United States Patent

Arzt et al.

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[54] SWITCH CLOCK

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[52] **U.S. Cl.**.....**200/37 R,** 200/38 R, 200/38 B

[51] **Int. Cl.**.....**H01h 43/10**

[58] **Field of Search**.....200/37 R, 37 A, 38 A, 38 FA, 200/38 F, 38 FB, 38 D, 38 DA, 37, 38; 338/200

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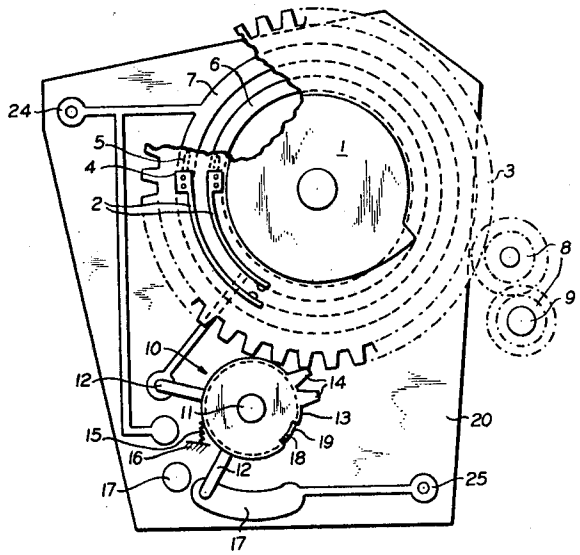
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[57] **ABSTRACT**

A switch clock, comprising a dial train indicating the time, and at least two switching contacts. A cam means actuates the switching contacts. A switch device contains the cam means. A clockwork and a motor, respectively, drive the cam disk of the dial train. An adjusting means is provided for adjusting the switching times. An adjusting disc carries the switching contacts and engages the adjusting means by means of a drive. A rotary switch means comprises a switch shaft provided for adjusting the various operative states of the switch device, and a gear is mounted on the shaft of the rotary switch means and at least directly engages the adjusting disc, wherein the gear is capable of being actuated by means of teeth disposed on a smaller portion of its periphery by turning the adjusting disc.

6 Claims, 2 Drawing Figures



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FIG. 1.

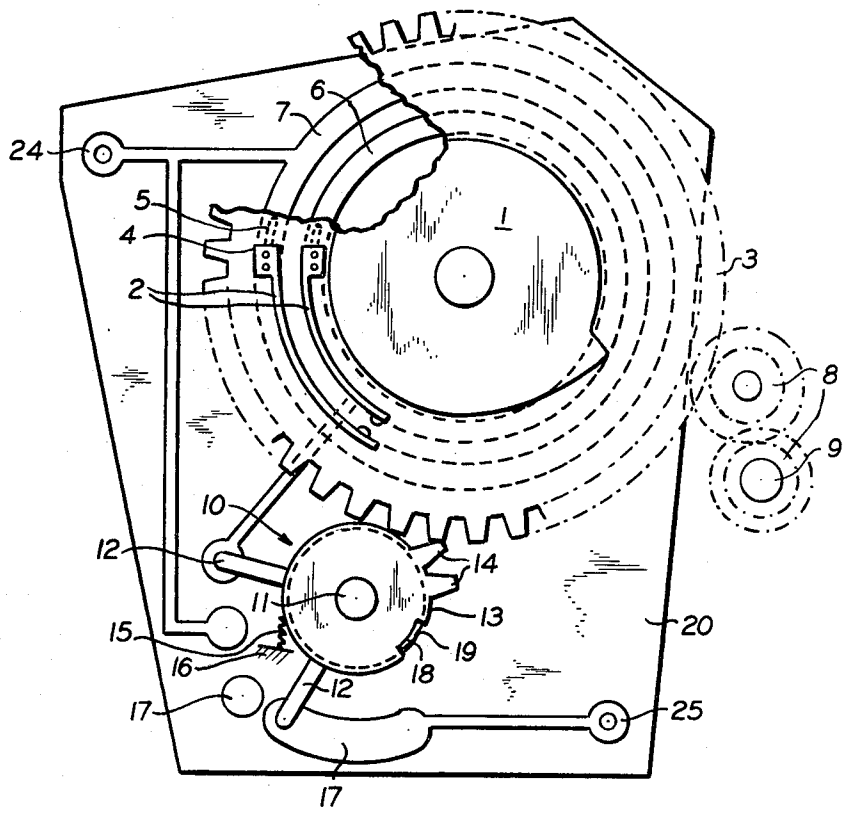
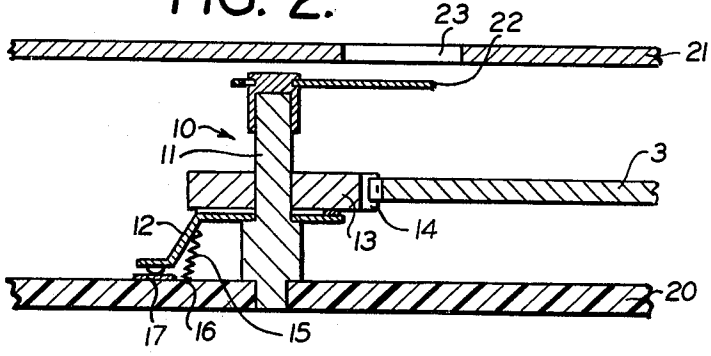


