 that is secured by screw nuts g^6 to the inclined

extension g^7 of the upright post b^4. To the inclined shaft s^2 is applied a worm gear-wheel h which meshes with a double worm h^1 on the fan-shaft s^3 which is supported in bearings h^2 of lugs h^3 that are bent up from a transverse bar h^4 which is attached to the upper end of the inclined extension-arm g^7, as shown clearly in Figs. 1 and 3. The fan-shaft s^3 is extended through the fan-casing c to the outside of the same and carries a fan i of any approved construction by a hub i^1. The worm h^1 is preferably a double worm formed of two independent helical windings so as to engage with the teeth of the worm gear-wheel and produce the rapid rotation of the fan in a substantially noiseless manner. A suitable wire-guard i^2 is preferably arranged around the fan so as to prevent injury by the blades of the same.

Any suitable mechanism may be arranged in connection with the spring-motor for arresting the motion of the same when it is desired to interrupt the motion of the fan.

When it is desired to start the running of the ventilating fan, the hand-crank f is applied to the winding-up shaft s^1 and turned until the motor-spring or springs are wound up to their full extent. During the winding-up of the springs the check-pawl and ratchet mechanism holds the motor-shaft s in position for preventing the unwinding of the springs. When the spring or springs of the motor m are wound up to their full extent, the crank-shaft is removed and the spring-housing rotated by the power stored in the springs. The motion of the springs is transmitted by the bevel gear-wheel g^2 and pinion g^3 to the intermediate transmitting shaft s^2 and from the same by the worm gear-wheel h and double worm h^1 to the fan-shaft s^3 so that the fan is rotated at a considerable speed, due to the great number of teeth of the bevel gear-wheel g^2 and worm gear-wheel h. As the spring-motor has to overcome the comparatively small friction of the intermediate transmitting shaft s^2 and of the fan-shaft s^3 in its bearings, the frictional resistance of the bearings of the same is very small, so that the fan can be rotated for a considerable length of time without rewinding the motor. A large number of rotations is thereby imparted to the fan-shaft in a given time, so that the effective work of the fan is the same as that of an electric fan of equal size and capacity, but without expense for the electric current.

My improved fan has the advantage that it can be placed at any desired position in the room to be ventilated that it can be run almost without any expense excepting a casual lubrication of the bearings of the rotary parts, and that owing to the simplicity of construction it can be manufactured and sold at a comparatively low price and be used wherever the electric current is not available or too expensive for use.

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

1. In combination, a base plate having a central step bearing, a vertical motor-shaft having its lower end resting in said step bearing, a ratchet wheel non-rotatively secured to the motor-shaft and resting on the base plate, a pawl pivoted to the base plate and engaging the ratchet wheel, a circular plate loosely mounted on the motor-shaft and resting on the ratchet wheel, a beveled motor gear-wheel loosely mounted on the motor-shaft near the upper end thereof, upright posts connecting the peripheral parts of the circular plate and bevel gear-wheel, sleeves on said shaft between said plate and gear-wheel, springs having their outer ends secured to one of said posts, means securing the springs, on said sleeves and to the shaft, a winding gear-wheel on said shaft and resting against the motor gear-wheels, a horizontal winding shaft carrying a pinion engaging the winding gear-wheel, a fan-shaft, a transmitting mechanism between the motor gear-wheel and fan-shaft, means supporting said shafts and mechanism.

2. In combination, a vertical motor shaft, a plurality of motor springs surrounding the shaft and having their inner ends attached to the shaft, a motor gear-wheel loosely mounted on the shaft near the upper part thereof, a circular plate loosely mounted on the motor shaft below the lowermost spring, upright posts connecting the peripheries of said circular plate and wheel and to one of which the outer end of the springs are secured, a ratchet wheel rigidly mounted on the shaft below the circular plate, a pawl engaging said wheel, a winding bevel gear-wheel rigidly mounted on the shaft just above said motor gear-wheel, winding means engaging the winding gear-wheel, an inclined shaft, a beveled pinion at the lower end of the inclined shaft and engaging said motor gear-wheel and a worm gear-wheel at the upper end of the inclined shaft, a horizontal worm shaft and a worm on said worm-shaft and engaging said worm gear.

In testimony, that I claim the foregoing as my invention, I have signed my name in presence of two subscribing witnesses.

CHARLES ARPURTH.

Witnesses:

FANNIE FISK,

PAUL GOEPEL.