Feb. 2, 1943. A. G. KALAYDJIAN 2,310,090

TIME SWITCH

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Fig. 1.

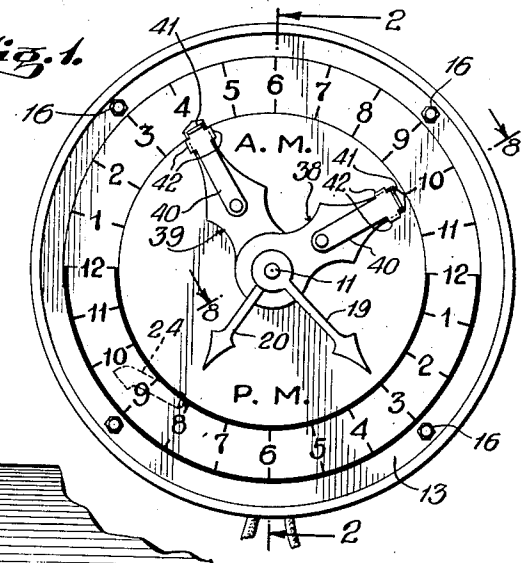
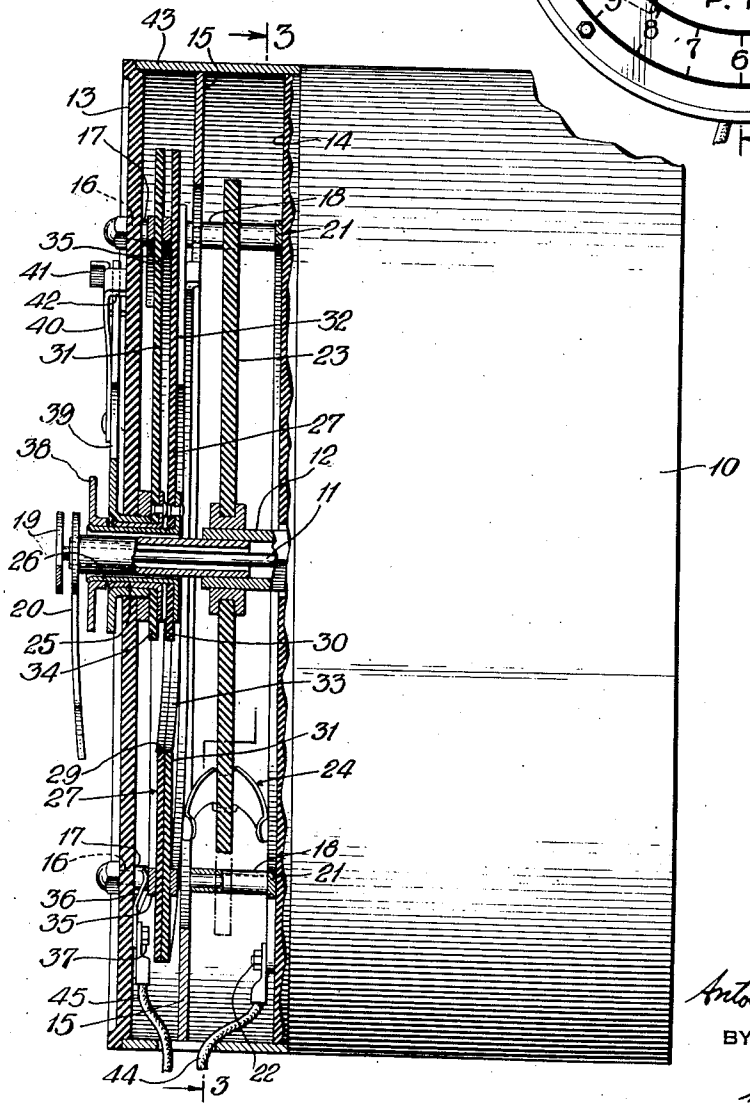


Fig. 2.



Antoine G. Kalaydjian INVENTOR

BY D. C. Heath

his ATTORNEY

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Fig. 3.

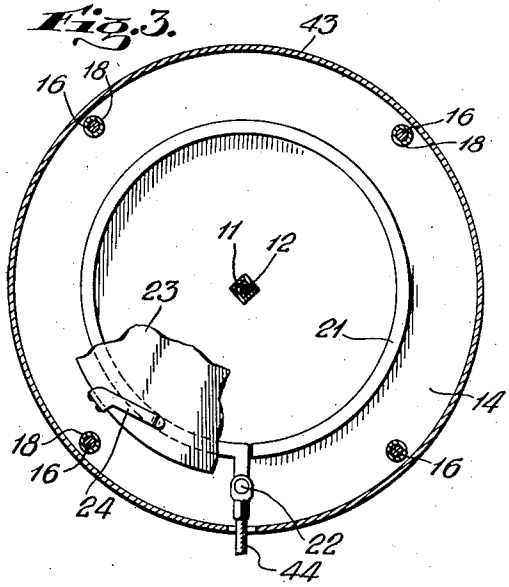


Fig. 4.