FIG. 2.



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SWITCH CLOCK

The present invention relates to a switch clock having a tine indicating dial train, a switch work containing two or more switch contacts and a cam disc actuating the dialtime, and a clockwork or motor, in particular a synchronous motor driving the dial train and preferably the cam disc of the switch work in which switch clock the adjusting of the switching time ensues by means of a setting shaft, which engages by means of a drive a setting disc carrying preferably the switch contacts.

Switchclocks with a time indicating dial train are known already, in which switch clocks is operated a cam disc driven by means of a clock-work or a motor, in particular a synchronous motor, in radial or axial direction a pair of contact springs or a micro switch, in order to switch-on or switch-off at a predetermined time an electrical circuit, for example a heating current circuit in an automotive vehicle, which is connected with the pair of contact springs or with the micro switch, depending upon whether the pair of contact springs or the micro switch is designed as an operating-or resting contact. After a certain time period, which depends upon the rotational speed and on the shape of the cam disc, the electrical circuit is again switched-off or switched-on. The adjusting of the switching time point takes place in these switch-clocks either by turning the switch contacts secured to an adjusting disc, with respect to the cam disc, arranged on a drive shaft or by turning the cam disc with respect to the switch contacts. Since an actuation of the pair of contact springs or of the microswitch occurs after each rotation of the cam disc, yet in most cases a periodical actuation is not desired, an additional switch for sustained switch-off is provided outside of the switch clock in the electrical circuit to be switched. In order to obtain, however, also the possibility of a sustained switch-on of the electrical circuit to be switched, beyond that a further switch is provided outside of the switch clock, by means of which further switch the switch clock can be bridged over. Both switches can be combined in one change-over switch. Such switch clocks have the drawback of a design disadvantageous as to mounting and beyond that it can occur at these switch clocks, at which the adjusting of the switching time and the sustained switch-on or -off, respectively, are carried out completely independent of each other, that the switching over from a sustained switch-on or switch-off to a time-dependently switching of the electrical circuit is forgotten such, so that inspite of an adjustment the desired switching time a switching of the circuit does not occur.

It is therefore, one object of the present invention to provide a switch clock, which avoids the difficulties and disadvantages of the mentioned switch blocks above.

It is another object of the present invention to provide a switch clock, wherein in accordance with the present invention a rotary switch is provided for the purpose of setting the various operative states of the switch device, which rotary switch can be actuated by turning the adjusting disc by means of a gear, which is mounted on a shaft of the rotary switch and which directly or indirectly engages the adjusting disc by means of one or more teeth, which are arranged on a small portion of the periphery of the gear. By this actuation of the switch for the various operative states, which ensues by means of the setting shaft, it is assured, that upon adjusting of a desired switching time point, a shifting from a permanent switch-on or switch-off to a time dependent switching cannot be forgotten, that even less, if according to the present invention a disc visible through a recess of the disc, for indication of the respectively set operative state is secured on the shaft of the rotary switch through a recess of the dial. Beyond that a thus designed structure involves the advantage of being advantageous as to manufacturing and mounting and this in particular then, if the rotary switch, in accordance with the present invention is designed as a two-armed sliding contact, which slides over the corresponding contacts, since then the contacts of the switch, the conduits connected with the switch-contacts, the power feeding lines and the like can be designed in a printed circuit. Furthermore, the shaft of the rotary switch can be mounted in the printed switching plate.

