June 5, 1934. J. BULLOCH 1,961,958

MICROREGULATOR FOR CLOCKS

Filed Sept. 6, 1933

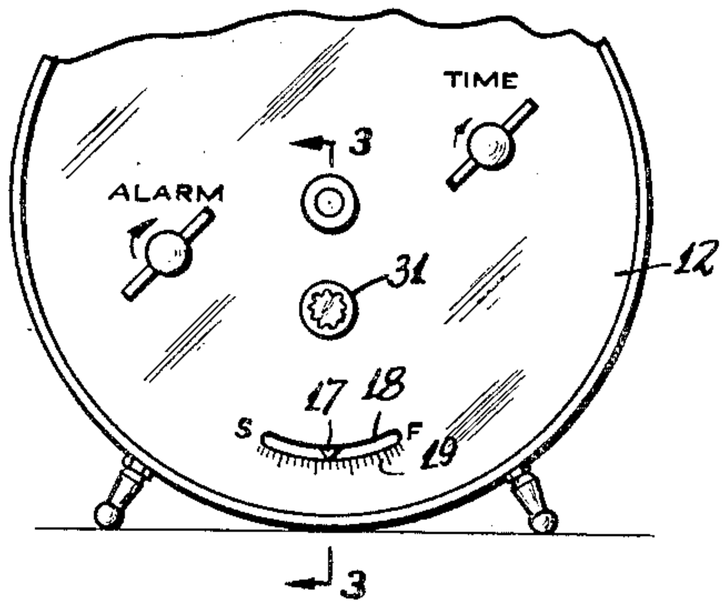

Fig. 1.

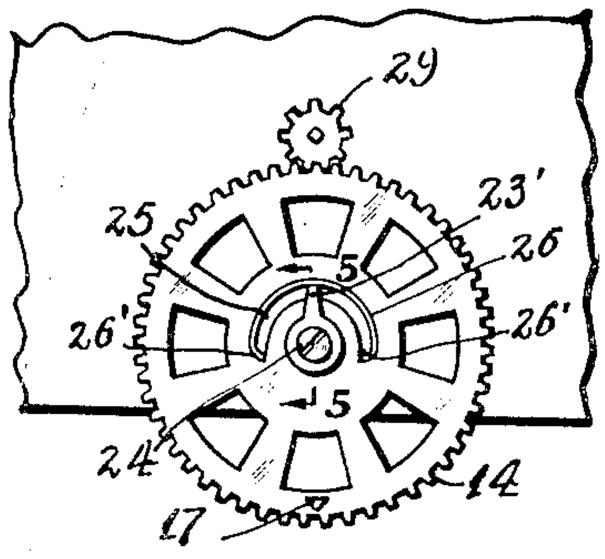

Fig. 4.

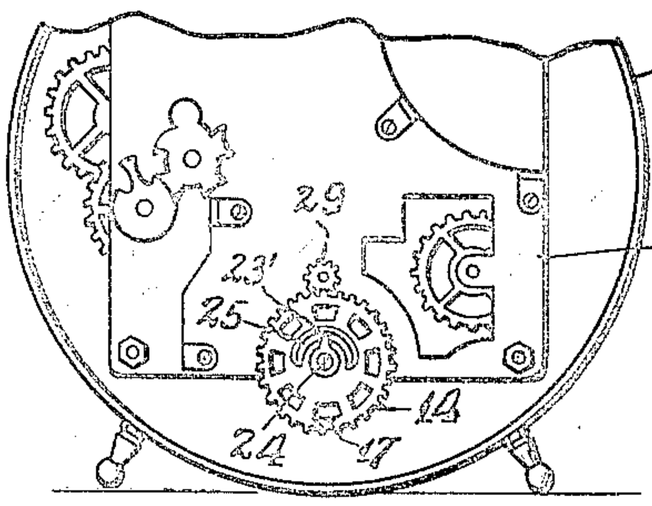

Fig. 2.

