No. 827,647. PATENTED JULY 31, 1906.

W. J. MEYER.

SPRING POWER MOTOR.

APPLICATION FILED DEC. 26, 1901.

2 SHEETS—SHEET 1.

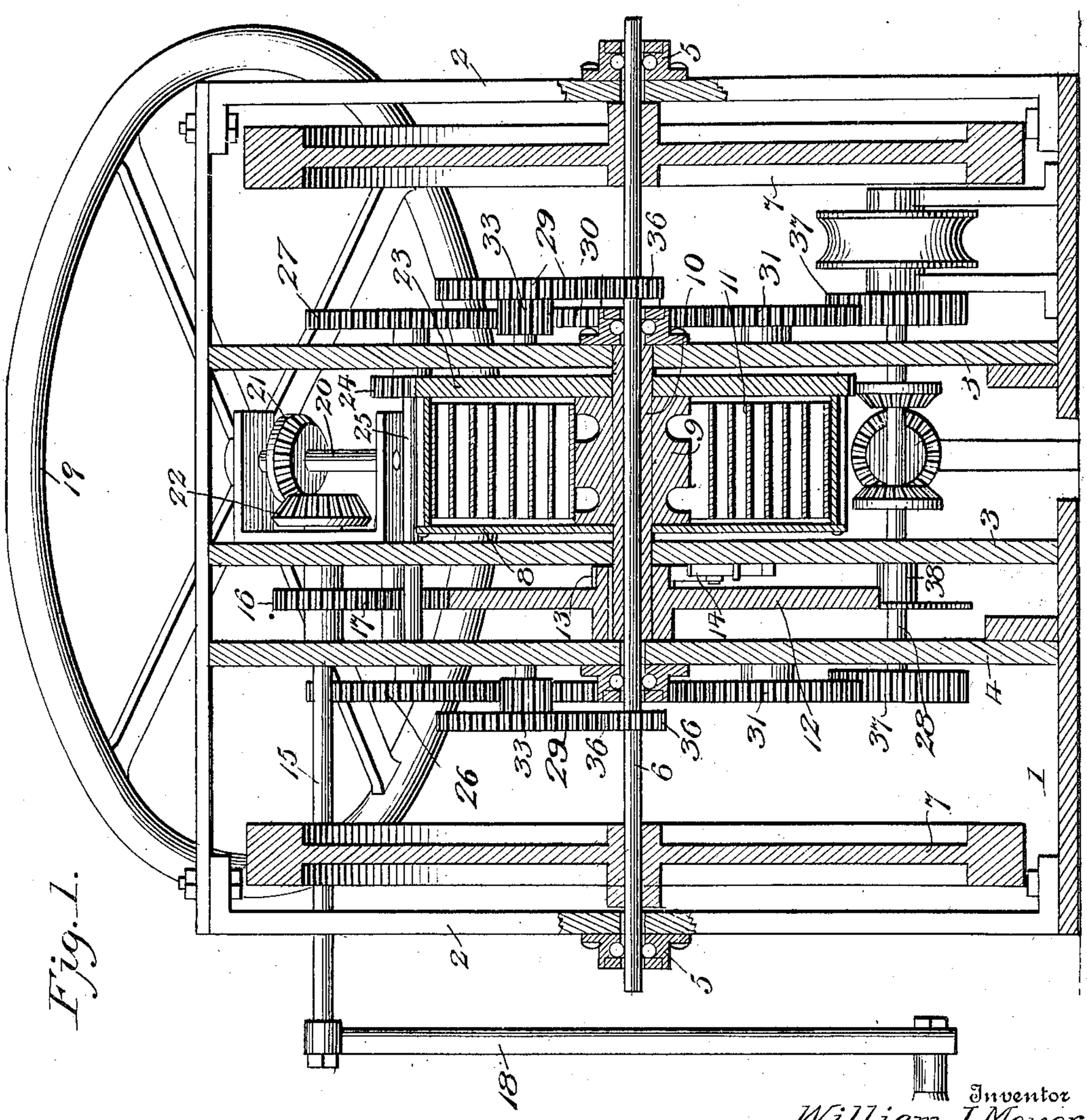

Fig. 1.

Witnesses
Edwin L. Thacker
Chas. S. Hoyer.

Inventor
William J. Meyer

By Victor J. Evans
Attorney

No. 827,647. PATENTED JULY 31, 1906.