Since the tooth or teeth arranged on a small portion of the periphery of the gear are permitted to disengage the adjusting disc, when the latter is turned in one direction, only for such amount, that upon turning the adjusting disc in the other direction the gear, which is mounted on the switch shaft, is again joined for rotation by the adjusting disc, it is advisible, to design the gear capable of being turned against a spring force, acting against both turning directions of the rotary switch. In a preferred embodiment, this can ensue by means of a pull spring, which radially applies on the non-toothed portion of the periphery of the gear, which pull spring is connected with a fixed point. By this arrangement, however, result, upon turning the adjusting disc a permanent movement of the gear oscillating for a small amount, since, depending upon the position of the gear, which is secured to the switch shaft, the first or the last tooth profile of the toothed wheel is pulled by the spring force from the outside circle of the gear, which drives the gear, can form a unit with the setting disc is pulled into the voids of the driving gear, then again lifted onto the outside circle, again pulled into a gear void and so on which driving gear can constitute a unit with the adjusting disc. By this are arrangement also the shoe reciprocates on the contact, which causes an increased wear of the contacts. In order to avoid this occurrence, most practically the shoe and the gear, which is secured to the switch shaft, engage each other freely rotatable relative to each other about a small angle such, that the shoe stands still, with the oscillating gear.

With these and other objects in view, which will become apparent in the following detailed description, the present invention will be clearly understood in connection with the accompanying drawing, in which the present invention is disclosed by way of example only, and in which:

FIG. 1 is a top plan view of a switch device of a switch clock designed in accordance with the present invention, and

FIG. 2 is a longitudinal section of a rotary switch.

Referring now to the drawing in detail, the switch device of the switch clock comprises a cam disc 1, which is mounted on a 12-hour or 24-hour-tube of a clockwork, and a pair of contact springs 2, which are capable of being operated by the cam disc 1, and which pair of contact springs is secured to an adjusting disc 3, which is arranged coaxially to the cam disc 1. The power supply for the pair of contact springs 2 ensues by means of two shoes 4 and 5, which move on two annular conduit paths 6 and 7 disposed concentrically relative to each other.

A setting shaft 9 being in engagement with the setting disc 3 by means of a drive 8, serves the purpose of turning the setting disc 3, formed as a gear. A rotary switch 10 is disposed with parallel axes to the setting disc 3. This rotary switch 10 comprises a two-armed shoe 12 disposed on a switch shaft 11, and a gear 13, which carries two teeth 14 on a smaller portion of its periphery, which teeth 14 engage directly the setting disc 3. The gear 13 is connected with a fixed point 16 by means of a spring 15, which radially applied on the non-toothed portion of the periphery of the gear 13, whereby it is brought about that the gear 13 engages continuously the setting disc 3. From that arrangement results an oscillating movement of the gear 13, during rotation of the setting disc 3 since the first or the last tooth profile of the gear follows in about the shape of the teeth-carrying setting disc 3, and thereby also an oscillating movement of the shoe 12 on the contacts 17, wherefrom an increased wear of the latter results. In order to avoid this drawback, the shoe 12 and the gear 13 are rotatably mounted freely rotatable relative to each other about a small angle, what can be done such, that a recess 18 is provided in the gear 13, which is secured on the switch shaft 11, in which recess 18 engages a bent over tab 19 of the shoe 12. Thus practically, the conduit paths 6 and 7, as well as the contacts 17 and the other connecting lines are designed as a printed circuit. In the drawing the conduit plate 20 is shown which contains the printed circuit. Furthermore, the switch shaft 11 is mounted in the conduit plate 20, which results in a particular advantageous structure as to manufacturing and mounting. At the end of the switch shaft 11, which faces the dial plate the switch shaft 11

carries a disc **22**, which is usable through a recess of the dial **21**, and the indication of the respective operative states. The electrical circuit to be switched is connected between the connection points **24** and **25**.

While we have disclosed one embodiment of the present invention, it is to be understood that these embodiments are given by example only and not in a limiting sense

I claim:

1. A switch clock, having a time indicating dial train, comprising

a switch device including a cam disc,

at least two switching contacts, operated by said cam disc, and the latter being adapted to be driven by a clockwork,

a setting shaft setting the switching timing of said cam disc,

an adjusting disc carrying said switching contacts and engaging said setting shaft by means of a drive,

a rotary switch comprising a switch shaft for adjusting the various operative states of said switch device, and

a shaft,

a gear mounted on said shaft and at least directly engaging said adjusting disc,

said gear having at least one tooth over a small part of the periphery, and said rotary switch being operable by rotation of said adjusting disc.

2. The switch clock, as set forth in claim **1**, wherein said rotary switch comprises a two armed shoe sliding over corresponding of said contacts.

3. The switch clock, as set forth in claim **2**, wherein

said shoe and said gear engage each other freely rotatably about a small angle relative to each other.

4. The switch clock, as set forth in claim **1**, wherein said gear is

rotatably mounted spring biased in both turning directions.

5. The switch clock, as set forth in claim **4**, wherein said gear is

connected to a fixed point by means of a spring, radially applying at the non-toothed portion of the periphery of said gear.

6. The switch clock, as set forth in claim **1**, which includes

a disc being secured to said shaft of said rotary switch, and visible in a recess of a dial plate, for indicating the respectively set operative states.

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