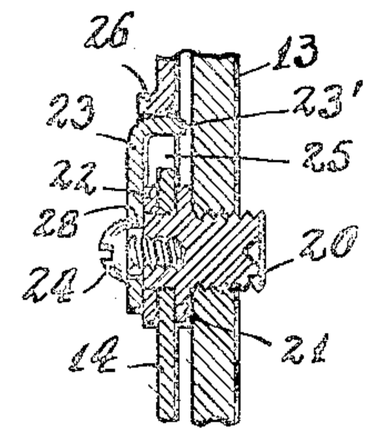

Fig. 5.

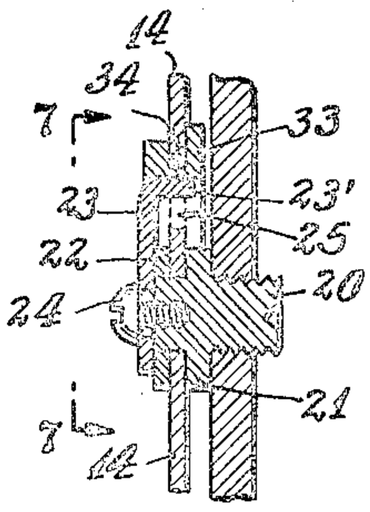

Fig. 6.

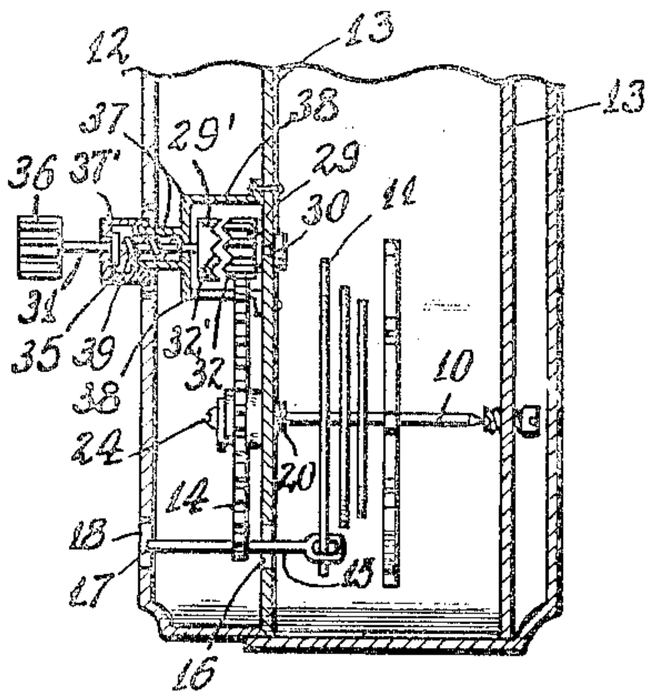

Fig. 3.

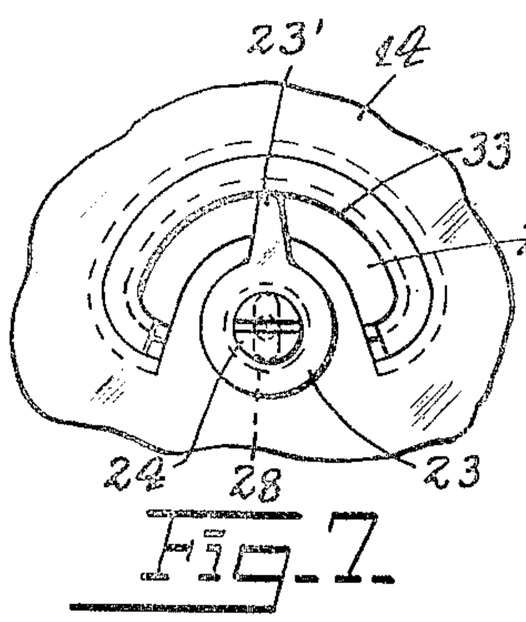

Fig. 7.

