

M. WORTMANN.
CLOCK.

APPLICATION FILED DEC. 30, 1902.

NO MODEL.

2 SHEETS—SHEET 1.

Fig. 1.

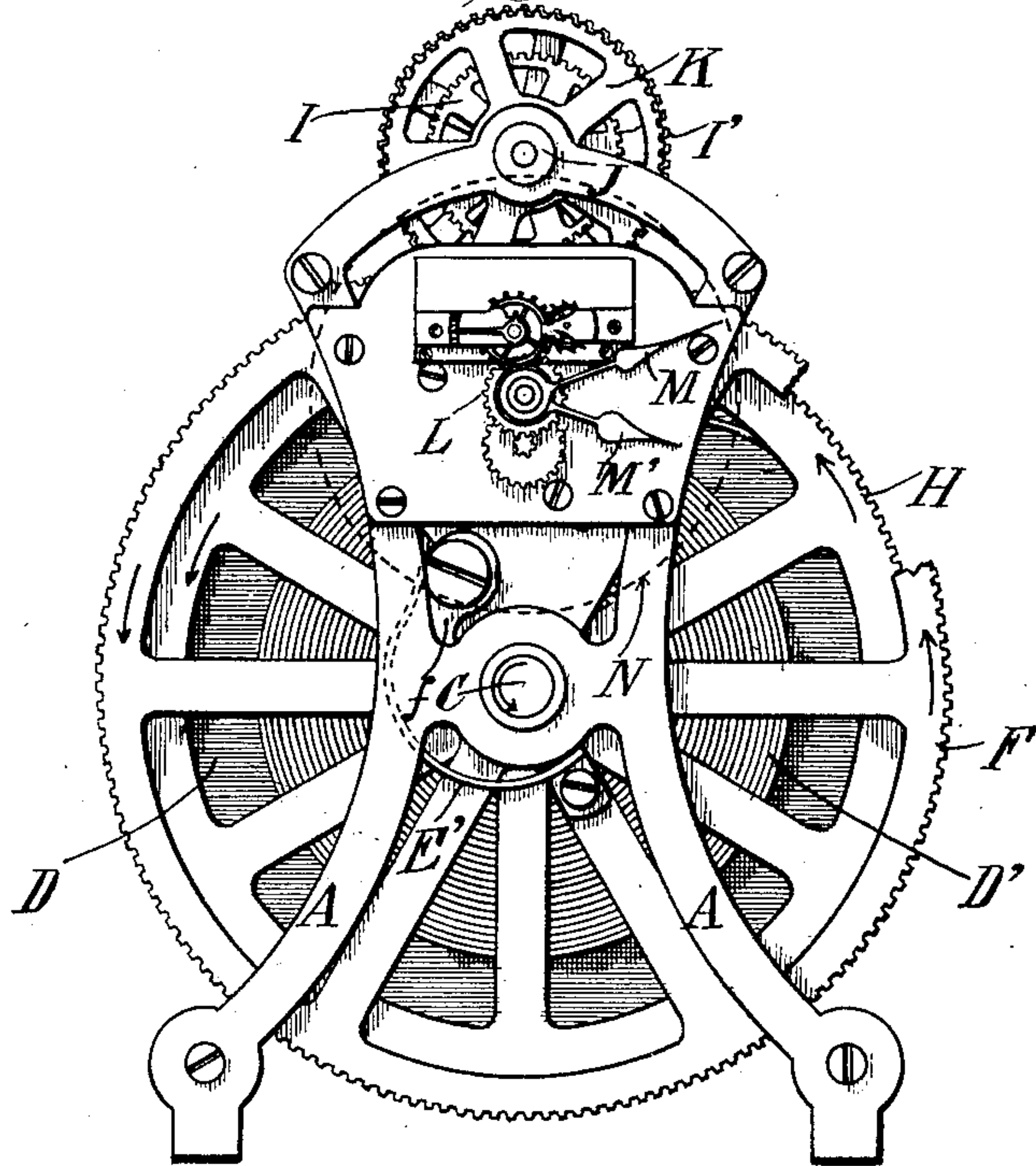
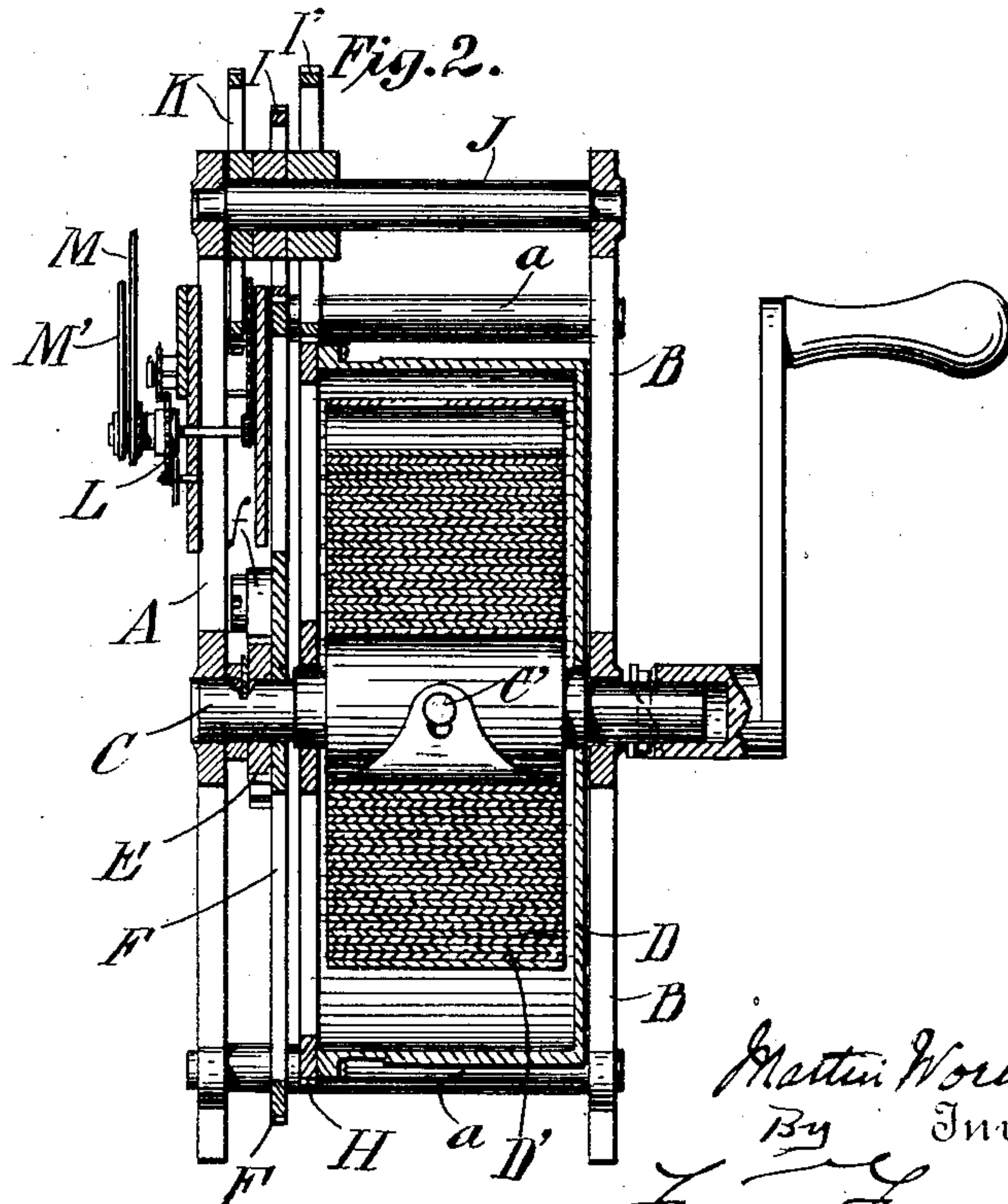