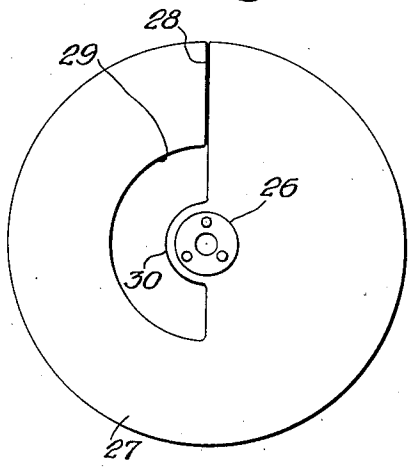


Fig. 5.

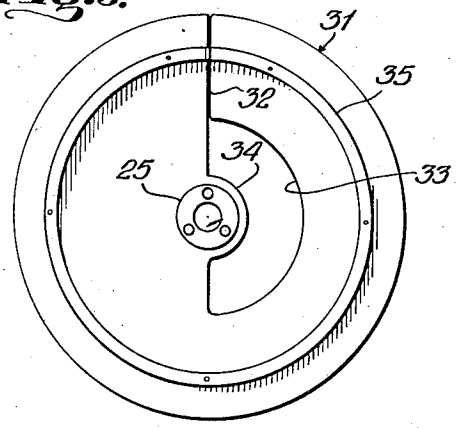


Fig. 6.

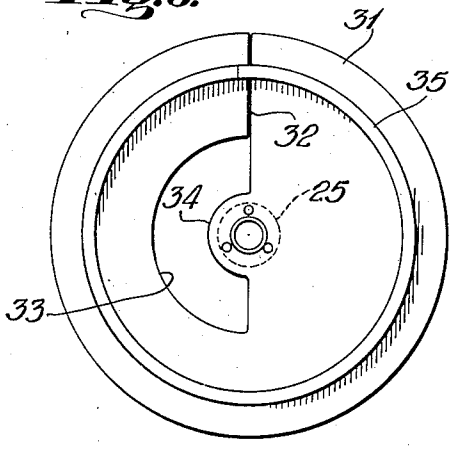


Fig. 7.

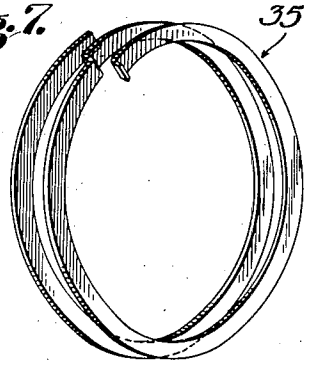
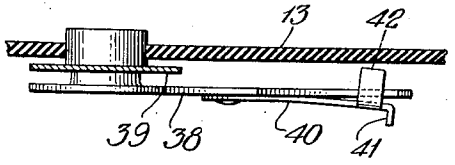


Fig. 8.



INVENTOR
Antoine G. Kalaydjian
BY
D. E. Olcott
his ATTORNEY

Patented Feb. 2, 1943

2,310,090

UNITED STATES PATENT OFFICE

2,310,090

TIME SWITCH

Antoine G. Kalaydjian, New York, N. Y.

Application December 24, 1941, Serial No. 424,271

6 Claims. (Cl. 200—36)

My invention relates to time switches and more particularly to a time switch of the type which is adjusted by relative movement of interdigitated conductor and insulation parts in the form of helixes or split circles.

It is an object of the invention to provide a time switch of this type having an improved electrical connection to the adjusting conductor, improved form of interdigitated parts, and improved adjustment of such parts resulting in a simple, compact time switch.

In the drawings:

Fig. 1 is a front elevation of a time switch embodying the invention;

Fig. 2 is a side elevation, partly in vertical section, of the time switch shown in Fig. 1;

Fig. 3 is a detail section taken on line 3—3 in Fig. 2;

Fig. 4 is a detail view of the cover disc or insulation adjustment part;

Fig. 5 is a detail view showing one side of the mounting disc for the conductor part;

Fig. 6 is a detail view showing the other side of the mounting disc;

Fig. 7 is a perspective view of the track or conductor part; and

Fig. 8 is a detail view of a setting arm in an operative position.

