(No Model.) 2 Sheets—Sheet 1.

J. L. McCASKEY.

ELECTRIC PROGRAM CLOCK.

No. 531,002. Patented Dec. 18, 1894.

Fig. 1.

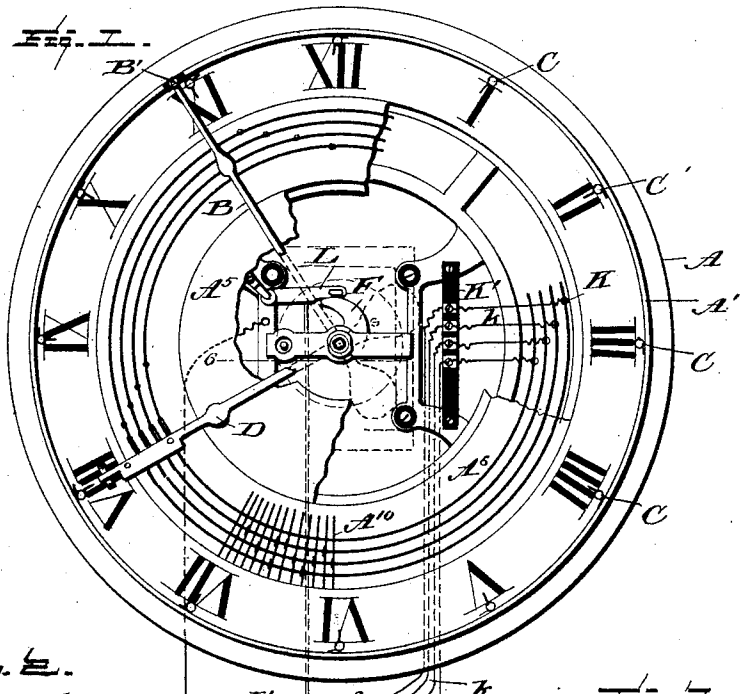
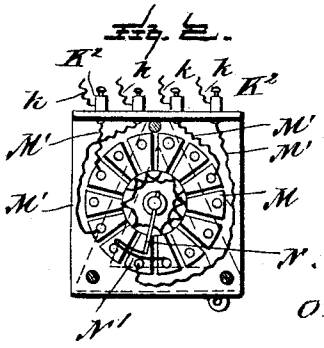


Fig. 2.



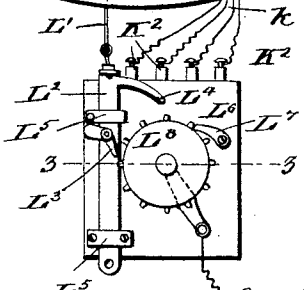
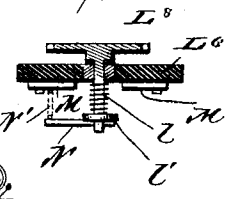
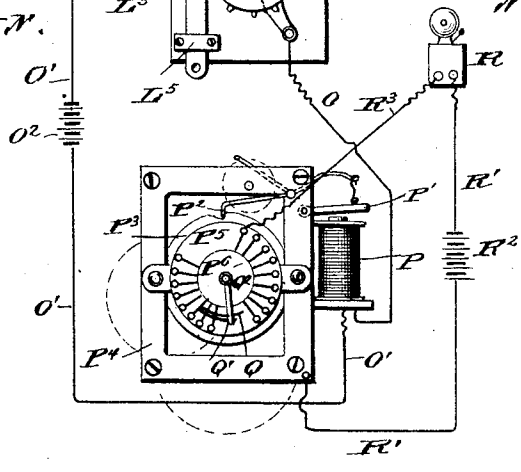


Fig. 3.





Witnesses
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C. A. Bond

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Attorney

(No Model.) 2 Sheets—Sheet 2.

J. L. McCASKEY.

ELECTRIC PROGRAM CLOCK.

No. 531,002. Patented Dec. 18, 1894.

Fig. 4.