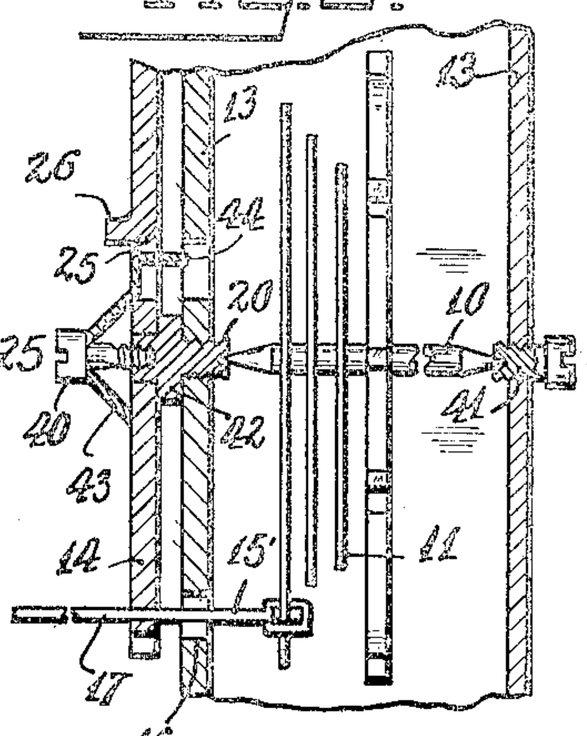

Fig. 8.

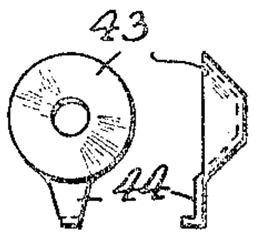

Fig. 9.

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MICROREGULATOR FOR CLOCKS

John Bulloch, Hoboken, N. J.

Application September 6, 1933, Serial No. 688,289

10 Claims. (Cl. 58—111)

This invention relates to new and useful improvements in a micro-regulator for clocks, etc.

The invention has for an object the construction of a micro-regulator as mentioned which is characterized by the provision of a hand operated pinion meshing with a gear carrying a loop element adapted to control the operation of the hair spring of a clock or similar mechanism.

Still further the invention proposes an arrangement whereby the pinion is controlled by a knob mounted outside of the clock casing.

As another object of this invention a provision is proposed for normally separating the knob from the pinion previously mentioned by a clutch mechanism.

As another object of this invention a provision is proposed for frictionally holding the gear in set positions so that it may be readily turned by the operation of the knob previously mentioned.

Still further the invention proposes the provision of an arcuate slot arranged in the gear and engaged by a tension spring mounted upon the spindle of the gear to produce the friction previously mentioned.

Still further it is proposed to arrange a lip along a portion of the slot for the purpose of reinforcing the slot and also for providing a greater area for contacting with the frictioning spring.

Still further the invention proposes an arrangement whereby a removable and adjustable element is arranged upon one edge of the slot so that the frictional resistance of the gear may be adjusted and controlled.

Still further the invention proposes the construction of a device as mentioned which is simple and durable and which may be manufactured and sold at a reasonable cost.

For further comprehension of the invention, and of the objects and advantages thereof, reference will be had to the following description and accompanying drawing, and to the appended claims in which the various novel features of the invention are more particularly set forth.

In the accompanying drawing forming a material part of this disclosure:—

Fig. 1 is a fragmentary rear elevational view of a clock with a micro-regulator according to this invention.

Fig. 2 is an elevational view of Fig. 1 but illustrated with the back of the casing removed.

Fig. 3 is a fragmentary sectional view taken on the line 3—3 of Fig. 1.

Fig. 4 is an enlarged detailed view of the gear used in the micro-regulator.

Fig. 5 is a fragmentary enlarged sectional view taken on the line 5—5 of Fig. 4.

Fig. 6 is a view similar to Fig. 5 but illustrating another embodiment of the invention.

Fig. 7 is an elevational view looking in the direction of the line 7—7 of Fig. 6.

Fig. 8 is a fragmentary view similar to a portion of Fig. 3 but illustrating another arrangement of the invention.

Fig. 9 is a detail of a tension spring washer used in Fig. 8.

The micro-regulator according to this invention is adapted to be used in combination with a clock having an arbor 10 with a spiral hair spring 11. The actual clock mechanism will not be described in this specification since clock mechanisms controlled with spiral hair springs are very common. A brief description of the more important parts of the clock will be given so that the association of the regulator with the clock may be readily recognized. The clock is shown provided with a casing 12 in which the customary frame 13 is supported. This frame supports the clock mechanism, partially illustrated in Fig. 2. Various controls for the clock extend from the rear of the casing as shown in Fig. 1.

