Dec. 16, 1930. W. J. LARGE ET AL 1,785,267

REGULATOR FOR CLOCK MOVEMENTS

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Fig. 1.

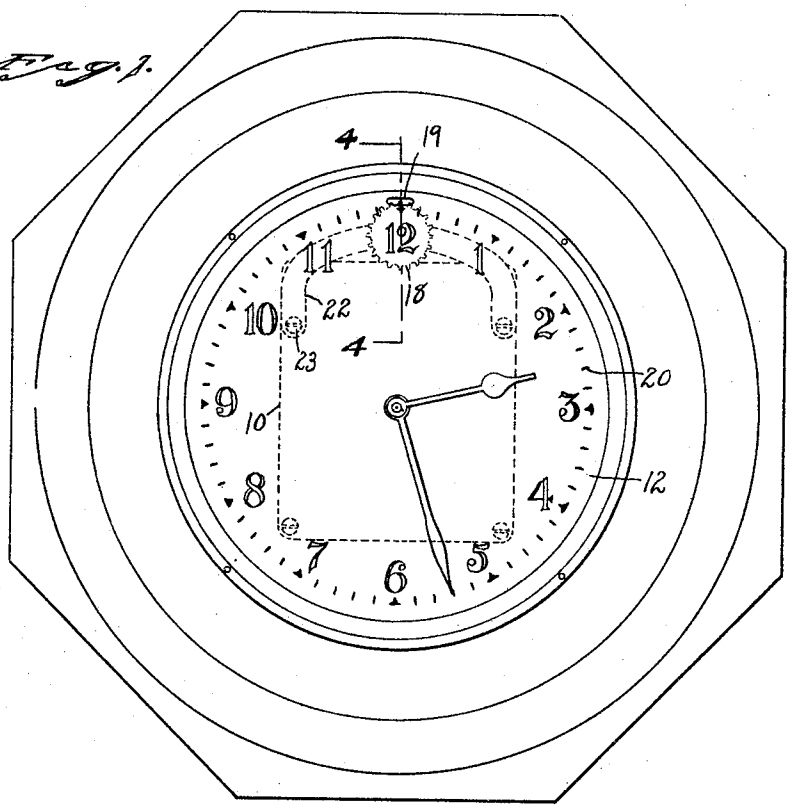


Fig. 3.

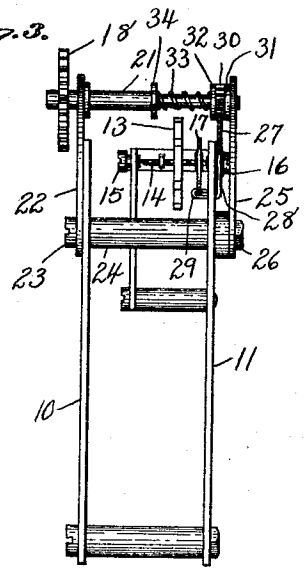
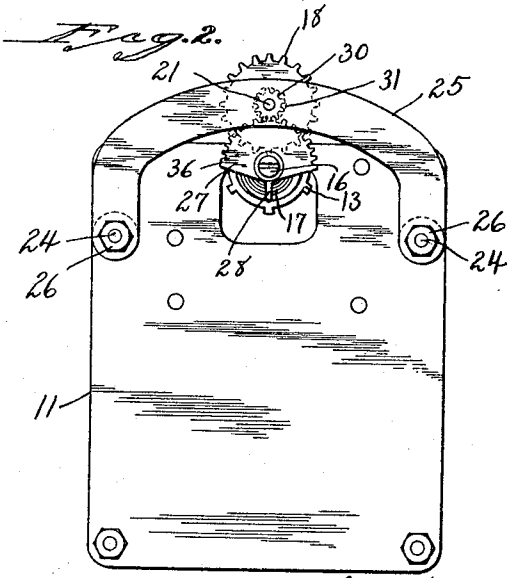


Fig. 2.



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Fig. 4.

