

UNITED STATES PATENT OFFICE.

SIEGMUND CHIGER, OF BERLIN, GERMANY.

ELECTRIC TIME-SWITCH.

1,031,040.

Specification of Letters Patent.

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To all whom it may concern:

Be it known that I, SIEGMUND CHIGER, a subject of the Emperor of Austria-Hungary, residing at 65 Kurfürstendamm, Berlin, Germany, merchant, have invented new and useful Improvements in Electric Time-Switches; of which the following is a specification.

The invention relates to electrical time switches which are applicable to clocks for timing the operation of alarms or for time controlling other operations. The said time switch is adapted to be operated by the ordinary clock hands, and has for its principal object to enable any ordinary clock to be converted into an alarm clock.

According to the invention a movable switch contact piece is arranged to be moved by a clock hand in a closed curved path around the axis of rotation of such hand. Into this path fixed contacts may be inserted at any desired place which contacts on being engaged by the movable switch contact close the electric circuit of an alarm bell or other device.

The improved switch may readily be constructed in such a manner that the distances or periods between the points at which the alarm is to be given may be altered as desired by very simple manipulations. The apparatus may, for instance, be arranged in such manner as to cause an alarm to be given at a certain hour of the day and at the same hour during the night, or it may be set for sounding an alarm at a certain hour of the day only or of the night only, also it may be adjusted so as to produce alarms at different times during the day and during the night. The improved device also enables the time at which an alarm is to be given to be set several days in advance.

In the accompanying drawings a constructional form of the improved device is illustrated by way of example.

Figure 1 is a front elevation partly in section, Fig. 2 is a cross section on the line A A in Fig. 1.

The device is preferably placed in front of the dial *a* of the clock and comprises an annular or disk-shaped frame *d* arranged concentrically with the arbor of the clock hands *b* and *c*, of which *b* is the hour hand while *c* is the minute hand. In the frame *d* is slid-

ably mounted the movable switch contact *e* which is actuated by the hour hand *b*.

The contact *e* may as shown, be formed of bent wire with an outer bent finger portion adapted to bear upon the face of the insulation annulus *d*¹, an intermediate portion adapted to move in the mouth of a groove *f*, an end portion adapted to move within the inner recessed portion *g* *h* of the groove, and an outstanding fork for engaging the hour hand *b*. The contact piece is thus guided in the cam groove *f* formed in the insulation annulus *d*¹ fixed on the disk *d* which groove controls the movement of the contact piece. The two walls of the groove thus consist of insulating material, one of the walls being provided with a recess *g* into which the contact piece engages and the opposite wall being provided with a recess *h* in which lies a conductor *i* each of which is adapted to be rubbed by the switch contact *e*. The conductor *i* as shown, may conveniently be a flange or rib on the disk *d*. The conductor *i* is connected to one terminal *l* of the circuit by toggle links *m*. These links are shown connected to a lug or arm *m*¹ on the disk *d*. The terminal is mounted on a plate *n* which may be fixed near to the periphery of the dial plate by a clamping device or any other suitable means. The other terminal *o* of the circuit which is also mounted on the plate *n* is connected by toggle links *p* with a projection *q* of a metal ring *r* fixed to the frame *d* but insulated from the conductor *i* as seen clearly in Fig. 2.

The metal ring *r* is provided on its circumference with projections *s* in which are formed slots *t*. In front of these projections are arranged contact pieces or rods *u*¹ and *u*² which are received in suitable more or less radial holes in the insulating material. The section to the left hand side of Fig. 1 is taken in a plane parallel with the plane of the dial so as to display these holes. The outer end of each contact rod or pin *u*¹ or *u*² is bent to form a hook which, when a rod is fully inserted may pass into the appropriate slot *t* between the two parts of the projection *s* the hooked end being caused to touch such parts and thus making contact with the metal ring *r*. When such a contact rod is pushed home in this way the inner end thereof projects

into the recess *g* of the guide groove *f* so as to lie in the path of the movable switch contact *e* driven by the clock hand. The path in which the contact *e* is moved by the clock hand is generally closed on itself and may in its simplest form be constituted by a circle. It may however also have the form of a spiral.

In the construction illustrated by the drawings, the path or guide groove *f* of the movable contact *e* has the shape of a double loop which is obtained by two spiral curves symmetrically arranged with regard to the vertical diameter and crossing each other at one point, viz., the point opposite six o'clock. The movable switch contact *e* has such shape and length that it automatically passes at the point of intersection of the two loops from the inner convolution into the outer convolution, and vice versa. It is therefore impossible for the contact *e* to perform twice in succession a movement in the outer convolution or in the inner convolution but it is constrained to move first in the one loop and then in the other. This is clearly to be seen from Fig. 1 for as the contact *e* comes around the inner loop toward six o'clock it is given such a set as will direct it into the outer loop, and when it comes around the outer loop toward the same point it is given such a set as will direct it back into the inner loop.

