United States Patent

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[54] **APPARATUS FOR THE CONTACTLESS RELEASE OF SIGNALS IN CLOCKS**
10 Claims, 7 Drawing Figs.

[52] **U.S. Cl.** **340/309.1,** 58/19, 58/21.11, 338/12, 338/32

[51] **Int. Cl.** **G04b 23/00,** G04c 21/00

[50] **Field of Search** ..... 340/309.1, 309.4; 338/12, 32; 58/19, 21.11, 38, 57.5; 324/46; 323/94 H; 307/309

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ABSTRACT: An apparatus for the contactless release of signals in alarm clocks, signal clocks, timers for electrical appliances, start-stop time switches, short-time bells, or the like, comprising in the area of a release mechanism which is actuated by the clockwork at least one magnetic-field-dependent resistor connected to an electronic control circuit, and a magnetic field that changes by reason of the release mechanism being caused to act on this resistor when the signal is released in the desired manner.

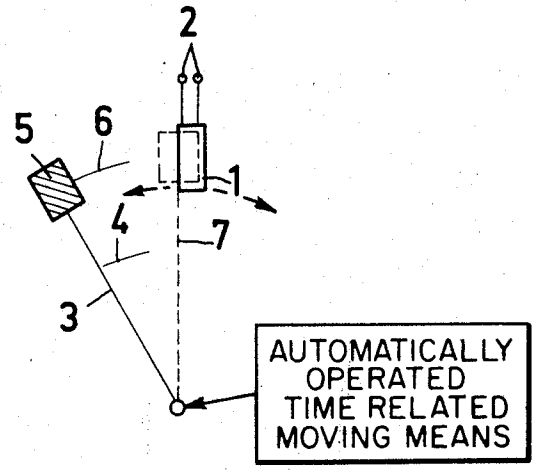


Fig.1

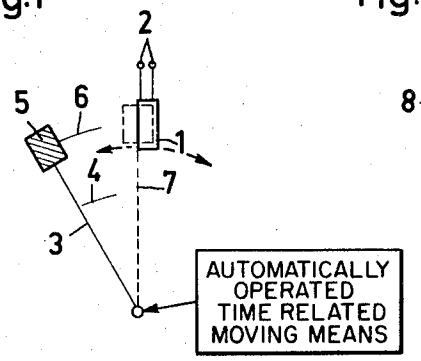


Fig.1a

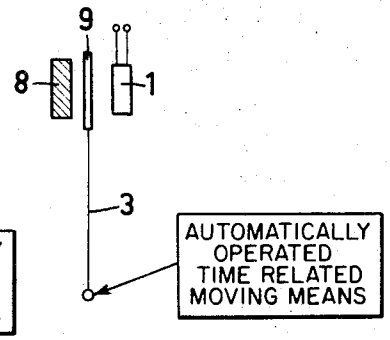


Fig.2

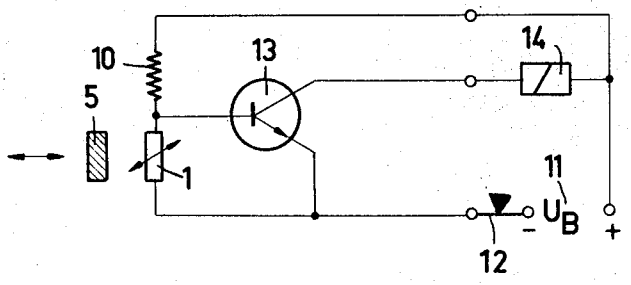
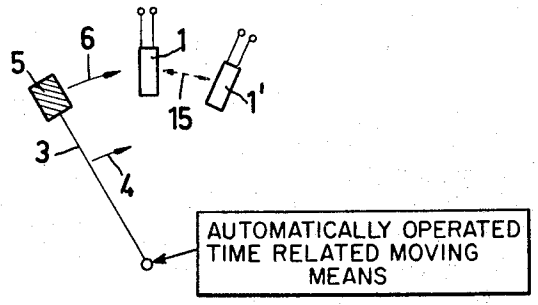