The micro-regulator comprises a gear 14 which is rotatively mounted upon the frame 13 of the clock axially with the arbor 10. The gear 14 is provided with a loop member 15 extending through an arcuate slot 16 in the frame 13 and contacting with the hair springs 11. An indicator 17 also is mounted upon the gear 14 and extends through or is viewable through an arcuate slot 18 in the clock casing 12 and works in conjunction with a scale 19 inscribed upon the clock casing. One end of the arcuate slot 18 is indicated by the letter "S" and the other end by the letter "F" to designate "slow" and "fast" and to instruct the regulation of the clock as hereinafter further described.

The rotative mounting of the gear wheel 14 is accomplished by rotatively mounting the gear wheel upon the bearing 20. This bearing extends through the frame 13 of the clock and serves to support one end of the spindle 10. The bearing 20 has a flange 21 engaging against the outer side of the frame 13 and a reduced portion upon which the gear 14 rotatively engages. A washer 22 is mounted upon the reduced portion and acts against the side of the gear 14. A friction spring 23 extends over the bearing 20 and is held in place by screw 24. The spring 23 acts to prevent the gear 14 from becoming free from the reduced portion of the bearing 20.

The hub portion of the gear 14 is formed with an arcuate slot 25 in which the end of the spring 23 engages. This arcuate slot has one side bent upwards into a rim portion 26. This rim 26 extends completely along one side of the slot and also around the ends of the slot at the points 26′. The free end of the friction spring 23 engages against the flange 26 so as to produce a larger frictioning surface. The friction spring

23 is in the form of a flat member from sheet material which has an end 23' extending into the arcuate slot 25 as previously mentioned. The degree of friction may be varied by reason of an elongated slot 28 which is formed in the flat friction spring 23 and through which the screw 24 passes. The screw 24 is adapted to clamp the spring 23 in various positions so as to obtain various degress of friction between the spring and the flange 26.

The gear 14 meshes with a pinion 29 which is fixed upon a spindle pin 30 rotatively mounted on the clock frame 13.

The pinion 29 is shown upon the vertical center line of the clock but its actual location is one of choice since it may be applied along any part of the circumference of the gear 14. One face of pinion 29 is provided with teeth 32 to form one member of a clutch. The other member 29' is provided with corresponding teeth 32' which are adapted to engage the teeth 32. Clutch member 29' has a central extension plunger 31 formed with a collar 35 and operating knob 36. A housing 37 is supported on a plurality of legs 38 secured to the frame 13. Plunger 31 is guided in housing 37 and cap 37'. A compression spring 39 within the housing tends to keep clutch member 29' out of mesh with clutch face 32. By forcing the operating knob 36 inwardly the clutch members may be engaged and the pinion 29 may be rotated for the desired setting.

In Figs. 6 and 7 a modification of the invention has been disclosed which relates particularly to the frictioning of the gear 14. More particularly the gear 14 is shown provided with an arcuate slot 25. A flexible metallic or similar element 33 is engaged upon one side and along the ends of the slot 25. This flexible element 33 has a back flange extending against the back of the gear 14, has a portion extending through the slot 25, and another portion extending over the front of the gear 14. The resiliency of the element 33 is depended upon to maintain its position. This element 33 may be removed when desired and replaced. A shim element 34 is interposed between the edge of the slot 25 and the outer side of the flexible element 33 for the purpose of controlling its position. Thus if a thicker shim element is engaged in place the element 33 will be located slightly outwards upon the slot 25. This arrangement allows adjustment of the frictional engagement between the friction spring 23 which is arranged and engaged against the inside of the flexible element 33. In other respects this form of the invention is identical to the previous form and corresponding parts may be recognized by the same reference numerals.