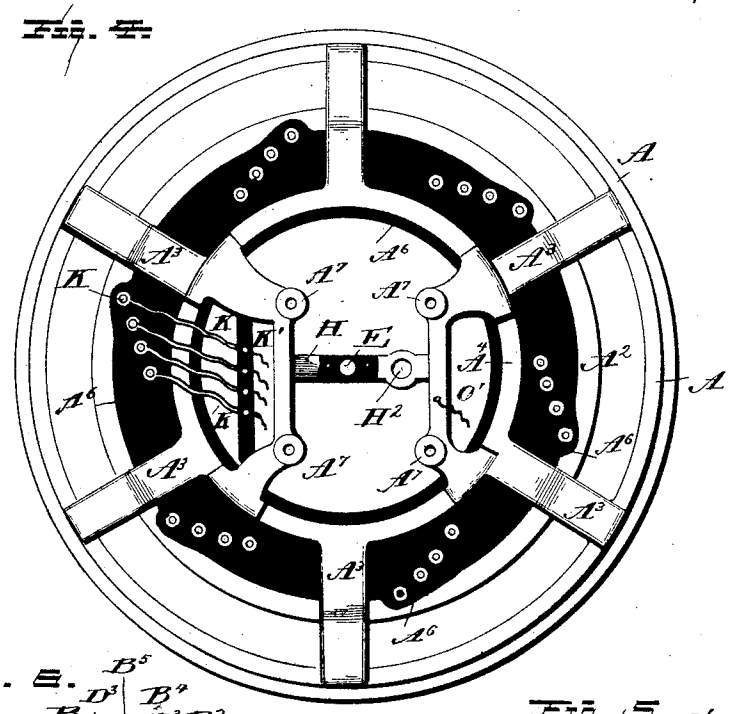


Fig. 8.

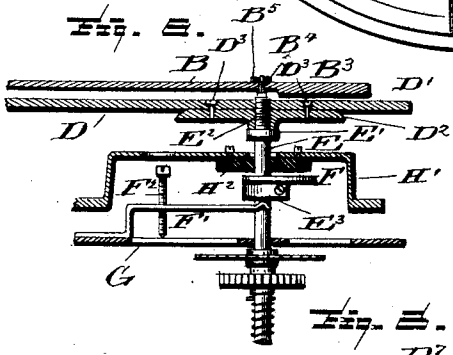


Fig. 5.

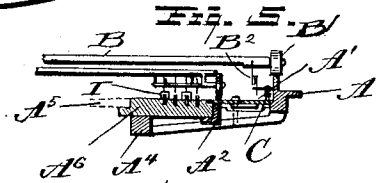


Fig. 7.

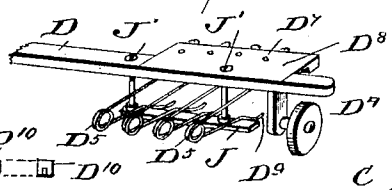


Fig. 6.

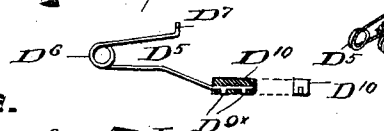


Fig. 9.

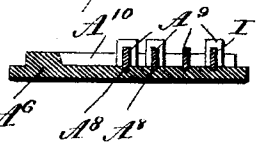
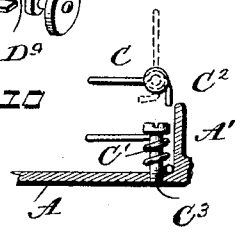


Fig. 10.



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by E. B. Stocking
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UNITED STATES PATENT OFFICE.

JOHN L. McCASKEY, OF WAYNESBOROUGH, PENNSYLVANIA, ASSIGNOR TO FREDERICK FRICK.

ELECTRIC PROGRAM-CLOCK.

SPECIFICATION forming part of Letters Patent No. 531,002, dated December 18, 1894.

Application filed September 13, 1893. Serial No. 485,410. (No model.)

To all whom it may concern:

Be it known that I, JOHN L. McCASKEY, a citizen of the United States, residing at Waynesborough, in the county of Franklin, State of Pennsylvania, have invented certain new and useful Improvements in Electric Program-Clocks, of which the following is a specification, reference being had therein to the accompanying drawings.