Fig.3



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Fig.4

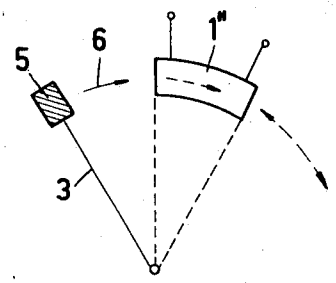


Fig.5

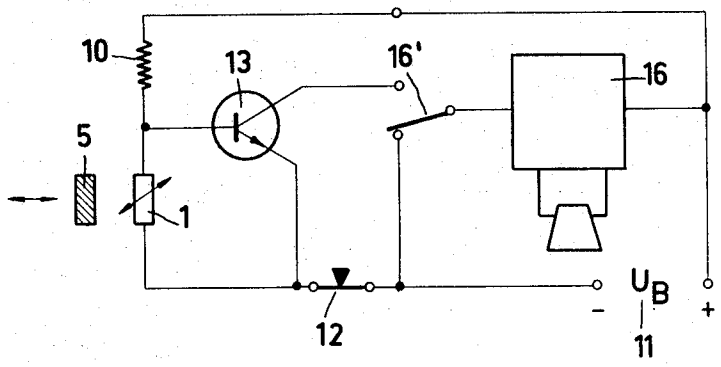
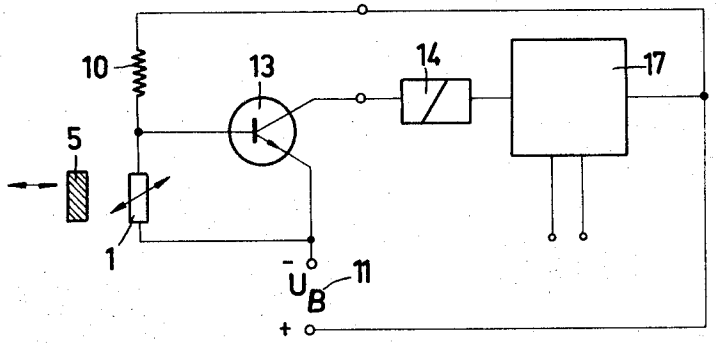


Fig.6



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APPARATUS FOR THE CONTACTLESS RELEASE OF SIGNALS IN CLOCKS

FIELD OF THE INVENTION

The present invention relates to an apparatus for the contactless release of signals in alarm clocks, signal clocks, timers for electrical appliances, start-stop time switches, short-time bells, or the like.

DESCRIPTION OF THE PRIOR ART

Several proposals for releasing or tripping signals in clocks of the aforementioned type are known from the prior art. For example, the release of the signal in an alarm clock may take place mechanically, first of all, by means of a setting lever. In this case, an increased torsional moment or torque must be supplied by the drive for purposes of the release. Winding-up for obtaining the signal is effected manually. In synchronous electric alarm clocks, winding takes place by means of a motor which is operated from an electric current source, for instance from the network.

Also known in the prior art is an electrical release by means of an electric slide contact or swing contact. This contact releases either a switch or a relay which, in turn, connects the current source to the desired consumer. These devices have become known, for example, in connection with timers for switching electric appliances and electric lighting on and off. The release of the switch contact is dependent upon the torsional moment or torque also in this case since a slider arrangement with a corresponding bearing or contact pressure is required therefor.

SUMMARY OF THE INVENTION

It is the object of the present invention to propose an apparatus for the contactless release of signals in clocks of the type mentioned hereinabove, which apparatus not only releases or trips the switching operation in a contactless manner, but also operates without torsional moment or torque load. This object is obtained in accordance with the present invention with the aid of an apparatus for the contactless release of signals in alarm clocks, signal clocks, timers for electrical appliances, start-stop time switches, short-time bells, or the like, which is characterized by the fact that, in the area of a release mechanism which is actuated by the clockwork, there is disposed at least one magnetic-field-dependent resistor connected to an electromagnetic circuit, and on which a magnetic field that changes by reason of the release mechanism is caused to act when the signal is released in the desired manner.

According to a specific embodiment of the present invention, a permanent magnet is disposed at a releasing lever serving as release mechanism and, after actuation of the lever by means of the motor, will be placed or caused to be positioned at a point adjacent to the magnetic-field-dependent resistor.

The present invention may also be so modified, however, that a permanent magnet is arranged opposite the magnetic-field-dependent resistor and at a distance therefrom, and that a magnetic shield which is connected to the release mechanism, for example a small ferromagnetic plate, is inserted in the space or interstice between the permanent magnet and the magnetic-field-dependent resistor, depending upon the switching operation that is desired.

