

[72] Inventors **Wolfgang Ganter**
Schramberg-Sulgen;
Heinz Otto, Rotenberg, both of, Germany
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[73] Assignee **Messrs. Gebruder Junghans GmbH**
Schramberg, Germany
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Primary Examiner—Richard B. Wilkinson
Assistant Examiner—Lawrence R. Franklin
Attorney—Burns, Doane, Swecker & Mathis

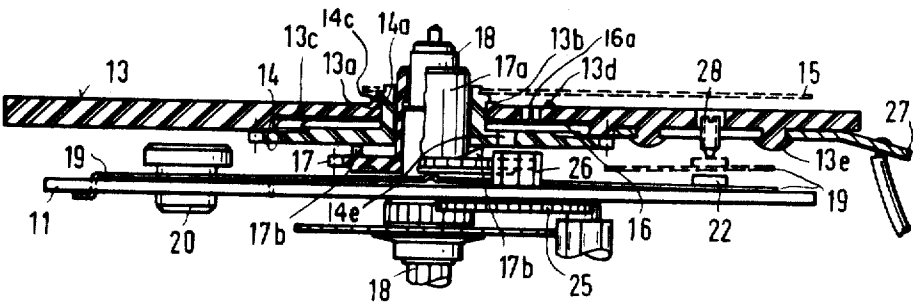
[54] **CLOCKWORK-TIME SWITCH**
10 Claims, 7 Drawing Figs.