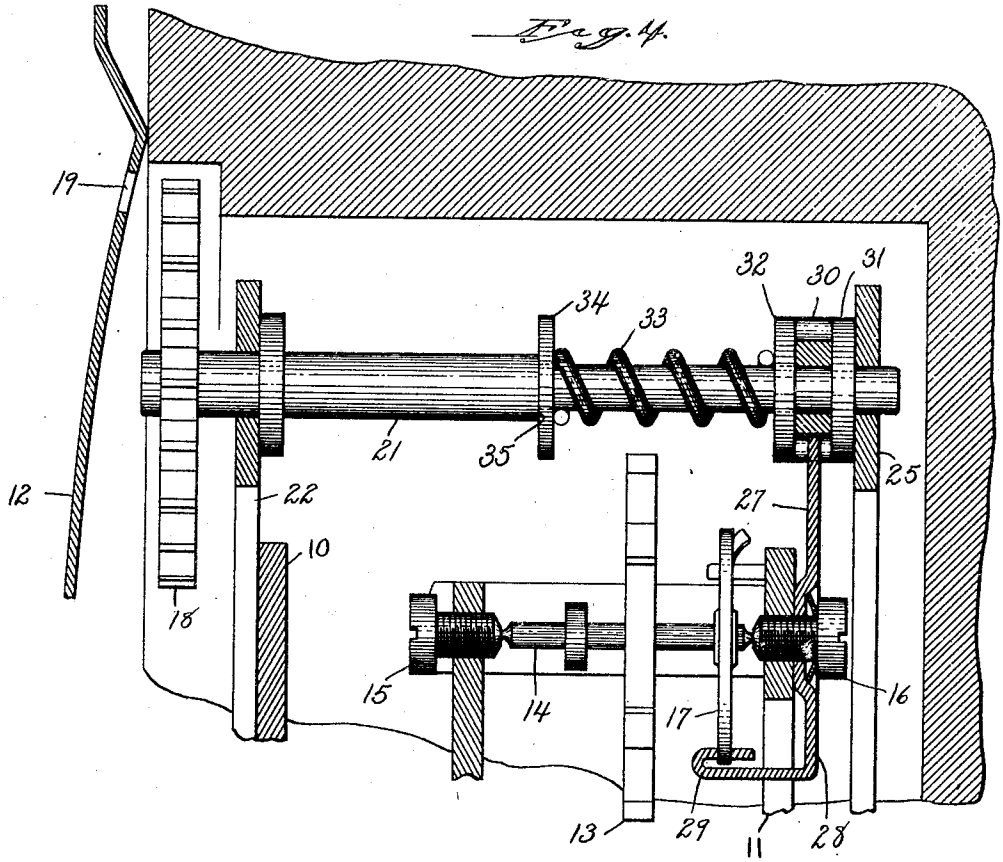


Fig. 5.

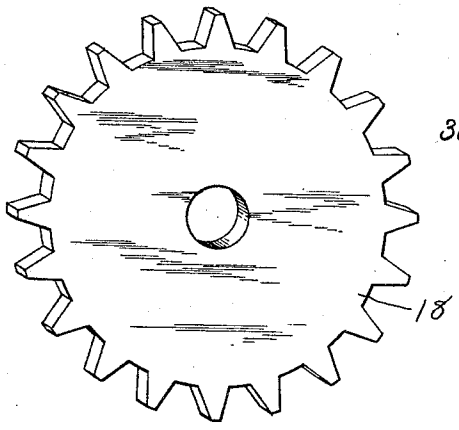
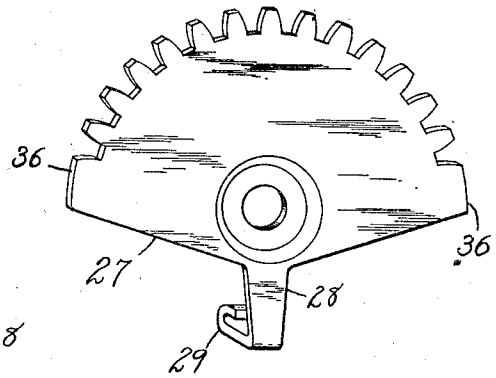


Fig. 6.