The operation of the device consists in forcing the knob 36 inwardly until the clutch members are in engagement and then turning the knob 36 to cause the pinion 29 to turn the gear 14 in a greatly reduced relation. It is for this reason that the regulator is called "micro". As the gear 14 turns the loop element 15 moves along upon the hair spring 11 and so regulates the operation of the clock. As the knob 36 is turned the indicator 17 may be watched as it moves along upon the scale 19 and in this manner the adjustment of the regulator set. In normal position the knob 36 may be turned idly without effecting the setting of the clock but when the knob 36 is forced inwardly it may be turned in one direction to cause the indicator 17 to travel in one direction as for example, towards the letter "S" which will regulate the clock to go slower, or the knob may be turned in the other direction to move the indicator 17 towards the letter "F" so that the clock will be regulated to go faster. The scale 19 should be tabulated so that the clock may be regulated to gain or lose minutes per day or week or fractional parts of minutes depending upon the desire.

As the knob 36 turns, the pinion 29 will transmit, this motion to the gear 14. The gear 14 will be held frictionally by the spring 33 so that it may assume various positions under the tension transmitted. When the gear 14 has been properly set the friction spring 23 is depended upon to maintain its position indefinitely until it is desired to reset the device.

It is to be understood that while a complete gear 14 has been illustrated, one-half or any portion thereof may be used and that the slot 26 may be formed in the said gear at any desired arc from indicator 17.

According to the arrangement illustrated in Figs. 8 and 9, the arbor 10 is supported at one end upon the bearing 20 which is formed in the end of a screw member 42. The screw member 42 threadedly engages through the frame 13 and is adjustable for tensioning the play of the arbor. The gear 14 is rotatively mounted upon the screw member 42. The screw members 42 is provided with a head 40 by which it may be adjusted. The head 40 is formed by engaging a headed screw partially into the outer end of the screw member 42 in a manner so that the parts are joined in an integral unit for unison operation, that is, the screw member 42 can be turned by turning the head 40. A friction spring washer 43 is arranged coaxially upon the screw member 42 and acts between the head 40 of the screw member and the side of the gear 14.

The friction spring washer 43 has a hub portion of frusto-conical shape clearly illustrated in Fig. 8, having a projecting finger portion 44 which engages through the arcuate slot 25 of the gear 14. In Fig. 9 the friction spring washer 43 is shown in front and in edge elevational view. The loop member 15' is mounted upon the gear 14 and extends through the slot 16 in the frame 13. In other respects the device is similar to the forms previously described. A feature of this construction resides in the fact that the screw 40 may be adjusted for simultaneously frictioning the gear 14 and adjusting the play of the arbor 10.

While I have shown and described the preferred embodiment of my invention, it is to be understood that I do not limit myself to the precise construction herein disclosed and the right is reversed to all changes and modifications coming within the scope of the invention as defined in the appended claims.

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

1. In combination with a clock having an arbor with a spiral hair spring, a gear rotatively mounted on a bearing on said clock axial of said arbor, a loop element on one side of said gear engaging said hair spring to regulate the operation of the clock, a pinion meshing with said gear and mounted on said clock, a knob for turning said pinion, said gear being formed with an arcuate slot, and a friction spring fixed upon said bearing and engaging into said slot against one wall of the slot for frictionally holding said gear.

2. In combination with a clock having an arbor with a spiral hair spring, a gear rotatively mounted on a bearing on said clock axial of said arbor,

a loop element on one side of said gear engaging said hair spring to regulate the operation of the clock, a pinion meshing with said gear and mounted on said clock, a knob for turning said pinion, said gear being formed with an arcuate slot, and a friction spring fixed upon said bearing and engaging into said slot against one wall of the slot for frictionally holding said gear, the wall of the slot engaged by said friction spring being bent into a flange.

3. In combination with a clock having an arbor with a spiral hair spring, a gear rotatively mounted on a bearing on said clock axial of said arbor, a loop element on one side of said gear engaging said hair spring to regulate the operation of the clock, a pinion meshing with said gear and mounted on said clock, a knob for turning said pinion, said gear being formed with an arcuate slot, and a friction spring fixed upon said bearing and engaging into said slot against one wall of the slot for frictionally holding said gear, the wall of the slot engaged by said friction spring being bent into a flange, and said flange also extending across the ends of said slot.

