No. 825,875. PATENTED JULY 10, 1906.

M. WORTMANN.

CLOCK.

APPLICATION FILED JAN. 24, 1905.

Fig. 2.

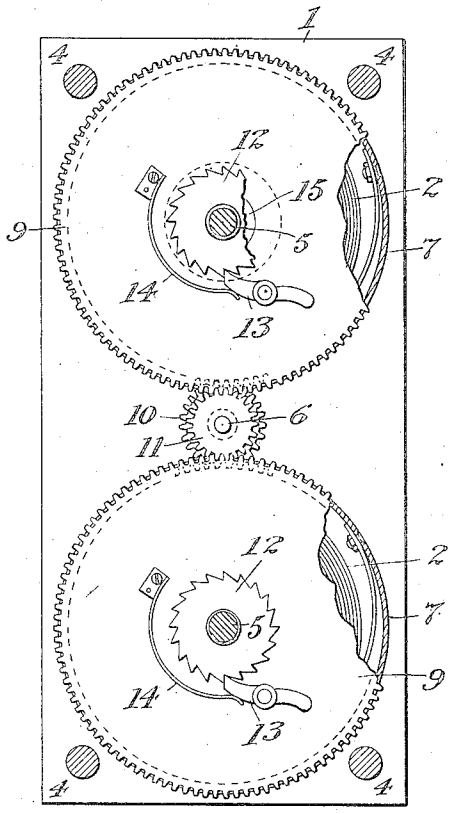


Fig. 1

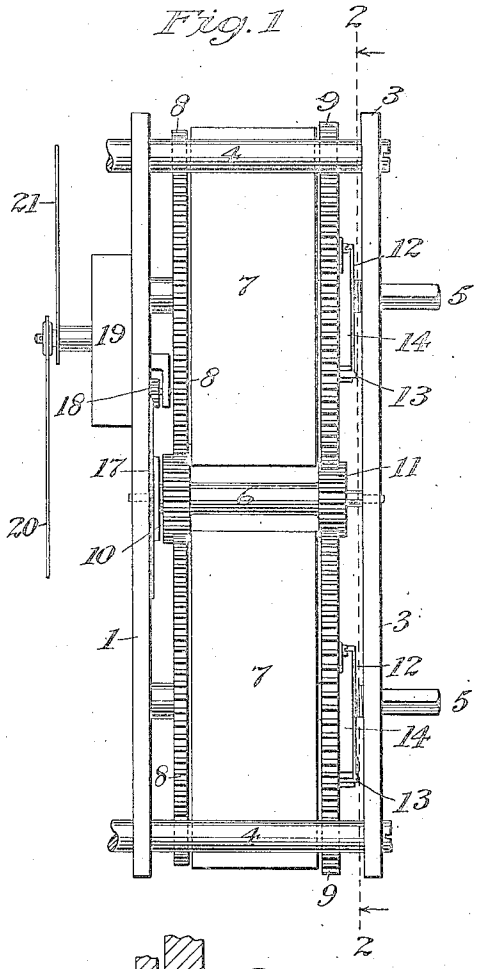


Fig. 3

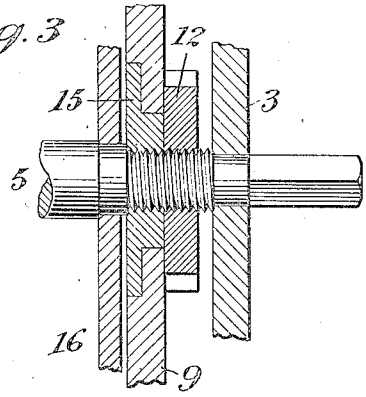
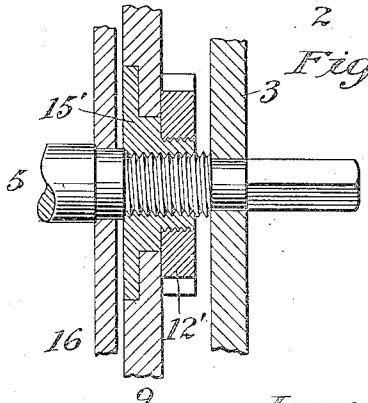


Fig. 4



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UNITED STATES PATENT OFFICE.

MARTIN WORTMANN, OF NEW YORK, N. Y.

CLOCK.

No. 825,875. Specification of Letters Patent. Patented July 10, 1906.

Application filed January 24, 1905. Serial No. 242,512.