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UNITED STATES PATENT OFFICE

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REGULATOR FOR CLOCK MOVEMENTS

Application filed November 2, 1928. Serial No. 316,702.

Our invention relates to an improved regulator for clocks particularly of the so-called "marine" type, though not so limited, the object being to produce a simple, compact and efficient regulator constructed with particular reference to avoiding the mutilation of the field of the dial and to guarding against unwittingly carrying the regulation of the escapement either in the direction of speed or slowness too far at any given operation of the regulator, whereby the common fault of overdoing the regulation by any given adjustment of the regulator is avoided.

With these ends in view, our invention consists in a regulator for clock-movements, characterized by a manually-operable regulator-wheel located in a plane parallel with the plane of the plates of the clock-movement and preferably within the clock-dial and accessible for being turned in one direction or the other through an opening therein by means of a pencil-point, knife-blade, or other small instrument.

Our invention further consists in a regulator for clock-movements characterized as above and provided with a gear-segment carrying the balance-spring curb and moved by the step-by-step turning of the regulator-wheel in one direction or the other.

Our invention further consists in a regulator for clock-movements having certain other details of construction as will be hereinafter described and particularly pointed out in the claims.

In the accompanying drawings:

Fig. 1 is a view in front elevation of a clock provided with our improved regulator;

Fig. 2 is a detached view in rear elevation of the clock-movement stripped, save for its balance or escapement-wheel and our improved means for regulating the same;

Fig. 3 is a corresponding edge view;

Fig. 4 is an enlarged-scale broken view in vertical central section on the line 4—4 of Fig. 1;

Fig. 5 is a detached perspective view of the manually-operable regulator-wheel; and

Fig. 6 is a corresponding view of the gear-segment of the regulator.

In carrying out our invention as herein shown, it is applied to a marine clock having a front movement-plate 10, a rear movement-plate 11, a dial 12, and a balance or escapement-wheel 13 mounted on an arbor 14 running in screw-bearings 15 and 16 and having the inner end of a hair-spring 17 attached to it in the usual manner. The parts described may be of any approved construction and form no part of our present invention.

Back of the dial 12 we locate a regulator-wheel 18 located in a plane parallel with the planes of the movement-plates 10 and 11 and accessible for being rotated step-by-step in one direction or the other by successive manual operations by the engagement of its teeth by a small slender instrument, such as a pencil-point, penknife blade, wooden toothpick, etc., inserted from the front of the dial through a regulating-opening 19 formed therein directly over the figure 12 on the face thereof and above the circle 20 of graduations encircling the figures representing the hours of the day. For the reason that the wheel 18 is manually operated step-by-step, though not directly engaged by the fingers of the operator, we have characterized it as a manually-operable regulator-wheel. It is mounted upon the forward end of a shaft 21 having bearing at its forward end, as shown, in a bridge-plate 22 secured to the upper portion of the front face of the front movement-plate 10 by screws 23 entering the projecting forward ends of the pillars 24 uniting the upper ends of the two movement-plates. At its rear end the said arbor 21 has bearing in a plate 25 secured by nuts 26 to the inner ends of the pillars 24 aforesaid.

Upon the rear face of the rear movement-plate 11 we mount a gear-segment 27 turning about the bearing-screw 16 before referred to, and having a regulator-arm 28 offsetting from it in its plane and turned inward at a right angle and bent to form a loop 29 receiving the outermost coil of the hair-spring 17 and lengthening or shortening the effective length thereof according to its position with respect thereto, since the activity of the spring in expanding and contracting is checked by the loop which acts as a curb in the well-known manner.