Fig. 2.



Witnesses
Committed,
Geo. L. Wheelock

Martin Wortmann
By Inventor
John Freeman
attys

No. 748,250.

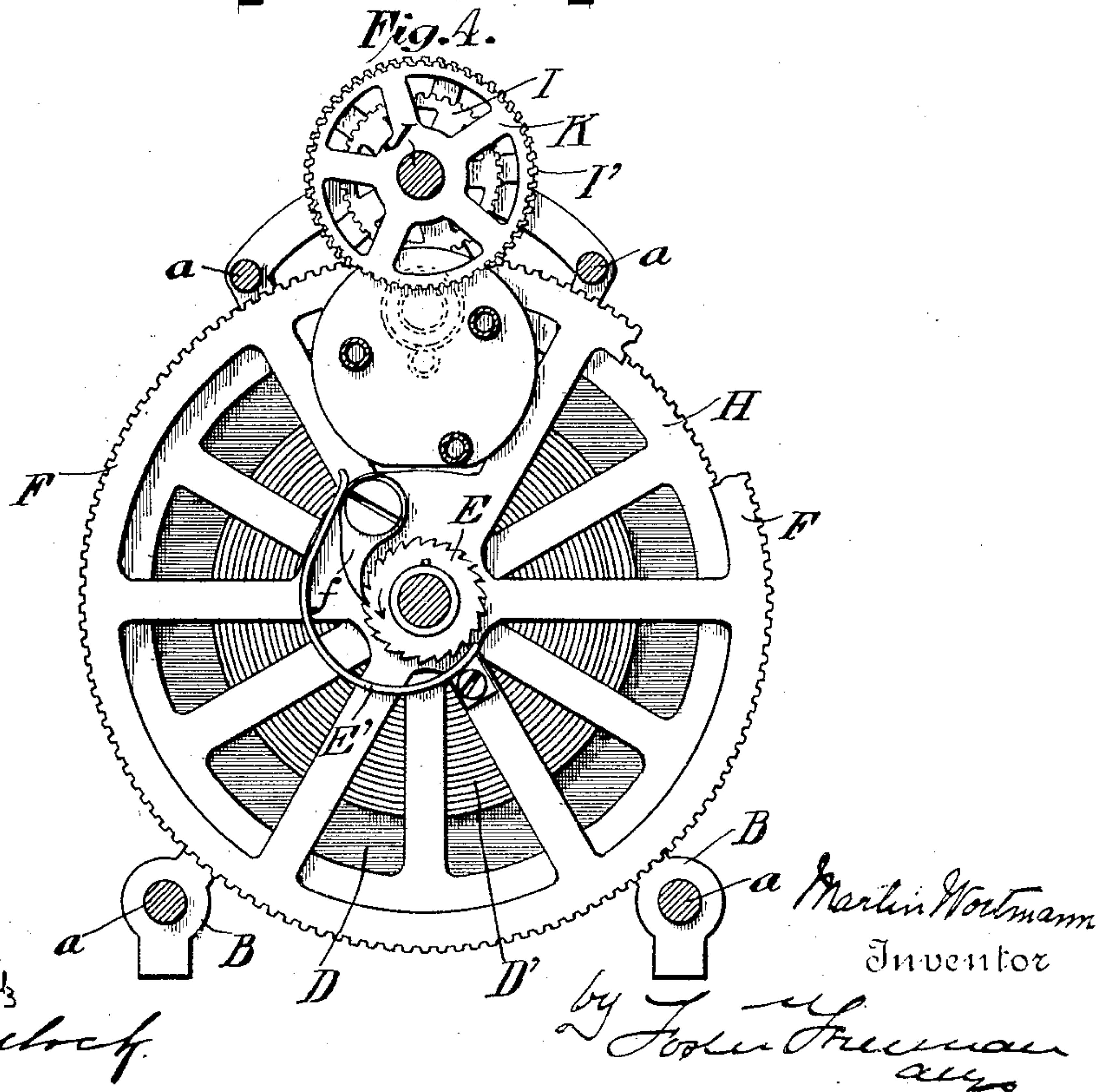
