P. RAVIGNEAUX.

WINDING INDICATOR.

APPLICATION FILED AUG. 19, 1909.

1,035,104. Patented Aug. 6, 1912.

Fig. 1.

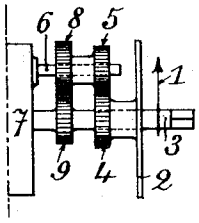


Fig. 2.

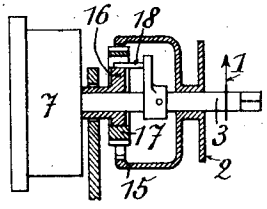


Fig. 3.

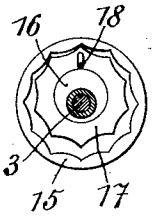


Fig. 4.

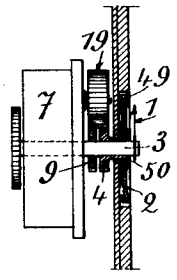


Fig. 5.

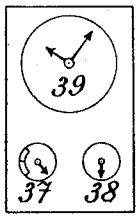


Fig. 6.

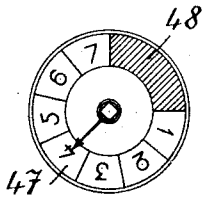


Fig. 7.

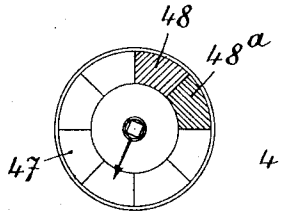
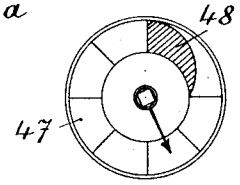


Fig. 8.



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WINDING-INDICATOR.

1,035,104. Specification of Letters Patent. Patented Aug. 6, 1912.

Application filed August 19, 1909. Serial No. 513,686.

To all whom it may concern:

Be it known that I, POL RAVIGNEAUX, a citizen of the Republic of France, residing at 3 Rue du Midi, Neuilly-sur-Seine, in the Republic of France, engineer, have invented certain new and useful Improvements in and Relating to Winding-Indicators, of which the following is a specification.

This invention relates to winding indicators and has for its object to provide a device for showing at any instant the amount by which a watch or clock spring is unwound from its fully wound position. This object is accomplished by means of two rotating indicating members, one of which is fixed on the spindle of the barrel, and the other is connected to both the spindle and the barrel by a gear train, this train being such that the relative movement between the two indicating members is at most one turn during the relative motion of several turns of the barrel and the spindle both on a complete winding and a complete unwinding of the barrel spring. With this combination it is possible to reduce the number of the gear-wheels and the members controlling the indicating elements to a very small one. The mechanism is also rendered much more compact and there is a reduction in the cost.

Several ways in which the invention may be carried into effect are shown by way of example in the accompanying drawings, in which—

Figure 1 is an elevation of a primary form of the invention; Figs. 2 and 3 show a further modification in end elevation and longitudinal section; Fig. 4 is a sectional elevation of a further modification; Fig. 5 is a diagrammatic view of a clock face; Figs. 6, 7 and 8 are diagrammatic front elevations of the indicating members.

In the form shown in Fig. 1, the pointer 1 is fixed to the barrel spindle 3, and the dial 2 to the hub of a wheel 4, which runs loosely on the spindle. The wheel 4 engages with the wheel 5 which revolves freely on a spindle 6, mounted on the barrel 7 which contains the ordinary main spring. As the spring is well-known and forms no part of my invention, it has been deemed unnecessary to illustrate the same. While the wheel 5 is thus carried round by the rotation of the barrel, it is at the same time connected to the barrel spindle 3 by a wheel 8, fixed to the wheel 5, and a wheel 9 fixed to the spindle 3.

When the spindle 3 is turned in order to wind the barrel spring, the pointer 1 turns with it, the dial 2 also turns but at a different speed, the proportion of the wheels 9, 8, 5, 4, being so chosen that if the spindle 3 be turned through the number of revolutions corresponding to the complete winding of the spring, the dial 2 turns through a number greater or less by one than the above, so that the motion of the pointer 1 relatively to the dial 2, takes place in a certain direction, and is at most equal to one revolution.

While the spring unwinds, the spindle 3 the pointer 1 being fixed, the train of wheels 9, 8, 5, 4, causes the dial 2 to turn through the same portion of a revolution in the opposite direction to the previous relative motion. Consequently, if an index be provided on the dial, the angular distance between the pointer and this index will always indicate the amount by which the barrel spring is unwound from its fully-wound position.

Let m be a number equal to, or greater than the number of revolutions of the spindle 3, required to fully wind the spring.

If the barrel be considered fixed (on winding) the gearing causes one of the members of the indicator to make $m+1$ revolutions while the other makes m revolutions when revolving together with the barrel spindle. The same gearing causes one of the members of the indicator to make one turn while the barrel makes m turns, the other member remaining fixed to the spindle. In any case, this gearing produces a relative displacement of one turn between the members of the indicator, while a relative displacement of m turns takes place between the barrel and the spindle.

