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ELECTRIC ALARM TIMEPIECE

Filed May 8, 1969

FIG. 1

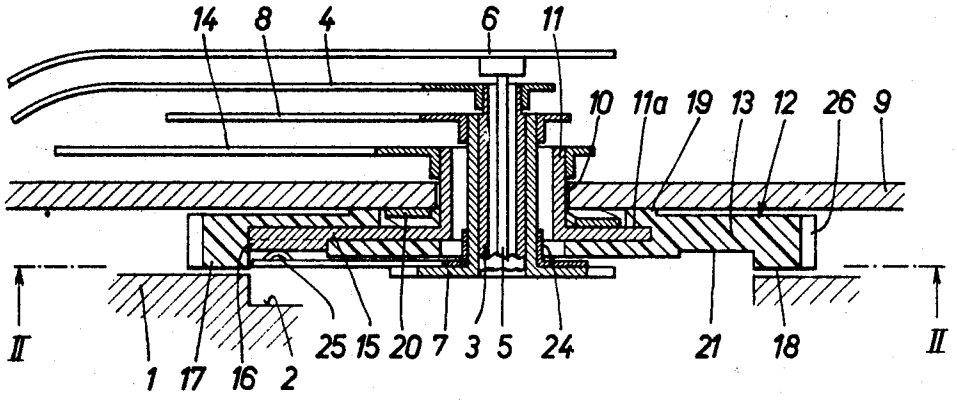
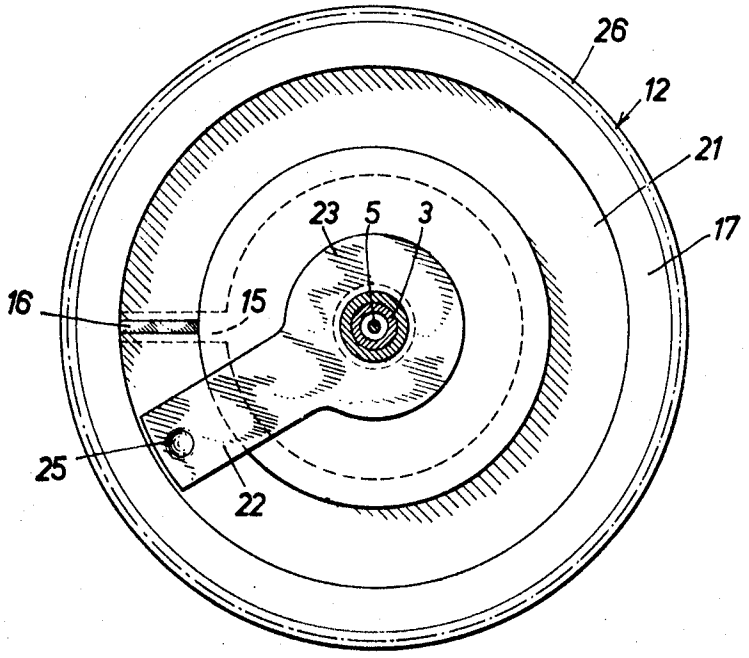


FIG. 2



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ELECTRIC ALARM TIMEPIECE

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ABSTRACT OF THE DISCLOSURE

The alarm-hand pipe carries a switch contact embedded in a synthetic plastic contact wheel to expose one surface, the other contact of the switch being carried by the hour wheel to slide over the contact wheel and to make contact with the first contact when at the position of the latter. The dial supports the contact wheel against axial movement, and the only friction between the hour and contact wheels is that of the one contact sliding over the contact wheel.

BACKGROUND OF THE INVENTION

The invention relates to a timepiece incorporating an electric switch, and including an hour wheel, at least one switch contact mounted to turn with the hour wheel, a contact wheel mounted coaxially with the hour wheel, at least one switch contact mounted on the contact wheel, one of these two wheels having, perpendicular to its axis, and annular flat surface containing that contact or contacts associated with the wheel.

The design and manufacture of electric switches for timepieces of this kind present a number of difficulties, because the switch must operate with the necessary dependability and yet must be as small as possible. In order to achieve this result, the contact wheel of known arrangements of this kind is pressed against the hour wheel. However the hour wheel should be as nearly free of friction as possible, then friction robs power from the motor of the timepiece; and the hour wheel particularly must have low friction, because it is driven continuously by the movement.