W. J. MEYER.

SPRING POWER MOTOR.

APPLICATION FILED DEC. 26, 1901. 2 SHEETS—SHEET 2.

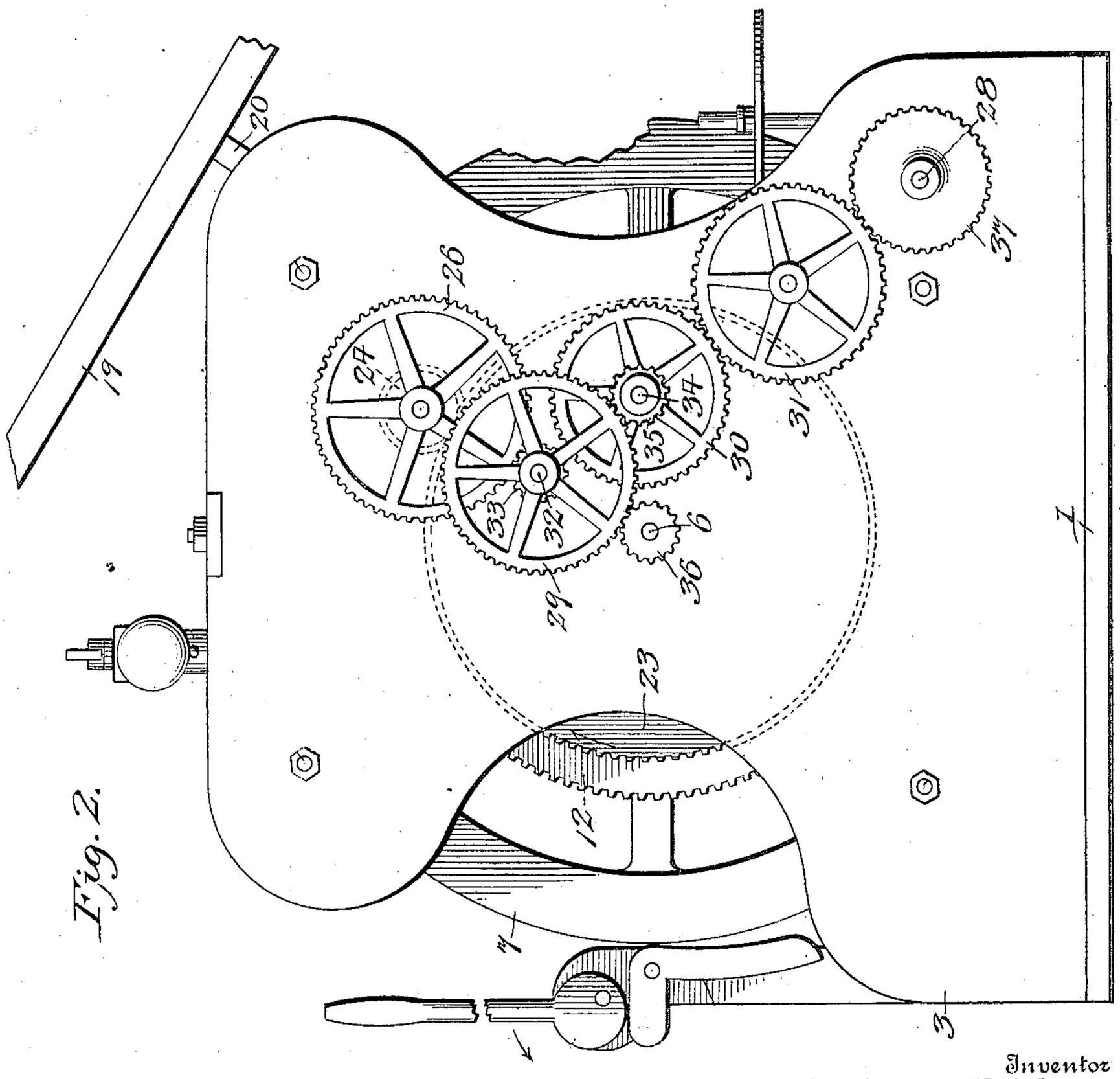

Fig. 2.

Witnesses
Edwin L. Thielke
Chas. S. Hoyer.

Inventor
William J. Meyer
By Victor J. Evans
Attorney

UNITED STATES PATENT OFFICE

WILLIAM J. MEYER, OF MILWAUKEE, WISCONSIN.

SPRING-POWER MOTOR.