This invention has relation to electric program clocks and it consists in certain improvements upon the inventions disclosed in prior patents granted to me to wit:—No. 428,854, May 27, 1890, and No. 463,843, November 24, 1891, to which reference can be had for a more particular description of parts herein shown and not particularly described.

The objects and the advantages of the invention will be set forth in the following description and the novel features thereof will be particularly pointed out in the claims.

Referring to the drawings Figure 1 is a front elevation with parts in section of a program clock constructed in accordance with my invention and connected to an automatic calendar switch and to a mechanism for directing an electric current to any one set of alarm devices, or to two or more of a greater or less number employed in connection with the clock. Fig. 2 is a rear elevation of the calendar switch. Fig. 3 is a section on the line 3—3 of Fig. 1, of the calendar switch. Fig. 4 is a rear elevation of the dial of the clock. Fig. 5 is a section of the outer portion of the dial including the annuli thereof. Fig. 6 is a vertical section of the central portion of the dial and of the hour and minute hands and their spindle. Fig. 7 is an enlarged perspective of the free end of the hour hand. Fig. 8 is a side elevation of one of the spring contacts modified to give a plurality of impulses, the insulation being in vertical section. Fig. 9 is an enlarged vertical sectional view of the annuli, the insulatory base of the same and of the removable contacts, and Fig. 10 is a plan and side elevation of adjustable nodes with a portion of the dial shown in section.

Like letters of reference indicate like parts throughout the several views.

A represents the dial of a clock and in my present invention I provide it with an annular flange A′ on which a friction roller B′ at the extreme end of the minute hand B may travel thereby preserving the minute hand in a continuous and regular horizontal plane whereby its contact point B^2 see Fig. 5 will assuredly make connection with the nodes C one of which is located at each five minute point on the dial. These nodes are of peculiar and novel construction. Each consists of a wire coiled vertically as at C′ Fig. 10 between its ends one of which projects horizontally to contact with the point B^2 of the minute hand and the other of which projects as at C^2 to increase the surface of contact with the dial A. A screw C^3 is threaded into the dial and forms a pintle on which the node may be rotated. Now by entering the screw for a greater or less distance into the base the coiled body portion of the node presses with greater or less friction against the base and the head of the screw so that the node will be sufficiently rigid to resist turning by the contact of the point B^2 on the minute hand and to remain in any adjusted position of the node. As shown by dotted lines in Fig. 10 the node may be swung out of the path of the contact point of the minute hand when it is desired so that no alarm will be sounded through the operation of the minute hand.

A reference to Fig. 6 will show that the minute hand B and hour hand D are peculiarly mounted and that each is provided with a counterbalancing extension B^3 and D′ respectively. The hand arbor or shaft E of the clock works is provided with a collar E′ above which it is finished in a left hand screw thread E^2. A base plate D^2 is mounted upon the thread E^2 and the hour hand D is also adapted to fit the thread and is secured to the base plate by screws D^3 or otherwise while the minute hand B is mounted on the upper squared end B^4 of its spindle which passes through the hour hand arbor or shaft and is secured thereon by a nut B^5 as shown.

It is essential for insuring positive contacts and therefore regularity and proper timing of the alarms that the hour and minute hands be maintained parallel with each other and

h the ce of the dial and that the movement of either hand and the lagging of the same when passing from a vertical to a horizontal position be avoided. This last action is more liable to occur when devices are applied to the hands at their free ends and I therefore have not only provided the counterbalancing extensions but have applied to the hour arbor or shaft a collar E^3 which in this instance is a part of the calendar cam F and beneath this collar a spring F′ bears with a pressure varied by means of a screw F^2 which bears upon a portion of the frame-work of the clock work G.

H′ is a bracket secured to or formed as a part of a casting A which constitutes the main and fundamental part of the dial. The hand arbor of the clock work is insulated from the bracket H′ by the block H^2 of insulating material secured thereto so that the electrical current is conducted in one direction from the hands through the clock work while its conduction in the opposite direction is through a system of insulated annuli hereinafter described.