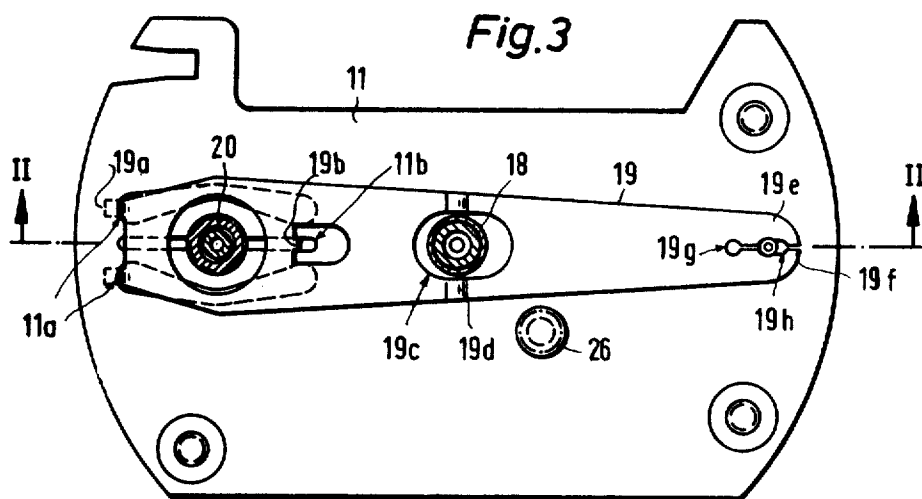
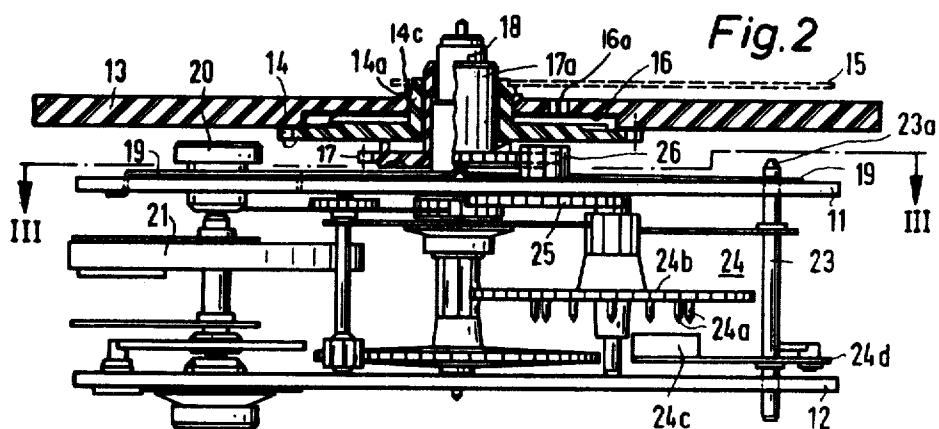
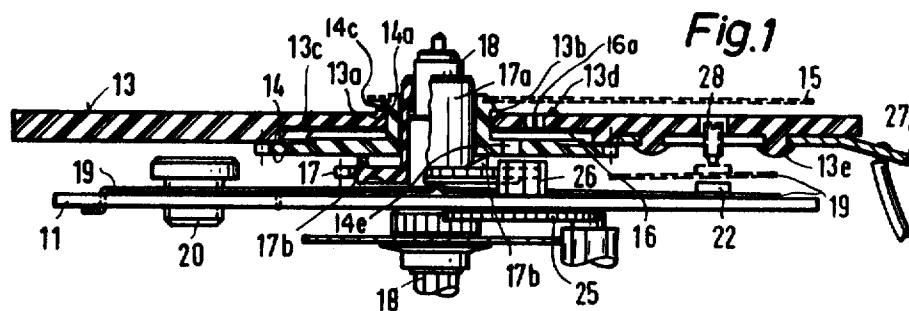
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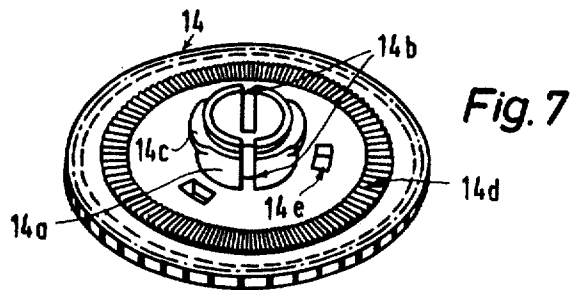
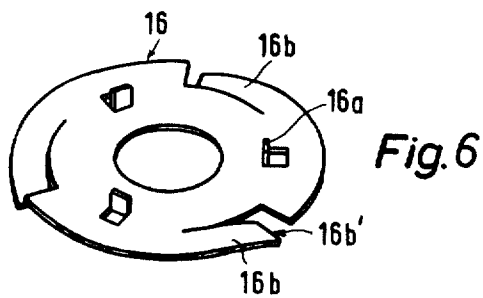
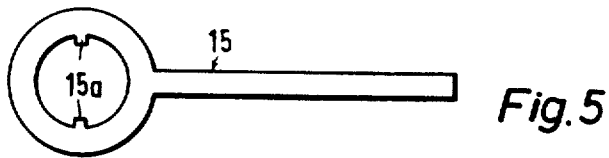
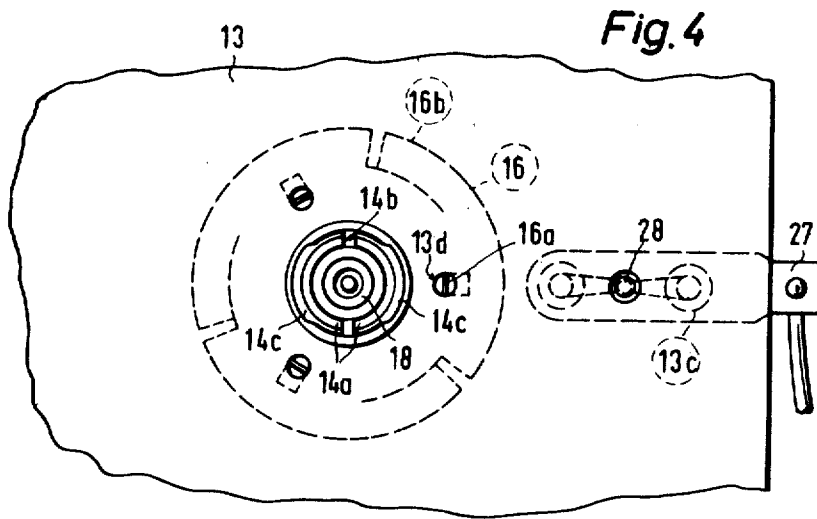
ABSTRACT: A clockwork mechanism is provided having a return locking spring disposed between a baseplate and an adjustment wheel of the device. The adjustment wheel is formed with a hub having a longitudinal slot so that the hub may be compressed and fit within a hole formed in the baseplate. The indicating hand of the clock may be formed with projections which fit into the slot to prevent the hub from being compressed and removed from the hole. An alarm release spring is mounted within the mechanism and operates in a cantilever manner to actuate and shut off the alarm.