The outer convolution of the guide groove *f* may be traversed by the contact *e* during the day, while the inner convolution may be traversed during the night, or vice versa. When the contact rods *u*¹ and *u*² are in their inoperative position, that is to say when they are pulled out of the grooves *g*, the electrical circuit of an alarm or other device cannot be closed. If however a contact rod *u*² be pushed in so that its hooked end comes into the slot *t* of the corresponding projection *s* as seen at nine o'clock in Fig. 1 the inner end of the contact rod projects sufficiently into the groove *g* to engage with the movable switch contact *e* upon the latter being brought opposite the contact piece *u*² by the movement of the clock hand. As the contact *e* is constantly bearing upon the flange *i* it is obvious that this engagement with the rod *u*² will electrically connect the disk *d* and ring *r* so that the gap previously open between the terminals *l* and *o* is now closed.

Any desired number of contacts *u*¹ or *u*² may be used. It is essential that those contacts *u*¹ which project into the inner convolution of the guide groove shall not pass through the outer convolution of the guide groove, or at least that they shall not lie in the path of the movable contact *e* when the latter is traversing the outer convolution of the guide groove, as otherwise these contacts *u*¹ would establish contact with the movable

contact *e* at intervals of 12 hours. On the other hand the contacts *u*² which are intended to establish contact with the movable contact piece when the latter moves in the outer convolution should not project into the inner convolution.

From Fig. 1 it can easily be seen that the contacts *u*² correspond with the outer convolution while the contacts *u*¹ correspond with the inner convolution. The contacts *u*¹ are made somewhat thinner than contacts *u*² so that they lie somewhat to the rear of the contacts *u*² and are not touched by the movable piece *e* when the latter moves in the outer convolution. The contact between the movable switch contact *e* and the contacts *u*¹ is therefore made only when the contact *e* moves in the inner convolution. Owing to the rods *u*¹ being thinner than the rods *u*² it is convenient to cause the thinner ends of the rods *u*¹ to enter holes in little contact blocks *u*³ which latter lie in the path of the contact *e* whereas the rods *u*² being thicker their extremities actually lie themselves in the path of the contact *e*.

If it be assumed that the contacts *u*¹ close the circuit at a certain time of the day the corresponding contacts *u*² will if brought into operative position close the circuit 12 hours later and therefore during the night. If both contacts *u*¹ and *u*² of a pair are pushed home the alarm will be given regularly at intervals of 12 hours. If only one contact of a pair be pushed home the alarm will be given at intervals of 24 hours.

The toggle links *p* and *m* are arranged in a plane behind the clock hands and serve for facilitating the fixing of the device on clocks of various diameters.

It will be understood that when applying the device to a clock of smaller diameter the links will fold so as to contain a more acute angle, while with a clock of large diameter the links will open so as to contain an obtuse angle and allow the plate *n* to be moved farther away from the center of the clock dial. Further facility in fixing the device to clocks of various shapes is afforded by making the outer pins *v* slidable in the tubular terminal sockets *l* and *o*, so that the plate *n* may be easily adjusted in the direction perpendicular to the plane of the disk *d*. Set screws *x* serve to firmly secure the pins *v* in the sockets after the adjustment has taken place. The plate *n* may of course be fixed to any desired part of the peripheral portion of the dial plate or the clock casing. The terminals *l* *o* are suitably connected in the circuit containing the battery and the alarm bell but these connections are not shown as they are obvious to anybody skilled in the art.

The frame *d* may be made conveniently in two parts so as to enable the same to be fixed behind the hands without necessitating the

removal of the latter. The frame 7 may however be inserted into the dial plate, or may form part of the same if desired.

I claim:

- 5 1. Time switch apparatus applicable to clocks, comprising a movable contact, means for guiding said contact in an endless path comprising a plurality of intersecting con-
10 volutions, means adapted to form electrical connections between said contact and one circuit terminal, and a plurality of contacts adapted to be put into and out of connection with the other circuit terminal; sub-
15 stantially as set forth.
- 20 2. Time switch apparatus comprising an endless guiding path comprising a plurality of intersecting convolutions, a clock-driven contact movable in said path and adapted to be guided thereby so that said contact is
25 always guided from one convolution to the other upon traversing the intersection of said convolutions, a constant electrical connection between said contact and one circuit terminal, and adjustable contacts movable
30 into said path and simultaneously into connection with the other circuit terminal, sub-
35 stantially as set forth.
3. A time switch, comprising in combina-
40 tion a switch contact adapted to be driven by a clock hand, a disk formed with an end-
45 less guiding path comprising a plurality of intersecting convolutions for said switch contact, extensible supports for said disk adapted to be connected to the clock dial,
50 means adapted to constantly connect said switch contact driven in said convolutions of its endless path with one terminal of an electric circuit, and contacts adapted to be
55 simultaneously inserted into the path of said switch contact and into and out of electrical connection with the other terminal of said circuit; substantially as set forth.
4. A time switch, comprising in combina-
60 tion a switch contact adapted to be driven by a clock hand, a base formed with an end-
65 less path comprising a plurality of convo-
lutions and guiding said switch contact, ex-
tensible arms connecting said base with a
fixed part of the clock, a continuous contact
on one side of the convolutions of said path
connected with one terminal of an electric
circuit, said switch contact being adapted to
constantly engage said continuous contact
and contacts adapted to be inserted into the
path of said switch contact and into and out
of connection with the other terminal of
said circuit; substantially as set forth.
5. A time switch apparatus applicable to
clocks and comprising a disk formed with
an endless guiding path comprising a plu-
rality of convolutions, a contact movable
in said path and adapted to engage a hand
of said clock, a continuous contact on one
side of the convolutions of said path and in
a position to be engaged by said switch con-

tact, said continuous contact being in con-
nection with one circuit terminal, and in-
sertible and removable contacts adapted to
be projected into or removed from said path
and to be put into or out of connection with
the other circuit terminal; substantially as
70 set forth.

6. Time switch apparatus applicable to
clocks and comprising a disk formed with
an aperture for receiving the central arbor
and with an endless guiding groove, a switch
contact movable in and guided by said
75 groove and adapted to engage one clock
hand, a permanent contact on one side of
said groove in position for engaging said
movable switch contact, and adjustable con-
80 tacts on the opposite side of said groove
movable into and out of the path of said
switch contact, and connections between re-
spective circuit terminals said permanent
85 contact and said adjustable contacts sub-
stantially as set forth.

7. Time switch apparatus applicable to
clocks and comprising a perforated disk,
means for mounting said disk concentric-
90 ally with a clock dial, an insulation annu-
lus mounted on said disk and formed with
an endless groove, a switch contact movable
in said groove, means on said contact for en-
95 gaging a clock hand, a fixed contact ar-
ranged on one side of said groove and adapt-
ed to engage said switch contact, adjustable
contacts movable in relation to the other side
of said groove and into and out of the path
100 of said movable switch contact, and connec-
tions from said fixed and adjustable contacts
to respective circuit terminals, substantially
as set forth.

8. Time switch apparatus applicable to
clocks and comprising a perforated disk,
105 means for mounting said disk concentrically
with a clock dial, an insulation annulus
mounted on said disk and formed with two
intersecting endless grooves, a switch con-
110 tact movable in said groove and adapted to
be guided by the side walls of said grooves
so that said contact is always guided from
one groove into the other upon traversing
the intersection of said grooves, means on
115 said contact for engaging a clock hand, a
constant connection between said switch con-
tact and one circuit terminal, and adjustable
contacts movable into and out of said
grooves and therefore into and out of the
120 path of said movable switch contact, and
connections from said adjustable contacts
to the other circuit terminal, substantially
as set forth.

9. Time switch apparatus applicable to
clocks comprising an insulation annulus
125 adapted to be mounted on a clock dial and
provided with an endless guiding groove, a
switch contact adapted to be driven by the
clock around said groove, a fixed endless
130 contact disposed to one side of said groove

and adapted to be continuously engaged by said movable contact, an adjustable contact insertible into one of a plurality of spaced apertures in said insulation and adapted to be projected into the path of said movable contact from the other side of said groove, and electrical connections from respective circuit terminals to said fixed and adjustable contacts substantially as set forth.

10 10. Time switch apparatus applicable to clocks comprising an insulation annulus adapted to be mounted on a clock dial and provided with an endless guiding groove and with circularly spaced more or less radial apertures communicating between the periphery of said annulus and said groove. 15 a switch contact adapted to be driven by the clock around said groove, a fixed endless contact disposed toward the inner wall of said groove and adapted to be continuously engaged by said switch contact, a rod adapted to be inserted into any one of said apertures and to project into the path of said switch contact, a common conductor adapted to make electrical connection with said rod in any position in which said rod is inserted, and respective connections from circuit terminals to said conductor and said fixed endless contact substantially as set forth. 30

11. Time switch apparatus applicable to clocks comprising an insulation annulus adapted to be mounted on a clock dial and formed with an endless guiding groove and with circularly spaced more or less radial apertures communicating between the periphery of said annulus and said grooves, a switch contact adapted to be driven by the clock around said groove, a ring conductor 35 mounted along the inner wall of said groove, a ring conductor mounted exteriorly of said annulus, projections on the last-named conductor, a rod adapted to be inserted in one of said apertures and to have one end in engagement with the appropriate projection 40 and the opposite end projecting into said groove, said switch contact being adapted to engage the first named ring conductor and the projecting end of said rod, and respective connections from circuit terminals to said conductor and said fixed endless contact substantially as set forth. 50