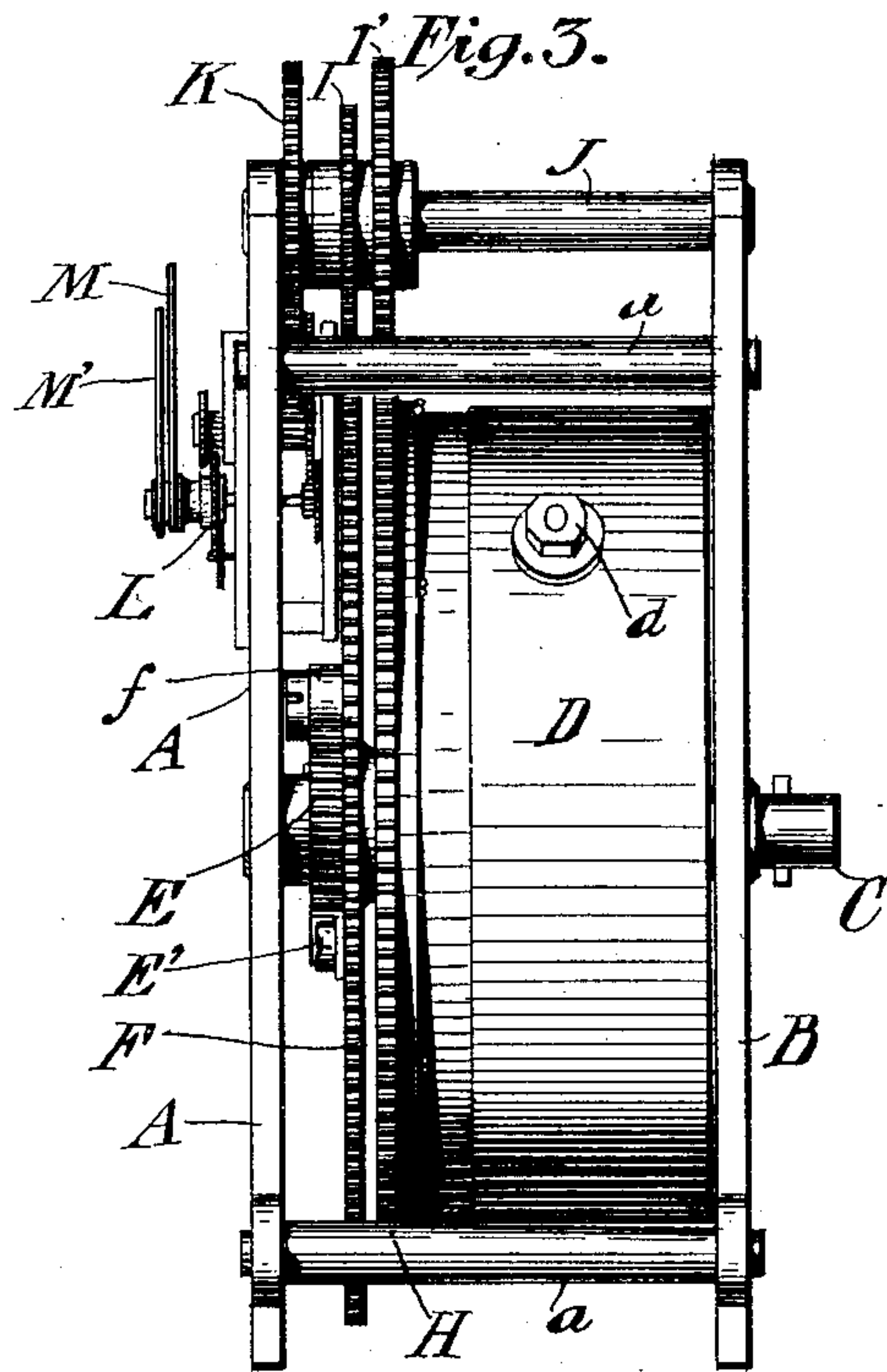
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2 SHEETS—SHEET 2.