4. In combination with a clock having an arbor with a spiral hair spring, a gear rotatively mounted on a bearing on said clock axial of said arbor, a loop element on one side of said gear engaging said hair spring to regulate the operation of the clock, a pinion meshing with said gear and mounted on said clock, a knob for turning said pinion, said gear being formed with an arcuate slot, and a friction spring fixed upon said bearing and engaging into said slot against one wall of the slot for frictionally holding said gear, a screw engaging through said spring into said bearing for holding the spring in position.

5. In combination with a clock having an arbor with a spiral hair spring, a gear rotatively mounted on a bearing on said clock axial of said arbor, a loop element on one side of said gear engaging said hair spring to regulate the operation of the clock, a pinion meshing with said gear and mounted on said clock, a knob for turning said pinion, said gear being formed with an arcuate slot, and a friction spring fixed upon said bearing and engaging into said slot against one wall of the slot for frictionally holding said gear, a screw engaging through said spring into said bearing for holding the spring in position, said spring being formed with an elongated slot through which said screw passes to provide for adjustments of the position of said spring to vary the frictional engagement.

6. In combination with a clock having an arbor with a spiral hair spring, a gear rotatively mounted on a bearing on said clock axial of said arbor, a loop element on one side of said gear engaging said hair spring to regulate the operation of the clock, a pinion meshing with said gear and mounted on said clock, a knob for turning said pinion, said gear being formed with an arcuate slot, and a friction spring fixed upon said bearing and engaging into said slot against one wall of the slot for frictionally holding said gear, and an element engaged upon one wall of said slot, said friction spring engaging said element.

7. In combination with a clock having an arbor with a spiral hair spring, a gear rotatively mounted on a bearing on said clock axial of said arbor, a loop element on one side of said gear engaging said hair spring to regulate the operation of the clock, a pinion meshing with said gear and mounted on said clock, a knob for turning said pinion, said gear being formed with an arcuate slot, and a friction spring fixed upon said bearing and engaging into said slot against one wall of the slot for frictionally holding said gear, and an element engaged upon one wall of said slot, said friction spring engaging said element, and a shim interposed between said element and the wall of the slot for controlling the position of the element and the friction of engagement with the spring.

8. In combination with a clock having an arbor with a spiral hair spring, a gear rotatively mounted on a bearing on said clock axial of said arbor, a loop element on one side of said gear engaging said hair spring to regulate the operation of the clock, a pinion meshing with said gear and mounted on said clock, a knob for turning said pinion, said gear being formed with an arcuate slot, and a friction spring fixed upon said bearing and engaging into said slot against one wall of the slot for frictionally holding said gear, and an element engaged upon one wall of said slot, said friction spring engaging said element, and a shim interposed between said element and the wall of the slot for controlling the position of the element and the friction of engagement with the spring, said element having a portion extending through the slot and portions engaging against the front and back faces of said gear.

9. In combination with a clock having an arbor with a spiral hair spring, a gear rotatively mounted on a bearing on said clock axial of said arbor, a loop element on one side of said gear engaging said hair spring to regulate the operation of the clock, a pinion meshing with said gear and mounted on said clock, a knob for turning said pinion, said gear being formed with an arcuate slot, and a friction spring fixed upon said bearing and engaging into said slot against one wall of the slot for frictionally holding said gear, and an element engaged upon one wall of said slot, said friction spring engaging said element, and a shim interposed between said element and the wall of the slot for controlling the position of the element and the friction of engagement with the spring, said element having a portion extending through the slot and portions engaging against the front and back faces of said gear, and said element also engaging around the ends of said slot and having sufficient resiliency to maintain its position.

10. In combination with a clock having an arbor with a spiral hair spring, a gear wheel rotatively mounted on the clock axially of said arbor, a loop element on one side of said gear and engaging said hair spring to regulate the operation of the clock, a pinion rotative on said clock and meshing with said gear, and a knob for turning said pinion, said knob being located on the outer side of the clock, means for automatically keeping said knob disengaged from said pinion in normal position, when adjustment is not desired, said means comprising a spring operated plunger extending from the said knob and terminating in a normally disengaged clutch member, a clutch face on the said pinion, said clutch face being engageable with the said clutch member.

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