INVENTOR.

BY



INVENTOR.

BY

CLOCKWORK-TIME SWITCH

BACKGROUND OF THE INVENTION

The invention relates to a clockwork-time switch, especially where the switch is provided with an electric switching contact. In the case of clockwork-time switches, particularly in the context of alarm clockwork mechanisms, a baseplate customarily developed itself as a dial or if need be carrying such a dial, is located in front of the front plate of the clockwork frame. Between these two plates is the timer gear.

SUMMARY AND OBJECTS OF THE INVENTION

The invention is based on the task of housing the timer gear, in the case of a clockwork-time switch, within a frame design which is as small as possible a space. At the same time, the invention is concerned with a rugged timer gear and an arrangement for protecting it from damage through incorrect operation, especially through the winding for adjustment in the wrong direction.

The invention is characterized in that, coaxially in relation to the hole in a baseplate which receives the shafts of the hands, on the rear, and preferably sunk into this baseplate a return locking spring shaped like annular disk is seated. This spring resists torsion imposed through it on the baseplate and has at least one locking arm tangentially bent out of the plane of the disk with a radial locking edge.

An adjusting wheel, including a return lock cogged surface engage with the locking edge rests, via an annular shaped gliding zone, preferably on the baseplate. This adjusting wheel is mounted by means of a barrel hub in the baseplate hole for the shafts for the hands. The back side of this adjusting wheel is acted upon resiliently by an hour wheel. The hour wheel is coaxially mounted in the adjusting wheel by means of a barrel hub. Cooperating cams and openings have been provided partly on the adjusting and partly on the hour wheel.

Such a timer gear takes up only little space. The return locking spring, effectively provided with three locking arms, can exert a considerable torque to absorb the adjusting turn in a reverse sense. The engagement of the return lock cogging with the adjusting wheel is soft because the crown cogging on the latter may be made delicately.

In a further development of the invention the hour wheel will engage a releasing spring in the direction of the adjusting wheel. This spring extends across the front plate and is developed in a straight line and symmetrically to its longitudinal axis. This spring is fixed, on the front plate with torsional strength and in a shiftproof manner, preferably seated in the latter. It carries devices for an effective connection with the signal control means and has in its middle part a lead aperture for the minute shaft. In the case of a clockwork mechanism with a balance wheel regulator, one can advantageously make use of the bearing bolt of the upper bearing to fix the releasing spring.

In order to ensure that upon placing of the adjusting hand for example the adjusting hand of an alarm clock, onto the adjusting wheel the latter will not be pushed out backward from the baseplate, the resilient barrel hub of the releasing wheel has been slit longitudinally so as to be radially resilient. At the end of this hub there are lateral projections. In the case of a radially compressed hub these projections lie on a smaller diameter than that of the hole of the shafts of the hands in the baseplate while they radially expand after passing through this hole to axially engage the front side of the baseplate. Furthermore, the adjusting hand has, on its point of attachment, projections which fill the slits in the hub in a positively locking manner.