To all whom it may concern:

Be it known that I, MARTIN WORTMANN, a citizen of the United States, residing in the borough of Manhattan, city of New York, in the county of New York and State of New York, have invented certain new and useful Improvements in Clocks, of which the following is a specification, reference being had therein to the accompanying drawings, forming a part thereof.

This invention relates to clocks, and more especially to clocks which are constructed to run for a considerable period of time, as for a year, without rewinding and in which the two ends of the mainspring are connected by differential gearing, so that the mainspring will be permitted to unwind at one end and will be rewound at slower speed at the other end throughout the operation of the clock. In clocks of this description where a center-wind or wind at the center of the mainspring is employed, as is highly desirable by reason of simplicity, direct application of the winding force, short number of turns required, and capability of being wound without stopping the clock, it is necessary to provide a ratchet-and-pawl or similar connection between the winding-arbor and the arbor-gear or slow-gear wheel of the differential gearing to permit the rotation of the winding-arbor in winding the clock without imparting movement to the arbor-gear. At all other times except when the clock is wound the arbor-gear and the arbor must move together, since it is the arbor-gear which imparts to the spring the rewinding movement at its inner end at a slower speed than the unwinding movement at its outer end—essential in the operation of clocks of this description. The connection, therefore, between the arbor-gear and the winding-arbor must be such that when the clock is wound at intervals of one year the winding-arbor must be permitted to rotate independently of the arbor-gear, and at all other times the arbor-gear and the winding-arbor must move together as one rigid part concentrically and without side play or yielding, since the arbor-gear meshes at its outer periphery and at a considerable distance from its axis with one of the differential gears and must at all times work accurately therewith. This bearing, therefore, between the arbor-gear and the winding-arbor is only used as a bearing once a year; but when it is thus used it must not bind or stick, for if it did the winding movement would probably break the clock, and at all times except during the winding movement it must maintain such rigidity that the arbor-gear will mesh accurately with the differential gear.

My present invention has for its object to provide a connection between the arbor-gear and the winding-arbor which will satisfy the extreme conditions arising in clocks of this description.

I will now describe the constructions embodying my invention illustrated in the accompanying drawings and will thereafter point out my invention in claims.

Figure 1 is a side elevation of a clock-movement embodying my invention. Fig. 2 is a vertical section of the same on a plane indicated by the line 2 2, Fig. 1. Fig. 3 is an enlarged sectional detail of the connection between the winding-arbor and the arbor-gear. Fig. 4 is a similar view of a modified construction.

In the clock shown in the accompanying drawings two mainsprings 2 are provided, connected so as to act together in driving the clock-train, and I have found in practice that by reason of the embodiment of the features of my present invention two ordinary eight-day springs will furnish sufficient power for running for even a greater period than a year.

The front plate 1 and the back plate 3 are joined by connecting-bolts 4, forming the frame in which the mainsprings are held and which contains the bearings for the two spring-arbors or winding-arbors 5. Each of these arbors is shown as squared at its rear end to receive a winding-key. By reason of the comparatively small springs employed an ordinary winding-key may be used to wind the springs. Each mainspring has a spring-barrel 7, and each spring-barrel is fitted to rotate upon its winding-arbor 5, the inner end of each mainspring being secured to its spring-arbor and the outer end of each mainspring being secured to its spring-barrel, the construction here being usual and well known, and therefore not particularly shown. To each spring-barrel 7 a barrel-gear 8 is fixedly secured, as shown at the front end thereof, and rotates with its spring-barrel and concentrically with the winding-arbor. The other gear for each spring, which is mounted concentrically with the spring-barrel and winding-arbor, is the arbor-gear or slow-gear wheel 9 of larger diameter than the barrel-gear, the function of this arbor-gear being to transmit motion to

its winding-arbor and spring, so that during the going operation the spring will be rewound at a slower rate than it is permitted to unwind. The counter-arbor 6 is fitted to rotate in bearings in the plates 1 and 3 and has fixedly mounted upon it differential gears 10 and 11, of which the larger gear 10 meshes with both of the barrel-gears 8 and the smaller gear 11 meshes with both of the arbor-gears 9.