The casting A has an outer annulus bearing the figures of the dial and this is rabbeted or grooved as at A^2, Fig. 5, and divergent spokes or arms A^3 connect this annulus with an inner ring A^4 a central removable disk A^5 forming the central face portion of the dial. Between the ring or annulus A^4 and the edge of the central disk A^5 is a ring A^6 of insulating material. The entire casting A is mounted upon the frame-work of the clock-work by means of screws passing through the perforated lugs A^7 of the casting with insulating material placed between the parts whereby the dial is insulated from the clock-work.

The portion A^6 of the dial is of insulating material and while it may be of any suitable substance still rubber by reason of its ease of formation is preferable, but it also possesses the characteristics of readily changing its shape and condition in consequence of changes in the temperature of the surrounding atmosphere so that I have been forced to provide some means for retaining it in position and shape after it has been made to form a portion of the dial. Various forms of installing the rubber portion of the dial may be adopted which although differing from those shown and described herein will secure the desired results and in this regard I do not limit the invention to the exact form of construction illustrated. The rabbet or groove A^2 of the castir g A receives one edge of the rubber ring or annulus A^6 while its opposite edge rests upon the ring A^4 of the casting and is rabbeted to receive and support the central disk A^5 all as clearly shown in Fig. 5. By this means the opposite edges of the rubber are held firmly against warping and contortion and in a common horizontal plane with the rest of the dial. Within the rubber A^6 there are formed a series of concentric grooves A^8 see Fig. 9 in which are seated metallic annuli A^9. The rubber portion A^6 is also provided with a continuous series of radial slits A^{10}. These may be arranged to agree with the minute spaces of the dial.

I, Figs. 1, 5 and 9, represents removable nodes which can be inserted in the slits A^{10} and in contact with the annuli so as to produce an alarm at a desired moment when properly arranged and in co-operative electrical connection with the remaining devices employed.

The hour hand D is provided at its free end with a supporting roller D^4, see Fig. 7, and with a series of contacts D^5 each of which consists of a wire formed into a coiled spring D^6 between its ends terminating at one end in a form to be connected with a carrier and at the other end to form one or more contact points. These formations of the contact may be varied and still preserve the intended function. In this instance the connecting end D^7 is simply bent at a right angle so that it may be inserted in a plate perforated to receive the same which constitutes the carrier D^8 and this plate may be secured in any suitable manner to the free end of the hour hand. The contact end of the device may be a simple bend of the wire as shown in Fig. 7 at D^9 or the end of the wire may be formed into two or more points $D^{9\times}$ and provided with a shoe D^{10} of insulating material whereby as the contact makes electrical connection a plurality of impulses will be produced, the shoe acting to render the passage of the contact over an electrical conductor or node smooth and easy. It is apparent that without a shoe of some character the points $D^{9\times}$ would catch upon a node and interfere with the operation of the device.

When a series of contacts D^5 are employed it is advantageous to provide some means for regulating the pressure of all of the series and to permit of backward rotation of the hands to which they are applied so that the contacts can pass in either direction over the nodes without deformation or other injury of the contacts. A slight upward bending of the extreme end of the free end of the contact D^5 and a slight rounding of the ends of the shoe D^{10} also tends to obviate injury of the contacts by the backward movement of a hand to which they are applied. The means which I have provided to regulate the pressure and position of the contacts consists of a bar J suspended from the hour hand D by screws J′ so that by turning said screws the bar may be raised or depressed with relation to the hour hand and as the contacts D^5 rest at their free ends upon said bar they will be simultaneously adjusted as to height above the nodes A^9.

The annuli project at desired points through the rubber A^6 in a form suitable for electri-

cally connecting the same with other portions of the apparatus. These connections are upon the rear of the dial as shown at K, Fig. 4. Insulated conductors *k* extend from the annuli to a bar K′ of insulating material secured to the casting A in any suitable manner. From thence the conductors extend in regular order to the four binding posts K^2, of the calendar switch of the apparatus.