Effectively the adjusting wheel is made of a plastic material, likewise the hour wheel and the baseplate. In this case headed pegs can be provided on the rear side of the baseplate or some similar means, in order to attach thereon a contact spring cooperating with the releasing spring.

According to a further characteristic of the invention, the releasing spring itself is provided, at its end serving for the purpose of switching, with some means for the mechanical coupling with the spline shaft of a time-interrupter gear system known per se for an electric signal circuit and with means for the selective attachment of an electric switching contact. In this case the same releasing spring can be used whenever a switch clock or an alarm clock is made.

BRIEF DESCRIPTION OF THE DRAWINGS

Further characteristics and advantages of the invention will become clear from the subsequent description of a design given by way of example and from the drawings and the claims.

The drawings, in a fragmentary and/or schematic form, but considered overall and in the context of known art, describe the invention. In these drawings:

FIG. 1 provides a transverse sectional view of the timer gear of a switch clock with electric switching contact;

FIG. 2 supplements the illustration of FIG. 1, showing the development of the timer gear in the case of an electric battery alarm clock which is provided with an electrically operated alarm device, as viewed along section line 4—4 of FIG. 3;

FIG. 3 provides a top view of the front plate of the FIG. 2 assembly, where the baseplate and the timer gear have been lifted from said front plate, i.e. as viewed along section line III—III of FIG. 2;

FIG. 4 provides a top view of the front plate of the clockwise mechanism shown in FIG. 1, with the baseplate, the timer gear and the releasing spring being lifted off;

FIG. 5 illustrates the adjusting hand of FIG. 1 in plan view;

FIG. 6 illustrates, in perspective, the return blocking spring of FIG. 1; and

FIG. 7 illustrates, in perspective, the adjusting wheel of FIG. 1.

DETAILED DESCRIPTION

In front of the front plate 11 of the clockwork mechanism shown in FIGS. 1 and 2, comprising the front plate 11 and the rear plate 12, there is seated the baseplate 13. In this example of the invention, plate 13 has been made of plastic.

The adjusting hand 15 is pressed in front onto the barrel hub or base 14a. In order to insure that, as a result of this pressing, the adjusting wheel will not be squeezed toward the rear from the baseplate, the barrel hub 14a (FIG. 7) has been longitudinally slit at 14b and moreover has opposite radial projections 14c displaced by 90° in relation to the slits 14b. The radial projecting length of the projections 14c beyond the circumference of the hub 14a and the width of the slit 14b, have been chosen in such a way, that the hub of the adjusting wheel can be pushed through the hole 13a of the shafts of the hands whenever it is compressed resiliently. In their attached state, the projections 14c axially engage the baseplate 13 or a collar portion 13b thereof.

The hand 15 itself has on its "eye" aperture bosses 15a pointing inwardly. These bosses 15a laterally fill and enter the slits 14b in the barrel hubs. Upon placing the hand 15 on hub 14a, the halves 14a/14c of the barrel hubs will not have a spring action any more toward the inside, i.e. radially inwardly, and the adjusting wheel 14 cannot be squeezed out toward the rear from the baseplate.

At its rear, the baseplate 13 has been provided at point 13c with a disk-shaped recess 13c. The diameter of recess 13c is somewhat smaller than that of the adjusting wheel 14, so that the latter may rest sliding on the baseplate on an annular zone in the neighborhood of the contiguous area of overlap of wheel 14 and plate 13.

The recess 13c has been provided for the purpose of receiving the disk-shaped return locking spring 16 (compare also FIGS. 4 and 6). In order to connect this locking spring, so it will have torsional resistant strength, with the baseplate, flaps

16a are provided. These flaps, pointing upwards, are bent out of spring 16 and engage corresponding perforations 13d in the baseplate.

The locking spring 16 also has three, tangentially running, punched out and bent out, locking arms 16b, whose locking edges 16h run approximately radially in relation to the disk-shaped bodies of the spring.