SUMMARY OF THE INVENTION

An object of the invention is to provide a timepiece of the kind specified above, which better satisfies these conditions of operation than have these timepieces hitherto.

This object and others of the invention will be apparent from the following detailed description.

BRIEF DESCRIPTION OF THE DRAWING

The invention will be described, with reference to the figures of the drawing, wherein:

FIG. 1 is a partial axial section showing the timepiece switch of the invention; and

FIG. 2 is a view taken along line II—II, and in the direction of the arrows, of FIG. 1.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

With reference to the figures, the bottom plate **1** of the timepiece movement has a central recess **2** containing the minute wheel and the cannon pinion (not shown). The recess opens into the interior of the movement, to permit the center pinion to mesh with the barrel drum.

The upper end of the cannon-pinion pipe **3** carries the minute hand **4**. The end of the arbor of the center wheel is not shown in the figures, but the center arbor **5** of the fourth wheel carrying the seconds hand **6**, as well as the hour wheel **7** carrying the hour hand **8**, are shown. The dial **9** extends above the plate **1** and incorporates a central opening **10** that guides the metal hub **11** of a contact wheel **12**.

The contact wheel constitutes two parts: the hub **11** and an electrically insulating synthetic plastic disc **13** which partly covers the annular lip **11***a* of the hub **11**. The latter projects through the dial **9** and carries an alarm hand **14**. The lip **11***a* extends horizontally along a plane perpendicular to the axis of the contact wheel **12**, and has a circular outer edge. Part of this outer edge embodies a tongue **15** (see FIG. 2) extending radially outwards and having a thickened part **16** that constitutes one of the contacts of the switch being described.

The disc **13**, which can be molded onto the bub **11**, covers the lower face of the lip **11***a* and extends outwards from this lip to the end of a radius that is considerably larger than that of the hour wheel **7**. The periphery of this disc has an annular rib **17** projecting downwards and extending opposite a wall **18** provided in the plate **1**. The upper face of the disc **13** has a second annular rib **19** of smaller diameter, which covers the periphery of the lip **11***a* but leaves exposed the interior of the lip upper face.

The pipe of the alarm hand **14**, press fitted on the hub **11**, holds the contact wheel **12** in place axially. This pipe presses on the dial **9**, and prevents the contact wheel from touching the hour wheel **7**. An annular convex washer **20** is squeezed between the dial **9** and the hub lip **11***a*. The dial **9** is preferably made of a synthetic plastic, and an electric current supply wire (not shown) is embedded in the dial to make an electric contact with the washer **20** at the point at which the washer touches the dial.

The lower face of the disc **13** embodies a groove **21**, the bottom of which constitutes an annular flat surface perpendicular to the axis of the arrangement and extending level with the lower face of the thickened part **16** of the tongue **15**. As seen in FIG. 2 the part **16** has a trapezoidal section so that only a narrow radial strip, which forms the lower surface of the first contact member, appears in the bottom of the groove **21**.

The second contact member of the switch being described is carried by the hour wheel **7**. An elongated, rectangular plate **22**, constituting a springy arm, embodies at one end a circular part **23**, the center of which is stamped to form a sleeve **24** pressed onto the hour wheel **7**. The rectangular plate **22** projects radially at a height slightly above the rib **17** of the disc **13**, and incorporates at its free end a conical boss **25** that constitutes the second contact member of the switch. The boss presses continuously against the bottom of the groove **21**. When it is positioned directly under the part **16**, the electric circuit of the timepiece is closed through the metal parts of the movement which constitute ground and are connected to one of the poles of the current source by the wire embedded in the dial **9** and by the washer **20**.

In the arrangement described, the springy arm **22** carrying the contact **25** is very small and can be fixed on the hour wheel **7** simply by pressing the sleeve **24** onto the pipe of this wheel, thereby avoiding, on the one hand, the presence of a support and, on the other, the step of soldering or welding. In some arrangements of the prior art using a springy arm carrying a switch contact at one end, it was necessary to fix the arm to a support by soldering or welding. The use of the springy arm described above simplifies the manufacturing and reduces the height of the arrangement. Moreover, the invention enables the riveted silver switch contacts to be eliminated, since the contacts **25** and **16** can be silver plated, resulting in a further very considerable simplification of the manufacturing.