No. 827,647. Specification of Letters Patent. Patented July 31, 1906.

Application filed December 26, 1901. Serial No. 87,198.

To all whom it may concern:

Be it known that I, WILLIAM J. MEYER, a citizen of the United States, residing at Milwaukee, in the county of Milwaukee and State of Wisconsin, have invented new and useful Improvements in Spring-Power Motors, of which the following is a specification.

This invention relates to spring-motors.

The objects of the invention are to improve and simplify the construction of such devices.

With the foregoing and other objects in view, which will appear as the description proceeds, the invention consists in a drum having a coil-spring secured thereto and located therein, an arbor to which the inner end of the spring is removably secured, said arbor having a hollow shaft, and a fly-wheel shaft extending through the hollow shaft of the arbor and having fly-wheels thereon, said fly-wheel shaft being in gear with said drum, whereby as the spring expands and rotates the drum the rotation thereof is transmitted to the fly-wheels, for which reason when the spring is entirely expanded the momentum of the fly-wheels causes the drum to continue its rotation until such momentum is exhausted, and as the continued rotation of the drum causes the inner end of the spring to become disengaged from the arbor said spring is prevented from offering resistance to said continued rotation of the drum. In this manner the maximum power is secured during the operation of a motor. It will be understood that the drum in addition to its gear connection with the fly-wheel shaft is also geared to a suitable power-shaft.

Referring to the drawings, wherein is illustrated a practical embodiment of the invention, Figure 1 is a longitudinal vertical section of a motor embodying the features of the invention. Fig. 2 is an end elevation of the motor, showing the one fly-wheel removed.

Similar numerals of reference are employed to indicate corresponding parts in both views.

The numeral 1 designates a base having end uprights 2 rising therefrom. Frame plates or members 3 and 4 also rise from the base to a suitable elevation, the plate or member 4 being located outside of and closer to one of the plates or members 3 than the other, and the latter are spaced apart a distance sufficient to conveniently accommodate the mechanisms located therebetween. The successful operation of the motor is not dependent on any particular construction of the frame.

At suitable elevations the uprights 2 have ball-bearing boxes 5 secured thereon, in which the opposite extremities of a longitudinally-disposed fly-wheel shaft 6 have bearing, and keyed to the said shaft are fly-wheels 7 of equal dimensions and weight. Between the members or plates 3 a spring-drum 8 is disposed and includes in its structure a spring-arbor 9, fast to a tubular arbor-shaft 10, surrounding the fly-wheel shaft 6, the latter shaft running loose in the arbor-shaft. Within the drum a spring 11 is disposed and has one extremity secured to the inner portion of the periphery of said drum and the opposite extremity constructed to connect with the arbor 9 and capable of an automatic detachment from the latter to prevent an obstruction to the operation of the motor after the spring has become fully unwound and expended its resilient force. The one extremity of the arbor-shaft 10 is projected over the shaft 6 outside of the one plate or member 3, and keyed thereon is a winding master-gear 12, having the inner portion of its hub provided with a ratchet-wheel 13, which is continually engaged by a spring-actuated pawl 14 to prevent backlash of the said master-gear during the winding operation, as will be readily understood. The motor, as shown, is equipped with two sets of winding devices for manual operations, either of which may be used at the will of the operator or to accommodate different applications of the improved device, and it will be obvious that in some instances one of such winding devices may be used alone in preference to the other. Both manually-operated winding mechanisms shown include, however, a winding-shaft 15, on which is keyed a pinion 16, meshing with an intermediate spur-gear 17, in turn meshing with the master-gear 12. One extremity of the shaft 15 is projected outwardly at one end of the motor and has a crank-handle or analogous device 18 fixed thereon, as clearly shown by Fig. 1. As before indicated, this crank-handle may at times be used as the sole manual operative means for winding the motor; but in some instances it will be preferred also to

use an additional means consisting of a hand-wheel 19, secured to a counter-shaft 20, on which is fixed a bevel-pinion 21, meshing with a corresponding pinion 22 on the inner end or extremity of the winding-shaft 15.