In the installed state (FIGS. 1 and 2), the return locking spring 16 rests on the base of the recess 13c in the baseplate, while the resilient locking arms 16b project resiliently somewhat beyond the rear delimiting surface of the baseplate. A crown cogging 14d on the wheel disk of the adjusting wheel cooperates with these locking arms. By way of comparison, this cogging may be made fine, so that a soft engagement is brought about which is felt pleasantly during adjustment but which is still sturdy because three locking arms 16b are provided on the return locking spring 16.

The axial distances and thicknesses of material at the baseplate 13, the adjusting wheel 14, its hub 14a, and the locations of radial projections 14c have been selected in such a way, that axially the adjusting wheel 14 is mounted in the baseplate 13 essentially free of axial play.

In the barrel hub 14a of the adjusting wheel 14, the barrel hub 17a of the hour wheel 17 is seated slidably; (FIGS. 1 and 2). The hour wheel, and its hub, is preferably made of a plastic. The hub 17a of the hour wheel is penetrated by the minute shaft 18, on which the hub of the hour wheel will find partial guidance.

Adjusting wheel 14 and hour wheel 17 have been provided, in a known manner, and on the disk surfaces facing each other, with engaging cams 17b or engaging openings 14c.

The hour wheel 17, on its rear side, is acted upon by the releasing spring 19; (FIGS. 1, 2 and 3). The releasing spring 19 has been developed symmetrically in relation to its longitudinal axis. At the end of spring 19, i.e. its point of attachment to plate 11, bent flaps 19a and 19b (FIG. 3), engage with corresponding perforations 11a and 11b of the front plate 11.

In order to secure the releasing spring 19 against an axial lifting-off from the front plate 11, in the case of the present example, the screw 20 of the upper bearing of the balance wheel 21 has been made use of.

In its middle part, the releasing spring has a perforation 19c for penetration by the minute shaft 18. It further has a relief embossed rib 19d with which the releasing spring 19 presses on the lower side of the wheel disk of the hour wheel 17.

At its free end 19e, the releasing spring has been slit at 19f and has two buttonhole-shaped perforations. One such perforation 19g is intended for the reception of a contact pin 22 (FIG. 1). The other such perforation 19h is developed as an elongated hole for the reception of the end of the spline shaft 23—provided with an undercut coupling knob 23a—of a time interrupter gearing, known per se in the case of electric alarm clocks and designated as a whole with numeral 24. Such gearings are provided because, as is well known, the reverse adjustment of the hour wheel (in this case 17) requires about a 30 minutes increment between the engaging position for releasing the switching process or the alarm signal, and the locking position (FIGS. 1 and 2), while an alarm signal is desired only for a fraction of a minute and a prolonged duration is impermissible because an alarm clock is not supervised constantly and is shut off by hand in the case of need. Since such time-interrupter devices are known per se, it will suffice to point out that the wheel 24b is provided with pegs 24a pointing downwards which pegs constitute part of the clockwork mechanism of the clock. Wheel 24b revolves constantly and, in the case of a release of the alarm, the releasing spring 19 will push the shaft 23 in the direction of the baseplate 13. Then the flap 24c, on the arm 24d attached on the shaft 23, will come into engagement with the pegs 24a and (as illustrated but not in detail) be swung through a predetermined angle by the nearest peg 24a. In this angular path, a contact attached to the arm 24d covers a counter contact segment, so that the signal circuit will be closed. Upon further

movement of arm 24d, the contact surfaces separate and the arm 24d is held in a final position free of contact, for example through operation of a magnet which is attached to the plate 12. In this ineffective position the arm 24d/24c will remain until it is again released for return into its initial position through suitable intermediate elements (not shown), whenever the engaging elements 17b/14c between the adjusting wheel and the hour wheel have been led back again to their starting positions (FIGS. 1 and 2).