Each arbor-gear 9 is connected with its winding-arbor 5 by a ratchet-wheel 12, fixedly secured to the winding-arbor, and by a pawl 13, carried by the arbor-gear 9 and pivotally held thereon and pressed inward by a spring 14. The bearing for each arbor-gear 9 is directly in a flanged sleeve 15, which is tightly screwed upon its winding-arbor 5 and has a large rear flange which fits or is countersunk in a recess in the front face of the arbor-gear 9, so that the arbor-gear has a circular or cylindrical bearing upon the outer periphery of this flange and a front end bearing against the face of this flange and a circular or cylindrical bearing upon the hub or body of the sleeve, the sleeve thus providing a circular bearing of large diameter, a flat bearing of considerable length, and a circular bearing of smaller diameter for the arbor-gear 9. The ratchet-wheel is screwed tightly up against the rear face of this circular bearing of smaller diameter and provides a rear flat bearing for the arbor-gear. The parts may readily be so fitted that the ratchet-wheel when screwed in place will nicely fit against the rear face of the arbor-gear 9 with the desired looseness to permit freedom of rotation only of the arbor-gear.

In the preferred construction (shown in Fig. 3) the ratchet-wheel is threaded directly upon the winding-arbor 5 and the flanged sleeve 15 and the ratchet-wheel 12 engage different parts of the same thread on the winding-arbor. In the modified construction shown in Fig. 4 the flanged sleeve is the only part directly threaded upon the winding-arbor and has an externally-threaded rear part, upon which the ratchet-wheel is directly threaded. By these means a bearing is provided for the arbor-gear which has the desired characteristics of firmness, accuracy, compactness, and negligible friction, as well as ease and simplicity of construction.

Each winding-arbor is suitably shouldered to receive its flanged sleeve 15 and is also slightly shouldered at the bearing of the head 16 of its spring-barrel 7. The springs employed being the ordinary eight-day springs, a very large diameter of the winding-arbors is not required.

The driving gear-wheel 17, whereby the clock-train is actuated, is mounted upon the counter-arbor 6 and meshes with a pinion 18. A marine clock-train is located within the casing 19 and is provided with a minute-hand 20 and an hour-hand 21, but is not particularly shown and need not be described, as obviously any suitable clock-train or other mechanism to be driven may be actuated.

It is obvious that various modifications may be made in the constructions shown and above particularly described within the principle and scope of my invention.

What I claim, and desire to secure by Letters Patent, is—

1. The combination of a winding-arbor, a spring-barrel rotatively mounted thereon, a mainspring connecting the barrel and arbor, a barrel-gear, an arbor-gear, and intermediate differential gears meshing with the barrel-gear and the arbor-gear, the arbor-gear being mounted concentrically with the arbor and so as to rotate concentrically relatively to the arbor and connected to the arbor to permit movement of the arbor relatively to the arbor-gear during the winding operation, the bearing for the arbor-gear including a flanged sleeve upon the arbor providing a flat bearing for the arbor-gear, a ratchet clamped in fixed position relatively to the flanged sleeve and also providing a flat bearing for the arbor-gear, the two flat bearings being at opposite faces of the arbor-gear, and a pawl secured to the arbor-gear and engaging the ratchet.

2. The combination of a winding-arbor, a spring-barrel rotatively mounted thereon, a mainspring connecting the barrel and arbor, a barrel-gear, an arbor-gear, and intermediate differential gears meshing with the barrel-gear and the arbor-gear, a flanged sleeve threaded upon the winding-arbor and providing a flat bearing for the arbor-gear, a ratchet-wheel suitably threaded and clamped against the flanged sleeve so as to provide another flat bearing for the arbor-gear, the bearing provided by the flanged sleeve and ratchet-wheel also including two circular bearings of substantially different diameters for the arbor-gear, and a pawl pivotally mounted upon the arbor-gear and coacting with the ratchet-wheel to impart movement to the arbor during the going operation and to permit movement of the arbor relatively to the arbor-gear during the winding operation.

3. The combination of a winding-arbor, a spring-barrel rotatively mounted thereon, a mainspring connecting the barrel and arbor, a barrel-gear, an arbor-gear, and intermediate differential gears meshing with the barrel-gear and the arbor-gear, a flanged sleeve threaded upon the winding-arbor, the arbor-gear being recessed to receive the flange of the sleeve and the flange of the sleeve providing a circular bearing of large diameter for the arbor-gear and also providing a flat bearing for the arbor-gear, and the body of the sleeve providing a circular bearing of smaller diameter for the arbor-gear, a ratchet-wheel suitably threaded and clamped against the flanged

sleeve so as to provide another flat bearing for the arbor-gear, and a pawl pivotally mounted upon the arbor-gear and coacting with the ratchet-wheel to impart movement to the arbor during the going operation and to permit movement of the arbor relatively to the arbor-gear during the winding operation.

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

MARTIN WORTMANN.

Witnesses:
HENRY D. WILLIAMS,
HENRY BARNES.