There is connected with the clock work a calendar cam F which may be of any well known construction mounted on the hour hand arbor so as to rotate once in twelve hours. A lever L is pivoted to the clock-work frame and extends into the path of the cam. A rod L′ connects the lever with a bar L^2 which carries the pawl L^3 and a detent L^4. The bar L^2 reciprocates in boxes L^5, secured to the base piece L^6 of the switch. A detent pawl L^7 may also be used to operate in connection with the ratchet L^8 of the switch. This ratchet has fourteen teeth one for each day of the week and for each noon-day, or noon hour of each day so that when the hour hand points to 12 o'clock it will operate the calendar switch ratchet one tooth, changing the switch at noon and at midnight or other desired time. By this means a system of alarms may be made to accord with morning and afternoon programs differing from each other and if desired programs of each morning and of each afternoon differing on succeeding days of the week and the programs of successive weeks being automatically repeated without variation while at the same time each or all can be readily changed at pleasure. A spring or weight connected to the bar L^2 at its lower end provides sufficient power to operate the ratchet.

Upon the rear of the base plate L^6 there are secured a series of fourteen plates M of conducting material representing the seven days and seven nights of the week and conductors M′ are extended from the annuli through the binding posts K^2 to these plates. The conductor from the first binding post at the right of Fig. 2 represents Saturday and terminates at and is connected with one of the lower plates of the circular series and the same is the case with the conductor from the third post which represents Sunday. The conductor from the second post which represents the seven nights of the week is connected with one of the plates as shown and from thence is extended to connect with every other plate of the series, while the same connections in character are made with the conductor from the last binding post representing five school days, it however being connected with plates not touched by the conductor from the second post. The shaft of the ratchet L^8 is provided with an arm N carrying a contact N′ which during the rotation of the ratchet sweeps over every plate of the series. A single conductor O extends from the calendar switch being electrically connected with the ratchet and its contact. The ratchet L^8 rotates in a metal bushing inserted in the rubber or other non-conducting material of which the base L^6 is made. A coiled spring *l* and a washer *l′* encircle the spindle of the ratchet and are retained against movement in one direction by the passage of the arm N through the spindle. This insures metallic connection and permits the ratchet to be raised or drawn bodily away from the face of the base plate so as to change the connection of the operating pawl L^3 with the ratchet from one tooth to another without operating the bar L^2. By this means the commencement of the series of programs may be changed from one day to another in the week as may be desirable. The circumstances rendering such a change of advantage might be the occurrence of a holiday or an unexpected interruption of business for a day or a half day whereby the calendar and program would after suitable change of the ratchet be repeated by the apparatus.

The conductor O′ with the battery O^2 completes the circuit for the devices thus far described. The conductor O′ connects with the dial casting, as shown in Fig. 1, while the dial casting and the conductors *k* with their connections are insulated from the dial, the former also being insulated from the clock frame-work. The circuit being open it will be noticed that a closure of the same will occur only when the contact points of the hands make connection with one of the several nodes employed.

The conductor O′ is connected with one spool of an electro-magnet P and the conductor O with the other spool thereof. The armature P′ is connected with a detent P^2 which operates in connection with a notched disk P^3 forming a part of a spring motor indicated by the dotted lines in the lower part of Fig. 1. Upon the frame P^4 of the motor there is supported a disk P^5 of insulating material having a series of contacts P^6 over which a movable contact Q carried by an arm Q′ mounted in the spindle Q^2 of the motor travels when the detent P^2 is raised by the attraction of the armature P′ by the magnet P. Such attraction will occur when the circuit is closed by the contact of the points on the hour and minute hands with their respective nodes. As the contact Q traverses the series of contacts P^6 an alarm will be sounded by the bell R in the circuit R′ to battery R^2 and to the frame work of the motor, the circuit being completed by one of a series of conductors R^3 extending from each of the contacts P^6 to an alarm arranged in a series of rooms or apartments in a building where the apparatus is used. The contact Q will travel over as many of the contacts P^6 as the number of notches in the disk P^3 will permit. A complete revolution of the disk may carry the contact over all or any portion of the contacts P^6.

What I claim is—

1. A node made in coil spring form and

mounted upon a screw, substantially as specified.

2. A node formed of resilient material made in the shape of a coil with an extension for increasing the contact surface of the coil and mounted upon a screw for determining the pressure at the point of surface contact, substantially as specified.

3. The combination with a clock hand having a contact, of a series of nodes each rotatably mounted upon and compressible by a screw, seated in a dial, substantially as specified.