The drum 8 has one of its end inclosures or walls 23 projected beyond the periphery of the drum and toothed in the form of a gear-wheel, which is in engagement with a pinion 24, secured on a transmitting-shaft 25, having bearing in the plates or members 3 and 4, and on the ends of said shaft 25 transmitting spur-gears 26 and 27 are respectively mounted, and from said spur-gears 26 and 27 the resilient actuating force of the spring 11 is directly taken and transmitted by the devices which will be hereinafter explained to a power-shaft 28, located in the lower portion of one side of the motor. The means for transmitting the force of the spring 11 from the spur-gears 26 and 27 to the power-shaft is capable of a wide range of variation, and it is obvious that it will be necessary to obviate a rapid run off or expenditure of the force of the spring and to utilize either compensating gears or other devices for producing the required speed without detracting to any material extent from the power.

As shown in the figures of the drawings, the intermediate mechanism between the gears 26 and 27 and the power-shaft 28 comprises a series of three spur-gears 29, 30, and 31, held on suitable stub-shafts secured to the one outer plate 3 and the plate 4, this intermediate mechanism being duplicated on opposite sides of the drum, so as to equalize the driving force by a transmission thereof to different portions of the power-shaft. The stub-shaft 32 of the spur-gear 29 also has a pinion 33 thereon fixed to the spur-gear 29, which is held in continual mesh with either the transmitting spur-gear 26 or the spur-gear 27, and on the stub-shaft 34 of the gear 30 is a similar pinion 35, held in continual mesh with the gear 29, the latter also engaging a pinion 36 on the fly-wheel shaft 6, and through the medium of the said pinion 36 driving power is applied to said fly-wheel shaft, and as the transmitting mechanism is duplicated on opposite sides of the drum the fly-wheel shaft will also have the driving power applied thereto at two opposite points, with material advantage from a standpoint of equilibrium. The power-shaft 28 at opposite points has power-receiving gears 37 secured thereto, with which the gears 31 are held in continual mesh, the gears 37 having a greater width than the gears 31. It is proposed to supply the several gears and pinions just set forth with antifrictional bearings, so as to cause the said gears to run smoothly and evenly and without lost motion.

It will be seen from the above description, taken in connection with the drawings, that as long as the spring is under sufficient tension to exert an expansive force the fly-wheel shaft will be positively rotated by the force of the spring transmitted from the spring-drum to the fly-wheel shaft through the interposed gearing. When the spring has become unwound to such an extent as to lose its expansive force, it will be readily seen that if the inner end of the spring were rigidly secured to the shaft as soon as the outer coils engaged the inner face of the drum the movement of the entire mechanism would be retarded. By revolubly mounting the drum on the fly-wheel shaft this objection is overcome, since when the spring loses its force the fly-wheel shaft will continue to rotate by reason of the momentum gained by the fly-wheels, and through the interposed gearing the spring-drum and the arbor 9 will be caused to rotate with the shaft until the said shaft has lost its momentum.

By the arrangement described the fly-wheels are held in positive engagement with the spring and are directly influenced thereby as long as it has any appreciable expansive force; but immediately upon the loss of such force the spring will have no effect upon the shaft, which will continue to rotate and furnish additional power to operate the power-shaft until the momentum of the fly-wheels subsides. By this form of spring and fly-wheel construction the spring has no effect upon the mechanism to retard it by reason of the rewinding of the outer coils after its force has been expended; but by reason of the arbor being revolubly supported its influence will be automatically discontinued, and the fly-wheels will alone continue for an appreciable interval to supply the power to the mechanism.

I have supported the fly-wheels independently of the power-shaft in order that the shaft 28, upon which the fly-wheels are mounted, will not be affected by the load on the power-shaft and in order that the spring will be more directly influenced by the momentum thereof. In order that the momentum of the fly-wheels may be utilized to continue the rotation of the drum after the spring has spent its force, the inner end of said spring is secured to the arbor by any suitable automatic detachable devices.

Having thus fully described the invention, what is claimed as new is—

In a spring-motor, a drum, power means operated by said drum, an arbor having a hollow shaft, means for winding said arbor, a spring connected at its outer end with said drum and detachably connected at its inner end with said arbor, the detachable connection between the spring and the arbor being such that said spring is automatically detached from the arbor by the continued rotation of the arbor after the spring has become

completely expanded, a fly-wheel shaft extending through the hollow shaft of said arbor, gearing connecting said drum with said fly-wheel shaft, and a plurality of fly-wheels upon said fly-wheel shaft, one of said fly-wheels being disposed on each side of said drum and arbor.

In testimony whereof I affix my signature in presence of two witnesses.

WILLIAM J. MEYER.

Witnesses:
CHAS. S. HYER,
GEORGE M. BOND.