Several advantages are afforded by an apparatus as proposed by the present invention.

On the one hand, it is possible to release the switching operation of the clock without any influence by means of a mechanical torque. According to a further embodiment of the apparatus proposed by the present invention, one, two or more magnetic-field-dependent resistors may be present in a manner such as to be displaceable both with respect to each other and to the release mechanism, in order to release several switching operations either successively or simultaneously. Lastly, it is also possible to choose the width of the magnetic-field-dependent resistor to be such that, while being swept over or passed by the permanent magnet being connected to the release mechanism, it will maintain the switching operation for as long a period of time as corresponds to the width of the magnetic-field-dependent resistor.

BRIEF DESCRIPTION OF THE DRAWINGS

The present invention will now be further described hereinafter on the basis of several preferred embodiments thereof taken in connection with the accompanying drawings, wherein

FIG. 1 illustrates the basic apparatus proposed by the present invention;

FIG. 1*a* is another illustration of the basic apparatus proposed by the present invention, viewed from the side;

FIG. 2 illustrates the apparatus according to the present invention in conjunction with an electronic circuit;

FIG. 3 illustrates a further embodiment of the apparatus according to the present invention;

FIG. 4 illustrates yet another embodiment of the apparatus according to the present invention with a widened magnetic-field-dependent resistor, and

FIGS. 5 and 6 illustrate still further switching examples of electronic circuits which are connected to the apparatus proposed by the present invention.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

In FIG. 1, reference numeral 1 is used to designate a magnetic-field-dependent resistor, for example a field plate, which comprises contacts 2 being connected with an electronic circuit. Secured to a releasing lever 3, which moves in the direction of the arrow 4, is a small permanent magnet 5. When the lever 3 is moved in the direction of rotation 4 of the clock, also the permanent magnet 5 will be moved toward the magnetic-field-dependent resistor 1, in the direction of the arrow 6, where it will assume the position shown at 7 in dotted lines. When the permanent magnet 5 is positioned above the magnetic-field-dependent resistor 1, the ohmic resistance thereof changes and the corresponding signal is released in a suitable electronic switching device.

As is apparent from FIG. 1*a*, an inoperative permanent magnet 8 is arranged opposite the magnetic-field-dependent resistor 1. A ferromagnetic plate 9 is disposed at the releasing lever 3. When this plate 9 is brought into the interstice between the magnet 8 and the magnetic-field-dependent resistor 1, the magnetic field is shielded and the magnetic-field-dependent resistor 1 changes its resistance value. When the magnetic-field-dependent resistor 1 is accommodated in a suitable electronic switching device or arrangement, the control signal is released thereby.

An operative example for releasing the control signal in connection with an electronic circuit is illustrated in FIG. 2. In this case, the magnetic-field-dependent resistor 1 which is brought, or caused to be, under the influence or action of the permanent magnet 5 is switched in series with an ohmic resistance 10 to a power source 11. Further provided in the electric circuit is a setting or positioning switch 12. The connecting point or junction of the resistance 10 with the magnetic-field-dependent resistor 1 is connected to the base of a transistor 13. On the one hand, the emitter of this transistor 13 is positioned at the power source 11 and, on the other hand, it is connected to a buzzer 14 being in operative engagement with the positive voltage. When the resistance value of the magnetic-field-dependent resistor 1 is changed due to the proximity of the permanent magnet 5, the potential being present at the base is shifted in a manner such that the transistor 13 is caused to be in a conductive state. As a consequence thereof, the buzzer 14 will be charged with current and hence emit the desired signal.

According to FIG. 3, two magnetic-field-dependent resistors 1 and 1′ are present which are adjustable with respect to each other in the direction of the double arrow 15. When the resistor 1 is swept over or passed by the magnet 5 for one

switching step, the resistor 1' may be utilized for a successive switching step when the magnet 5 passes or sweeps over the latter. Contacts 2 and 2' respectively are provided on the resistors.

FIG. 4 illustrates a relatively wide magnetic-field-dependent resistor 1'' whose resistance value is varied as long as the small permanent magnet 5 moves thereover. The switching duration may be regulated in any desired manner by adjusting the width correspondingly.