Referring to Figs. 1 and 2 of the drawings, a timepiece 10 which may be a spring clock, synchronous motor clock, or other similar device, is indicated only in general outline. The timepiece considered here is a 24 hour clock having a minute spindle 11 and a concentric square hour shaft 12. The time switch unit has a circular face plate 13, a circular back plate 14, and an intermediate ring 15, held together and, if desired, to the clock unit by four stud bolts 16. The intermediate disc 15 and the plates 13 and 14 are spaced by sleeves or bushings 17 and 18 on the stud bolts 16.

The face plate 13 and back plate 14 have aligned central openings through which project the shafts 11 and 12 of the clock unit 10. Minute and hour hands 19 and 20 respectively are attached to the outer ends of the shafts 11 and 12 in front of the face plate 13 in a usual manner. The face plate 13 is inscribed with a 24 hour dial.

The face plate 13 and back plate 14 are of electrical insulation material such as hard rubber, fibre, or Bakelite. On the face of the back plate 14 is mounted a circular conductor track 21 as shown in Fig. 3. The conductor track 21 is provided with a binding post 22. In front of the back plate 14 is located a rotating contact which for the purpose of balance comprises an insulating disc 23 mounted so as to rotate with the clock hour spindle 12 and carrying a two-pronged contact member 24. One prong of contact member 24 rides on the circular conductor track 21 on the back plate 14.

In the central opening in the face plate 13 are rotatably journaled concentric hubs 25 and 26. On the inside hub 26 and behind the face plate 13 is mounted a split insulator disc 27. The shape of this disc is shown in Fig. 4. It has a slit 28 from the periphery radially inward to one end of a semi-circular slot 29. The slot 29 encircles on one side a center portion 30 which may be attached to a flange on the inner end of hub 26 by rivets or the like.

On the inner end of the outer hub 25 is secured a conductor mounting disc 31. Opposite sides of this disc are shown in Figs. 5 and 6. Disc 31 has a straight slit 32 from the periphery radially inward to one end of a semi-circular slot 33. Slot 33 halfway surrounds a center part 34 which may be secured to a flange on the inner end of hub 25 by rivets or the like.

In Fig. 7 there is shown a helical conductor member 35 having slightly over two complete turns. Conductor 35 is laced through slit 32 in mounting disc 31 and has one turn secured to one face of this disc as seen in Fig. 5, the remainder of the conductor comprising slightly over a turn being located on the other side of disc 31 as seen in Fig. 6. The helical conductor member 35 may be made of a good resilient self-supporting material such as phosphor bronze.

The split discs 27 and 31 are formed with a slight spread at the slits 28 and 32 so as to form helical discs, and are located close together between the rear of the front plate 13 and the intermediate annular partition 15 so that when the discs 27 and 31 are revolved relatively in opposite directions they mesh or interdigitate in known manner. The radius of the conductor member 35 is substantially the same as the radius of the conductor member 21 on the back plate 14 and these radii are the same as the radius of rotation of the revoluble contact 24. When the slits 28 and 32 of discs 27 and 31 are aligned, the full circle of conductor 35 on the face of member 31 is exposed. The other prong of contact 24 rides on this exposed part of conductor 35. By rotating the discs 27 and 31 relatively through a full revolution, the slits 28 and 32 are again aligned but with the full extent of conductor 35 covered by the insulator

disc 27 so that contact 24 is open. In any other relative positions of discs 27 and 31, a part of conductor 35 is exposed to contact 24.

On the back of face plate 13 is secured a fixed contact 36 having a binding post 37. Contact 36 rides on the part of conductor 35 which is at all times exposed in the form of a complete circle on the back of disc 31 as seen in Fig. 6.

Interlocking of the closed ends of slots 29 and 33 in discs 27 and 31 limits relative rotation of discs 27 and 31 in one direction. By turning the end of conductor 35 outward at the edge of slit 32 so as to engage the edge of slit 28 in disc 27, a stop is provided for limiting relative movement of discs 27 and 31 to one revolution in the other direction.

By changing the rotative position of disc 27, the radial position of slit 28 determines the point in the travel of contact 24 at which the contact will hit conductor 35 and thus complete an electrical path between binding posts 22 and 37. By changing the rotative position of disc 31, the radial position of slit 32 determines the point in the path of rotation of contact 24 that this contact leaves conductor 35, thus opening the electrical path between binding posts 22 and 37. Since the contact 24 is rotated by the hour spindle 12 of the clock unit the switch closing and opening times are thus adjusted by the described manipulation of discs 27 and 31.

For setting the positions of discs 27 and 31, there are provided setting arms 38 and 39. Arm 38 is secured at one end to the inner hub 26 so that rotation of arm 38 turns hub 26 and disc 27 attached thereto. Arm 39 is secured at one end to the other concentric hub 25 so that turning of arm 39 turns hub 25 and the conductor mounting disc 31 attached thereto. The other ends of arms 38 and 39 project outward to the vicinity of the index circle on the face plate 13. The arms 38 and 39 are located between the time indicating hands 19 and 20 and the face plate 13. Arm 38 is located outward of arm 39 so that arm 38 may be moved into a position in which it overlies arm 39. The time indicating hands 19 and 20 clear both arms 38 and 39.