In the device shown in Fig. 2 the ordinary wheels are replaced by special parts 15, 16, 17, 16 being an eccentric disk fixed to the barrel. The wheel 17 having a toothed circumference and a concentric hole is fitted on the disk 16, and the wheel 15 which is toothed internally runs loose on the spindle 3. The wheel 17 is also provided with a radial slot in which works a pin 18 fixed relatively to the spindle 3. The wheels 17 and 15 engage with each other, the number of teeth on one being less than that on the

other, for example, by one. When the spindle 3 is at rest, the rotation of the barrel 7 and the eccentric 16 causes the wheel 17 to roll inside the wheel 15 and since the pin 18 prevents the wheel 17 from turning on its own axis, the wheel 15 is caused to advance one tooth at each revolution of the barrel. If on the contrary, the spindle 3 turns in the same direction, the effect is similar to that produced by a movement of the barrel relatively to the spindle in a direction opposite to the above, so that the effect of the gearing remains the same.

It is possible to simplify the form shown by Fig. 1. The ratio of the speeds of the two members 1 and 2 on winding being $\frac{m}{m+1}$ it differs little from unity, and thus the number of the teeth on the wheels 5 and 8 may differ only slightly from each other or may even be made equal. In the latter case, the wheels 5 and 8 may be replaced by one wheel 19 (see Fig. 4) large enough to engage with both the wheels 4 and 9, one of which has one tooth or a few teeth more than the other. This device is not only simpler than that shown in Fig. 1, but also occupies less space, thus allowing it to be more easily placed in a watch or other mechanism.

In some cases, the usual construction of the clock-work may be modified to allow of locating the indicating device in the nicest position.

Fig. 5 shows diagrammatically, for instance, a small traveling clock with alarm in which, by means of the modification of the usual position of the barrel the winding indicator could be put at 37 symmetrically with the alarm dial 38, with respect to the vertical axes of the main dial 39, and beneath the latter.

In the methods of construction described above the gear wheels have normal teeth suitable for transmitting continuous movements of rotation. Other gearing with blank teeth or the like can however also be used.

The indicating device may also contain a member the path of which is limited so as to stop the movement of the winding spindle when the spring is wound up in the same way as in known stopping devices.

The members of the indicator may have any preferred shape. In general one of them will be in the form of a pointer and the other in the form of a dial provided with divisions or with markings of any shape or color, such for example as indicated by hatched lines in Figs. 6, 7 and 8.

As the position of the dial is essentially variable, it is useful to make a clear difference between the zone in which the pointer is enabled to move and the zone in which it is forbidden to move. For that purpose, the marks will be of a different color as at 47 and 48 in Fig. 6; in this way, a glance will be sufficient to show the degree of removal of the pointer from its extreme positions.

In the mechanisms to be applied to watches, for instance, the very small size of the dial renders it difficult to put a graduation in place or to read the figures in case the latter should be put on the small revolving dial; under such conditions, in order to see whether the pointer is near to the one or the other of its extreme positions, it requires reflection and the remembrance of the direction of the rotation of the pointer relatively to the dial, and in practice, although the arrangement is usually such that the pointer turns with respect to the dial, there arises a difficulty which would not present itself were the dial to be fixed. To surmount such difficulty, a division will again be made as at 48^b and 48^a in Fig. 7 of one of the zones into two parts which will be colored differently; or the two ends of the said zone will be given appearances sufficient to prevent confusion between the extreme positions of the pointer (see Fig. 8). This dial may be placed in front of the dial of the clock work, or preferably in an opening in the said dial (Fig. 2) or in any other convenient place.

If the revolving dial of the indicator is to be enameled, its construction and adjustment will be facilitated by providing the metal disk forming the back of the dial, with raised borders (49, 50, Fig. 4) on the circumference and round the central hole, and by melting the enamel between these borders. The dial can thus be made a tight fit on the spindle without cracking the enamel.

From the foregoing description taken in connection with the accompanying drawings, the construction and operation of the invention will be readily understood without requiring a more extended explanation.

Various changes in the form, proportion and the minor details of construction may be resorted to without departing from the principle or sacrificing any of the advantages of the invention as defined in the appended claims.

I claim as my invention:

1. A device indicating the unwinding of the spring in clock-work, comprising a spring box and barrel shaft, a first index fixed on one of said last named members, an eccentric spindle fixed to the other of said members, a second index revolving concentrically to the first index, a satellite member turning on said eccentric spindle, and means adapted to connect both of said indexes to the said satellite member.

2. A device indicating the unwinding of a spring in clock-works, comprising the combination of a spring box and a winding

up shaft, a primary indicating member secured to the shaft, a second indicating member revolving concentrically to the shaft, and a train of epicycloidal elements comprising a central wheel secured to the shaft, a central wheel secured to the second revolving indicating member and having a number of teeth slightly different from the number of teeth of the first central wheel, a planet carrying stud secured to the barrel and a planetary pinion on the said stud, the said pinion meshing at the same time with both the central wheels.

3. A device indicating the unwinding of the spring in clock-works, comprising the combination of a spring box and a winding up shaft, a primary indicating member secured to the shaft, a second indicating member revolving concentrically to the shaft, and a train of wheels whereby such second indicating member is connected at the same time with the shaft and with the barrel, such second indicating member consisting of a dial composed of a metal back having borders so arranged as to form an annular cup and of an enamel crown in the said cup.

In testimony, that I claim the foregoing, as my invention, I have signed my name in presence of two subscribing witnesses.

POL RAVIGNEAUX.

Witnesses:
H. C. COXE,
MAURICE RÓUX.