Otherwise, the clockwork mechanism illustrated in FIG. 2 is of conventional design; it is an electrical battery clockwork with a motor-balance wheel. The customary change gear-drive is designated by 25/26, which provides the reduction in speed from the minute shaft 18 to the hour shaft 17.

In the design shown in FIGS. 1 and 4, headed pegs 13e have been provided on the rear of the baseplate 13 in order to attach thereby a contact lug 27. 28 designates a contact screw screwed into the lug 27, which screw cooperates with the counter contact 22 on the releasing spring 19.

What is claimed is:

1. A clockwork mechanism having a baseplate and a front plate carrying a dial and having time and release gearing disposed between the two plates wherein:

said baseplate is formed to define a hole for the insertion of a plurality of concentric shafts for mounting indicating hands;

a recess is formed on the rear side of said baseplate coaxial to the hole formed in said baseplate;

a return locking torsion spring is disposed within said recess; said spring being configured as an annular disk having at least one locking arm having a locking edge;

said locking arm protruding tangentially from said disk and engaging a locking crown cogging formed on said adjustment wheel;

said adjusting wheel being formed with a barrel hub for rotatable mounting within the hole formed in said baseplate;

at least one indicator hand being mounted on said barrel hub;

said adjusting wheel being rotatably and slidably held against the annular surface of the baseplate adjacent to and defining said recess;

an hour wheel being disposed behind said adjustment wheel and resiliently acting upon said adjustment wheel;

said hour wheel being formed with a hub disposed within an axial bore formed in said barrel hub of said adjustment wheel;

a minute shaft being disposed within an axial bore formed within said hub of said hour wheel; and

said hour wheel and said adjustment wheel being formed with engaging cams and slots for providing a torsional driving connection therebetween.

2. A clockwork mechanism according to claim 1 wherein said hour wheel comprises a plastic material.

3. A clockwork mechanism according to claim 1 wherein said baseplate consists of a plastic material.

4. A clockwork mechanism according to claim 3 wherein attaching pegs are formed on the rear of said baseplate for mounting a contact member for connection with an electrical source; and

said contact member being disposed in operable relationship with said alarm releasing spring.

5. A clockwork mechanism according to claim 1 wherein: said barrel hub of said adjusting wheel is formed with an axial slot;

the surfaces defining said axial slot being resilient;

lateral projections being formed on the outer surface of said barrel hub and extending in a radial plane;

said lateral projections having a diameter less than the diameter of the hole formed in said baseplate when said projections are resiliently pressed toward one another;

said projections being expandable to axially engage said barrel hub within the hole of said baseplate upon releasing the pressure on said projections;

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said indicating hand mounted on said barrel hub being formed with inwardly directed projections for filling in said slot formed in said hub whereby said hub is locked within the hole of said baseplate and may not be released by pressing said projections toward one another until said inwardly directed projections of said indicating hand are removed from said slot.

6. A clockwork mechanism according to claim 5 wherein said adjustment wheel consists of a plastic material.

7. A clockwork mechanism according to claim 1 having an alarm-releasing spring:

said releasing spring urging said hour wheel against said adjustment wheel;

said release spring generally comprising a straight line leaf spring having one end affixed to the said front plate whereby said spring is cantilevered at the other end thereof;

said other cantilevered end of said releasing spring being operably connected with an alarm control means; and said spring being formed with a generally centrally located aperture for the insertion of a minute shaft.

8. A clockwork mechanism according to claim 7 wherein said alarm releasing spring is disposed at the one affixed end thereof about an upper bearing of a balance wheel.

9. A clockwork mechanism according to claim 7 wherein said alarm releasing spring at the other cantilevered end thereof is operably connected with a spline shaft of a time interrupter gear for an electric signal circuit.

10. A clockwork mechanism according to claim 7 wherein said alarm releasing spring at the other cantilevered end thereof is operatively connected with an electrical switching contact.

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