The teeth of the said segment mesh into a pinion 30 frictionally mounted upon the arbor 21 by its interposition between a washer 31 non-rotatably mounted thereupon and a friction-washer 32 loosely mounted thereupon and pressed against the forward face of the said pinion by a spring 33 encircling the arbor, impinging at its rear end upon the friction-washer and at its forward end upon a loose washer 34 held in place by a shoulder 35 on the arbor. The friction developed by the spring 33 is sufficient to cause the pinion 30 to rotate with the arbor and hence turn the gear-segment 27 in one direction or the other to the limit of its rocking movement determined by stop-teeth 36 located at its either end in position to engage with the teeth of the said pinion when the segment has been sufficiently turned to effect such engagement. The turning of the segment moves the loop or curb 29 arcuately with respect to the coil of the spring with which it is engaged. At such time, if the arbor 21 is further turned through its regulator-wheel 18 with sufficient force to overcome the friction caused by the spring 33, the arbor turns idly within the pinion 30, whereby the damaging of the mechanism is prevented. It will be understood, however, that the regulation of the hair-spring 17 provided by moving the gear-segment within the limits set by its stop-teeth 36 is sufficient for all purposes of regulation by the user of the clock.

By inserting an instrument like the point of a pencil through the regulating-opening 19 in the dial, a tooth of the regulator-wheel 18 may be engaged and the wheel turned to the right or left as may be desired within the limit set by the length of the opening 19. This movement is transmitted through the arbor 21, pinion 30 and gear-segment 27 of the hair-spring 17, the effective length of which is increased or diminished as the case may be. If one such movement of the regulator-wheel 18 is deemed not sufficient to effect the desired regulation, the pencil must be removed from engagement with the wheel and re-engaged therewith to effect a further movement of the loop or curb 29 with respect to the outer coil of the hair-spring. The parts are so proportioned as to gearing that the change in the position of the loop or curb 29 with respect to the spring affected by any one movement of the regulator-wheel 18 is very slight, so that the person regulating the clock is guarded against overdoing it, which is the great defect of most regulators, such, for instance, as regulators in which the forward end of an arbor is squared and projected through the dial for the application of a key, as well as in regulators in which the edge of a regulating-wheel is projected through the dial at a right angle thereto for being directly engaged by the finger of the person attempting the regulation. Under our improvement, the regulator-wheel being located in the vertical plane behind the dial can only be moved a very short distance by any one engagement with its teeth by an instrument inserted through an opening in the dial.

Under our invention, the dial is less mutilated by an opening located outside of the circle of figures and minute graduations than where the opening for the regulator is located within these circles, as has been commonly done heretofore. Our improved regulator is very easy to operate and is so constructed that any one given operation of it effects the changing in the length of the hair-spring so slightly that the over-regulation of the clock is avoided, that being, as aforesaid, the common defect of the regulating appliances heretofore used in clocks of this type.

Another and important advantage of our improved regulator is that it is, as it were, visually controlled, rather than by the tactile sense, it being much easier to operate a regulator accurately by sight than by feeling. Furthermore, regulators operated by keys are open to the objection that the very act of applying the key to the arbor of the device introduces a factor beyond the control of the person inserting the key, since at this time the key can hardly be prevented from turning the arbor one way or the other before the intentional turning of the key and hence of the arbor to effect the desired regulation. On this account key-operated regulators are necessarily handicapped in use by the introduction of this factor of unconscious operation prior to intentional operation. On the other hand, our regulator will only be moved as specifically intended by the user.

We claim:

1. In a clock, the combination with a time-movement having an escapement, of regulating-mechanism for the said escapement, a dial having a regulating-opening extending from front to rear therethrough, a toothed regulating-wheel located behind the said dial in the plane thereof in position to have its teeth directly engaged through the said opening therein and mounted with capacity for full rotation, and movement-reducing connection between the said wheel and the said regulating-mechanism.

2. A mechanism as defined in the preceding claim, having a friction-coupling interposed in the said movement-reducing connection to guard against undue rotation of the said wheel in either direction.

In testimony whereof, we have signed this specification.

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JOHN O. SIMPSON.