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UNITED STATES PATENT OFFICE.

MARTIN WORTMANN, OF NEW YORK, N. Y.

CLOCK.

SPECIFICATION forming part of Letters Patent No. 748,250, dated December 29, 1903.

Application filed December 30, 1902. Serial No. 137,202. (No model.)

To all whom it may concern:

Be it known that I, MARTIN WORTMANN, a citizen of the United States of America, residing in New York city, borough of Manhattan, State of New York, have invented a new and useful Improvement in Clocks, of which the following is a specification.

This invention relates to improvements in clocks, and especially to clocks which are constructed to run for a considerable period of time, the clock forming the subject of the present invention being designed to run for a period of about a year.

One of the objects of the invention is to provide a center wind—that is to say, the winding-arbor has the mainspring coiled thereabout, and the construction is such that a very short wind in proportion to the length of the spring to be wound is obtained.

Another object of the invention is to provide means to compensate for the unwinding of one end of the mainspring by winding at a proportionately less speed from the other end, so that the spring will not unwind as fast as otherwise would be the case.

Other objects of the invention are to provide a clock of the described class which will be durable, efficient, and cheap to manufacture, as there are but comparatively few parts, and these parts are preferably used in connection with the ordinary watch-movement with a balance-escapement.

With these objects in view my invention consists of certain features of construction and combination of parts, to be hereinafter described and then particularly claimed.

In the accompanying drawings, Figure 1 is a front elevation of my improved clock, part of the same being broken away and the dial being indicated by broken lines. Fig. 2 is a vertical central section of the same. Fig. 3 is a side elevation of the clock, and Fig. 4 is a sectional view behind the front plate.

Referring to the drawings, A B represent the front and back plates, respectively, of the clock, which, with the connecting-bolts *a*, form the frame in which is journaled the center arbor C, that receives a winding-key at its rear end.

Mounted to turn on the winding-arbor C

is the spring-barrel D, which is of such diameter as that it may contain a very long mainspring D', one end of which is attached at *d* to the inner side of the cylindrical wall of the barrel and the other end of which is attached at C' to the winding-arbor C. The winding-arbor C also carries a rigidly-fixed ratchet-wheel E, which turns therewith during the winding of the mainspring. What will be hereinafter designated the "slow" gear-wheel F is mounted to turn loosely on the arbor and is of a diameter greater than the diameter of the barrel, the same being located in front of the barrel between it and the front plate A. A pawl *f* is pivoted to the slow wheel, and the toe thereof is adapted to take into the recesses between the teeth of the ratchet-wheel E, it being pressed against the teeth and into the recesses by means of a suitable spring E', which is fastened to the diametrically opposite side of the hub of the slow wheel. For compactness and also to secure a proper seating for the gear-wheel F upon the arbor C the receiving end of the arbor is reduced and the said gear-wheel placed thereon, it being held against movement away from the barrel by means of the rigidly-fixed ratchet-wheel. Also the larger diameter of the arbor is within the barrel and has the inner coil of the mainspring wound thereabout and attached thereto. The reduced end therefore is made use of for the purpose of confining the gear-wheel F upon the arbor between the ratchet-wheel and the shoulder at the end of the larger diameter of the arbor, while the larger diameter of the arbor is and may be made so great that the inner coil will not bend sharply around the arbor, and thus tend to break. Fixed to that side of the spring-barrel adjacent the slow wheel F is a smaller gear-wheel H, which has a number of teeth less than the number of teeth on the slow wheel, the pitch of the teeth being the same. An intermediate differential gear is located between the gear-wheels F H, the same consisting of a small gear-wheel I, which is mounted on a shaft J, that is journaled at its ends, so as to turn in bearings of the front and back plates A B of the clock-frame, which shaft also carries adjacent to the gear-wheel I a second

larger gear-wheel I'. The teeth of the gear-wheel I mesh with the teeth of the slow gear-wheel F, and the teeth of the gear-wheel I' mesh with the teeth of the barrel gear-wheel

5 H. A motion-transmitting gear-wheel K is mounted on the shaft J, so as to communicate the driving motion of the spring to the clock-train L, which is of any approved construction and is provided with minute and
10 hour hands M M' and with a dial N. (Indicated in dotted lines in Fig. 1.)