As shown in Figs. 1 and 8, each arm 38 and 39 has a leaf spring 40 attached thereto. One end of leaf spring 40 is attached to arm 38 by a rivet or other suitable fastening device. The other end of leaf spring 40 is turned outward to form a suitable hand grip 41. Tabs 42 project inward from leaf spring 40 adjacent the end 41 and overlie the sides of arm 38 so as to frictionally engage the surface of the face plate 13. A suitably roughened track may be provided on face plate 13 to increase the holding action of tabs 42 on the face plate. To turn arm 38, leaf spring 40 is grasped by the grip 41 and pulled outward to disengage tabs 42 from the surface of plate 13 so that the arm 38 can be revolved to a desired position. This operative position of leaf spring 40 is illustrated in Fig. 8. In a similar manner arm 39 can be set to a desired position. When arm 38 is set to a position overlying arm 39, so that the switch is open all the time or closed all the time, the tabs 42 on lever 38 overlie both the lever 38 and lever 39. The switch assembly is enclosed by a cylindrical case 43. A removable face cover may be provided if desired in any of various known manners. Conductors 44 and 45 may be connected to binding posts 22 and 37 for connection of the time switch in an electric circuit to be controlled.

Various changes and modifications may be made within the scope of the invention as set forth in the following claims.

What is claimed is:

1. A time switch comprising a 24 hour clock mechanism having concentric minute and hour spindles, a switch unit having a back plate and a face plate secured in spaced apart relation, said plates having central openings through which project said clock spindles, time indicating hands on the ends of said spindles in front of said face plate, said face plate having indicia of time thereon, a contact in the space between said plates and operated by said hour spindle to rotate in a circular path, a circular conductor on said back plate providing a connection from an electric circuit to said contact, a helical conductor also in the space between said plates so as to be contacted by said contact, an insulator member in the form of a helix having one turn and meshed with said helical conductor, said insulator member and helical conductor being rotatably mounted for mutually independent movement so as to expose any size segment of said conductor to said contact at any desired place in the path of travel of the contact, a second connection for an electric circuit including a fixed contact within the space between said plates, said helical conductor having at least two complete turns so that one of said turns is at all times exposed to contact with said fixed contact, the mountings for said insulator member and helical conductor including hubs journalled concentrically around said clock spindles in said face plate, and setting arms attached to said hubs in front of said face plate.

2. In a time switch having a revolving contact and an adjustable track formed by interdigitated conductor and insulating helixes, a helical conductor having at least two turns so that one turn is always exposed, and an electrical connection including a fixed contact located to contact said exposed turn.

3. In a time switch of the type having a revolving contact and an adjustable circular track formed by interdigitated helical discs, one of which serves as an insulator, and the other of which carries a helical conducting member, helical discs, each of said helical discs having a radial slit communicating at its inner end with a semi-circular slot surrounding one-half of a hub portion of the disc, said slots being located in the discs so as to stop relative rotation of the discs in one direction when said slits are substantially aligned.

4. In a time switch of the type having a rotating contact and an adjustable conducting track therefor formed by interdigitated helical insulating and conducting members, a timer having concentric hour and minute spindles, a face plate through which said spindles project and having time indicating indicia thereon, said rotating contact and adjustable track being located behind said face plate and concentrically around said spindles, adjusting members for said track projecting through and journalled in said face plate concentrically around said spindles and having manually adjustable parts in front of said face plate, and time indicating hands on said spindles also in front of said face plate.

5. In a time switch of the type having a rotating contact and an adjustable track therefor

formed by interdigitated helical conductor and insulation members, a face plate bearing time indicia, time indicating hands in front of said face plate, and adjusting members for said track having arms located in front of said face plate, each of said arms having an element engaging said face plate and releasable therefrom to permit rotation of the arm.

6. A time switch having a clock element, a switch mechanism of the type comprising a rotatable contact and an adjustable track therefor formed by interdigitated helical conductor and insulating members, a face plate mounted in spaced relation from said clock element, said switch mechanism being located in the space between said face plate and said clock element, said clock element having hour and minute spindles projecting through the center of said face plate, said rotatable contact being connected to be driven by said hour spindle, time indicating hands on said spindles in front of said face plate, and members for adjusting said track also projecting through said face plate and journalled concentrically around said spindles in said face plate and having arms projecting radially in front of said face plate.

ANTOINE G. KALAYDJIAN.