FIG. 5 illustrates another embodiment of the apparatus according to the present invention. In this case, for example a radio receiver 16 may be switched into the collector circuit instead of the buzzer 14. As soon as the desired switching position has been attained, the radio receiver is turned on. Accordingly, the radio receiver 16 may be used as alarm mechanism, if desired in conjunction with the installation of an electronic buzzer. The permanent magnet 5, the resistor 1, the ohmic resistance 10, the transistor 13, the positioning switch 12, and the leg 16' and source of current correspond to those of FIG. 2.

Additionally, it is possible to dispose at the radio receiver 16 another changeover switch or a switching relay 16' which is so provided that a self-support is effectively brought about and assured even when the permanent magnet sweeps or passes over the magnetic-field-dependent resistor. As a result thereof, the radio may remain in the turned-on condition and can subsequently be turned or switched off again, for example, by means of a new switching impulse produced in connection with yet another magnetic-field-dependent resistor. The apparatus proposed by the present invention is particularly well suitable for battery-operated radios which could hence be provided, for instance, as travel alarm in conjunction with an electrically actuated clock.

FIG. 6 illustrates a still further embodiment of the present invention based on the same principle. The elements shown therein are common to those of FIGS. 2 and 5. Another relay or a contactor 17 is switched in series with the buzzer 14 and serves for turning on other appliances, such as for instance hotplates, ovens, or the like.

It is understood that the apparatus according to the present invention may be employed in all types of clocks as referred to hereinabove, both those which are mechanically wound up, and those which are electrically or electronically operated. While for purposes of brevity the common necessary or desirable parts were identified only in certain embodiments they are to be included by reference also in those embodiments in which they were omitted.

I claim:

1. An apparatus for the contactless release of signals in signal devices such as alarm clocks, signal clocks, timers for electrical appliances, start-stop time switches and short-time bells comprising:
automatically operated time related moving means;
a release mechanism having a magnetic field and carrier means carrying said magnetic field,
said magnetic field fixedly located in relation to said carrier means;
said moving means connected to move said carrier means;
at least one magnetic-field-dependent and magnetic-field-sensitive resistor;
an electronic control and switching circuit connected to said resistor;
said resistor mounted in magnetic field effective proximity,
the said circuit becoming switch-and-control functional and operational when said magnet field is in a magnetic effective proximity of said resistor.

2. An apparatus for the contactless release of signals in signal devices as claimed in claim 1,
said magnetic field being a permanent magnet,
said carrier being a releasing lever,
said moving means connected to said carrier means to carry said magnet into a magnetic-field-effective position at a point adjacent to the said magnetic-field-dependent resistor after the actuation of said lever by said moving means.

3. An apparatus for the contactless release of signals in signal devices as claimed in claim 2,
said permanent magnet being fixedly mounted opposite said magnetic-field-dependent resistor at a magnetic field effective distance therefrom, and a magnetic shield mounted movingly and shieldingly on the said release mechanism inserted between said resistor means and said magnet by said moving means.

4. An apparatus for the contactless release of signals in signal devices as claimed in claim 1,
said at least one magnetic-field-sensitive resistor being at least two magnetic-field-dependent resistors,
means to space said at least two magnetic-field-dependent resistors adjustably relative to each other, and with respect to the said release mechanism to control several steps either for successive or simultaneous switching operations.

5. An apparatus for the contactless release of signals in signal devices as claimed in claim 1,
said at least one magnetic-field-dependent resistor having a width corresponding to a predetermined switching duration.

6. An apparatus for the contactless release of signals in signal devices such as alarm clocks, signal clocks, timers for electrical appliances, start-stop time switches and short-time bells as claimed in claim 1, comprising:
a transistor with a collector connected with the said release mechanism,
said at least one magnetic-field-dependent resistor being connected in a current circuit with an ohmic resistance, different from that of the remainder of the circuit, to the base of said transistor.

7. An apparatus for the contactless release of signals in signal devices as claimed in claim 6,
the said collector being connected to a circuit maker, such as a buzzer, a radio receiver, another switching device, a relay or a contactor, for the purpose such as of turning on an electrical appliance.

8. An apparatus for the contactless release of signals in signal devices as claimed in claim 1;
said moving means being a clock mechanism.

9. An apparatus for the contactless release of signals in signal devices as claimed in claim 3,
said magnetic shield being a ferromagnetic plate.

10. An apparatus for the contactless release of signals in signal devices as claimed in claim 1,
said at least one magnetic-field-dependent resistor being mounted in magnetic-field-effective proximity of the path of said magnet field, adjustably for at least two positions.

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