The operation is as follows: Both ends of the mainspring act in the present invention the outer end to drive the barrel around, as
15 usual, and the inner end tending to compensate for the unwinding of the spring; but the inner end of the spring cannot and does not move around the winding-arbor as a center proportionately as fast as the outer end. In
20 the present instance the ratio of progress is about five to four, although the invention is not limited thereto. This effect is not of itself new; but the manner in which the means for producing it is combined with the clock-
25 train proper to wind and run it is new. In winding the clock from the center winding-arbor C the barrel, with its gear-wheel and the larger relatively slow gear-wheel F, is fixed against turning, due to the clock-escapement.
30 As the mainspring is wound up directly from the winding-arbor, it does not take so long to wind the same as heretofore. When the clock is running, motion is transmitted by the spring to the barrel, which transmits
35 motion to the clock-train for running the same through the gear-wheel I'; but the important part of the invention comes into play by reason of the differential gear located between the large gear and the gear on the
40 spring-barrel. Due to the differential gear and the looseness of the spring-barrel and slow wheel F upon the arbor the barrel transmits motion through the gear-wheels I I' to the wheel F, causing it to rotate in the same
45 direction as the barrel, but at a less rate of speed. In the present invention the ratio of speed between the slow gear-wheel and the barrel is as five to four, so that the barrel turns five times while the slow wheel turns
50 four times. In this way the slow wheel is always turning at a less rate of speed than the barrel and tending to cause the inner end of the mainspring to catch up with the rate of rotation of the other end of the mainspring
55 and, in point of fact, winding up the mainspring from its inner end at a proportionately less rate than it is unwound. In this way the action of the mainspring is utilized to exert its influence at both ends and enable the
60 clock to run for a great length of time.

It is evident that the relative rates of rotation of the gear-wheel on the barrel and the loose gear-wheel on the arbor may be the reverse of that shown and described by making the former the larger gear and the latter

the smaller gear and mounting the pawl on the barrel. I therefore desire it understood that in referring to these gears in some of the claims I do not limit myself to the relative
70 speeds of these gears, although for convenience in describing the construction shown one is termed "fast" and the other "slow."

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

1. In a clock, the combination of the clock-train and its escapement, a suitably-journaled winding-arbor, a spring-barrel mounted loosely on the arbor, a mainspring connecting the barrel and the arbor, a gear on the
80 barrel, a second gear-wheel mounted loosely on the arbor, a shaft counter to the winding-arbor, differential gears on the said shaft meshing with the barrel-gear and said second gear, another gear on said shaft for transmitting motion from the differential gear and
85 shaft directly to the clock-train and its escapement, and means between one of the arbor-gears and the arbor for permitting winding and for permitting the arbor to turn during
90 the running of the clock, substantially as described.

2. In a clock, the combination of the clock-train and its escapement, a suitably-journaled winding-arbor, a spring-barrel mounted
95 loosely on the arbor, a mainspring connecting the main barrel and the arbor, a gear on the barrel, a slow gear-wheel mounted loosely on the arbor, a shaft counter to the winding-arbor, differential gears on the said shaft
100 meshing with the barrel-gear and the slow gear, another gear on said shaft for transmitting motion from the differential gear and shaft directly to the clock-train and its escapement, and means between the slow gear
105 and the arbor for permitting winding and for permitting the arbor to turn during the running of the clock, substantially as described.

3. In a clock, the combination of the clock-train, a suitably-journaled winding-arbor having a reduced end, a spring-barrel mounted
110 loosely on the arbor, a mainspring connecting the barrel and the arbor, the inner coil of the spring being directly attached to the larger diameter of the arbor, a gear on the barrel, a
115 second gear-wheel mounted loosely on the said reduced end of the arbor, a differential gear between the barrel-gear and the second gear, another gear transmitting motion from the differential gear to the clock-train, a
120 ratchet-wheel rigidly fixed on the arbor and by which the second gear-wheel is confined next the barrel-gear, and a pawl on one of the arbor-gears for engaging said ratchet-wheel, substantially as described.

4. In a clock, the combination of the clock-train, a suitably-journaled winding-arbor having a reduced end, a spring-barrel mounted
125 loosely on the arbor, a mainspring connecting the barrel and the arbor, the inner coil of the
130

spring being directly attached to the larger
diameter of the arbor, a gear on the barrel, a
slow gear-wheel mounted loosely on the said
reduced end of the arbor, a differential gear
5 between the barrel-gear and the slow gear,
another gear transmitting motion from the
differential gear to the clock-train, a ratchet-
wheel rigidly fixed on the arbor, and by which
the slow gear-wheel is confined next the bar-
10 rel-gear, and a pawl on the slow wheel for

engaging said ratchet-wheel, substantially as
described.

In testimony whereof I have signed this
specification in the presence of two subscrib-
ing witnesses.

MARTIN WORTMANN.

Witnesses:

EUGENE N. ROBINSON,
GEO. L. WHEELLOCK.