But the chief advantage of the invention lies in the fact that the springy arm **22** is the only source of friction between the hour wheel **7** and the contact wheel **12**. The friction is so small at all positions of the hour wheel that the arrangement of the invention does not load the motor of the timepiece. This advantage is owing to the fact that

the axial position of the contact wheel **12** is completely independent of the hour wheel **7**.

The annular rib **19** and the edge of the pipe of the alarm hand **14** axially position the contact wheel **12** with respect to the dial **9**.

In the embodiment described, the contact wheel is a movable alarm member, its periphery embodying teeth **26** which mesh with an operating member (not shown), positioned between the dial **9** and the bottom plate **1**, for setting the alarm. The wheel **12**, however, can also have a different function.

It will be apparent to the specialist in the art that, in accordance with the invention, the annular flat surface formed by the bottom of the groove **21** and the one or more contacts **16** embedded in the disc **13** can, instead, be associated with the hour wheel **7**, in which case the one or more springy arms **22** are now associated with the contact wheel **12**. In other words, the positions of the necessary parts are simply reversed.

Although the preferred embodiments of the invention have been described, the scope of, and the breadth of protection afforded, to the invention are limited solely by the appended claims.

What is claimed is:

1. A timepiece incorporating an electric swtich, including an hour wheel, at least one first switch contact mounted to turn with said hour wheel, a rotatable contact wheel mounted coaxially with said hour wheel, at least one switch contact on said contact wheel, one of said two wheels having, perpendicular to its axis, an annular flat surface containing said contact associated with that one said wheel, and wherein the improvement comprises at least one springy arm carried by the other of said two wheels, the free end of said arm forming the contact associated with the other said wheel and being resiliently held by said arm against said annular flat surface, and means cooperating with said contact wheel to limit the axial play of the latter and to prevent it from touching said hour wheel.

2. The timepiece as defined in claim **1**, including a metal washer pressing against one of said fixed parts for holding said contact wheel axially in a definite position, said washer acting as part of an electric conductor to which said contact-wheel contact is connected.

3. The timepiece as defined in claim **1**, wherein the said wheel having said annular flat surface comprises a metal hub and an electrically insulating disc that partly covers said hub and embodies said annular flat surface.

4. A timepiece incorporating an electric switch, including an hour wheel having an annular flat surface, at least one first switch contact mounted to turn with said hour wheel, a rotatable contact wheel having an annular flat surface mounted coaxially with said hour wheel, at least one switch contact on said contact wheel, the annular flat surface of one of said wheels being disposed perpendicularly to the axis of said one of said wheels and containing the contact associated with that one said wheel, said one of said wheels comprising a metal hub and an electrically insulating disc that partly covers said hub and embodies said annular flat surface, and wherein the improvement comprises at least one springy arm carried by the other of said wheels, the free end of said arm forming the contact associated with the other said wheel and being resiliently held by said arm against said perpendicularly disposed annular flat surface, and means cooperating with said contact wheel to limit the axial play of the latter and to prevent it from touching said hour wheel.

5. The timepiece as defined in claim **4**, including a metal washer pressing against one of said fixed parts, for holding said contact wheel axially in a definite position, said washer acting as part of an electric conductor to which said contact-wheel contact is connected, a dial, a central opening in said dial through which said contact-wheel hub projects, an indicating member carried by said hub, part of said indicating member, pressing on the upper face of said dial, and an annular rib on said insulating disc for limiting the upward axial movement of said contact wheel by abutting on the under face of said dial.

6. The timepiece as defined in claim **5**, wherein a thin metal strip pressed onto the pipe of said hour wheel constitutes said springy arm.

References Cited

UNITED STATES PATENTS

565,761	8/1896	Lipscomb	58—19
1,019,193	3/1912	Schneider et al.	58—19 AX
1,128,751	2/1915	Brown	58—19
1,529,852	3/1925	Tanglin	58—57.5
3,233,401	2/1966	Hoffman et al.	58—19 X

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U.S. Cl. X.R.

58—57.5