4. The combination with a clock hand and with a series of contacts carried thereby, of an adjustable bar for supporting the free ends of said contacts, substantially as specified.

5. The combination with a clock hand, of a series of spring contacts, a support for the same, and an adjustably connected bar extending beneath the contacts and connected to the hand, substantially as specified.

6. A contact formed at one end for connection with a carrier and provided with a spring coil at an intermediate portion and terminating with a slight upwardly bent contact point, substantially as specified.

7. A dial comprising an exterior annulus, an interior disk, and an interposed rabbeted annulus or ring of non-conducting material, substantially as specified.

8. A dial provided with a grooved annulus and with an insulating annulus having its edge seated in the groove of the dial, substantially as specified.

9. A hand provided with a counterbalancing extension and with an attaching plate secured to the hand, both being screw-threaded for connection with an arbor, substantially as specified.

10. An insulating annulus provided with radial slits and concentric grooves, substantially as specified.

11. An insulating annulus provided with concentric grooves, metallic annuli within said grooves, and nodes adapted to fit the annuli, substantially as specified.

12. A node removably combined with an annulus and with an insulating annulus having radial slits for receiving nodes, substantially as specified.

13. The combination with the arbor having a shoulder, of a spring bearing against said shoulder, and means for regulating the tension of the spring, substantially as specified.

14. The combination with a hand carrying a contact, of an arbor carrying the hand, a spring bearing against the arbor and means passed through said spring for adjusting the same, substantially as specified.

15. The combination with a dial, of a hand carrying a contact and a roller, of an arbor carrying a hand and a spring mounted to act in the direction of the length of the arbor, and means for regulating its pressure upon the arbor, substantially as specified.

16. A dial carrying an insulating annulus, a conducting annulus carried by the dial, and an insulating bar for the connection of conductors with the conducting annulus, substantially as specified.

17. A dial provided with an insulating annulus having a series of conducting annuli, conductors extending from each of said annuli to an insulating bar carried by the dial, an hour hand provided with a series of contacts and removable nodes arranged upon the annuli, and means controlled by the clock for rotating the spindle of the calendar switch, substantially as specified.

18. In a program clock, a calendar switch, the ratchet of which is provided with a single movable contact and a series of conducting plates in the path of said contact and insulated from each other and having suitable electrical connections and means controlled by the clock for rotating the spindle of the calendar switch, substantially as specified.

19. In a program clock, a calendar switch having a portion mounted yieldingly in the line of the axis of the spindle and means controlled by the clock for rotating the spindle of the calendar switch, substantially as specified.

20. In a calendar switch, a ratchet mounted yieldingly and carrying a contact and means controlled by the clock for rotating the spindle of the calendar switch, substantially as specified.

21. A calendar switch comprising a yieldingly-mounted ratchet, means for operating the same, a series of plates and electrical connection between the ratchet and the plates, substantially as specified.

22. The combination with a program clock, of a series of alarms, a calendar switch, an electrically-operated detent and a mechanically operated contact, substantially as specified.

23. A motor the spindle of which is provided with a contact-carrying arm, a series of contacts insulated from the motor and its spindle, an automatically-operated alarm-selecting device, an alarm in circuit with the contact and motor, and a detent for controlling the operation of the motor, substantially as specified.

24. The combination with a clock the hands of which are provided with contacts and the dial of which is provided with insulated annuli, of an electrical calendar switch, an alarm-selecting mechanism, and an electrical device for releasing said alarm-selecting mechanism, substantially as specified.

25. The combination with a check having insulated annuli and contact-bearing hands, of an electrically-connected calendar switch and an alarm-selecting device, substantially as specified.

26. The combination with a dial having concentric grooves and intersecting radial slits, of annuli in the grooves, and nodes re-

movably fitted in the slits of the annuli and held therein by frictional engagement, substantially as specified.

27. The combination with a dial having concentric grooves and intersecting radial slits, of annuli in the grooves, and removable nodes on the annuli and seated in the slits, substantially as specified.

In testimony whereof I affix my signature in presence of two witnesses.

JOHN L. McCASKEY.

Witnesses:
JNO. E. CANNAMY,
H. L. NISSLEY.