12. Time switch apparatus applicable to clocks comprising in combination a metal disk adapted to be supported concentrically on a clock dial, an insulation annulus thereon formed with an endless guiding groove and with more or less radial apertures communicating between the periphery and said 60 groove, an annular metal flange on said disk said flange projecting into said guiding groove at the inner side, a ring conductor mounted externally of said annulus, a rod adapted to be inserted into one of said apertures and to project into said groove, means 65

on said ring conductor for engaging said rod, a switch contact adapted to be driven by a clock hand around said groove and in engagement with said flange and so as to come into contact with said rod, and respective connections from circuit terminals to said disk and said ring conductor substantially as set forth. 70

13. Time switch apparatus applicable to clocks comprising in combination a metal disk adapted to be supported concentrically on a clock dial, an insulation annulus thereon formed with inner and outer endless guiding grooves intersecting one another at one point and also with two sets of more or less radial apertures, apertures of one set communicating between the periphery and the inner groove and apertures of the other set communicating between the periphery and the outer groove, annular metal flanges on said disk said flanges projecting into respective grooves at the inner sides thereof, a ring conductor mounted externally of said annulus, a rod adapted to be inserted into one of said apertures and to project into one of said grooves, means on said ring conductor for engaging said rods, a switch contact adapted to be driven by a clock hand around said grooves the walls of said grooves at the point of intersection causing said contact to leave the groove in which it last moved and to enter the other groove, said switch contact being movable in constant engagement with one or other of said flanges and so as to come into contact with said rod, and respective connections from circuit terminals to said disk and said ring conductor substantially as described. 90 95 100

14. Time switch apparatus applicable to clocks comprising in combination a perforated metal disk, means for securing said disk to a clock dial, an insulation annulus on said disk having an endless guide groove and more or less radial apertures formed therein, an endless flange arranged on said disk and projecting into said guiding groove to the inner side thereof, a peripheral insulation on said disk, a ring conductor surrounding said peripheral insulation, projections on said ring conductor, a rod adapted to be inserted into one of said apertures so as to project into said groove and to engage a projection adjacent to the aperture, connections between respective circuit terminals and said ring conductor and said disk, and a movable switch contact slidable in said groove in contact with said flange and so as to come into contact with said rod and adapted to be engaged with a clock hand substantially as set forth. 105 110 115 120 125

15. Time switch apparatus applicable to clocks and comprising in combination a perforated metal disk, means for securing said disk to a clock dial, an insulation annulus on said disk having two endless inter- 130

secting guide grooves and two sets of more or less radial apertures therein, the apertures of one set being of a different size and in a different plane from those of the other set, one set of apertures communicating between periphery of said annulus and the inner groove and the other set communicating between said periphery and the outer groove, two endless flanges arranged on said disk and projecting into respective guide grooves to the inner side thereof, a ring conductor surrounding said annulus, rods of different sizes corresponding with said apertures, said rods being insertible into appropriate apertures and adapted to connect with said ring conductor at the outer end and to project into the corresponding groove at the inner end, connections between respective circuit terminals and said disk, and a movable switch contact slidable in said grooves in constant contact with one or other of said flanges and so as to engage one or other of said rods and adapted to be engaged with a clock hand substantially as set forth.

16. Time switch apparatus applicable to clocks comprising in combination a disk, an endless guide thereon a permanent switch contact fixed on one side of said guide, switch contacts movable on said disk to project into said guide from the other side, a slider switch movable along said guide under the influence of the clock hand and adapted to connect across from any projected contact to said permanent con-

tact, a conductor common to projected switch contacts and adapted to be engaged by the latter, a clamp adapted to be fixed to the periphery of the clock dial, circuit terminals on said clamp, and extensible connections from said conductor and from said permanent contact to respective terminals substantially as set forth.

17. Time switch apparatus applicable to clocks comprising in combination a disk, an endless guide thereon, a permanent switch contact fixed on one side of said guide, switch contacts movable on said disk to project into said guide from the other side, a slider switch movable along said guide under the influence of the clock hand and adapted to connect across from any projected contact to said permanent contact, a conductor common to projected switch contacts and adapted to be engaged by the latter, a clamp plate adapted to be fixed to the periphery of the clock dial two pins on said clamp plate standing perpendicularly to said dial, toggle links connecting the permanent contact and the common conductor with respective pins, and end pivot bearings for said toggles capable of sliding on said pins substantially as set forth.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

SIEGMUND CHIGER.

Witnesses:

HENRY HASPER,
WOLDEMAR HAUPT.