

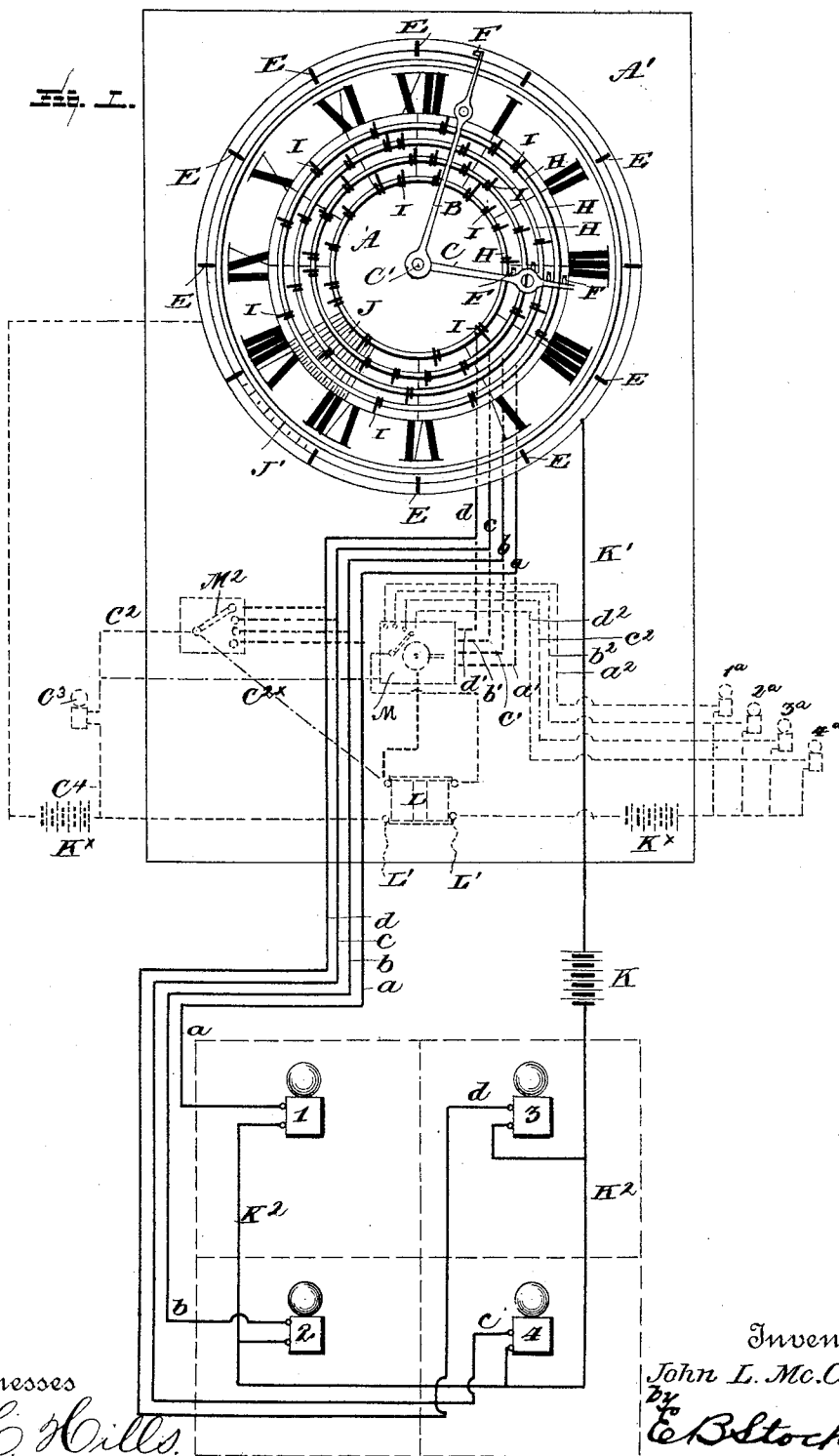
(No Model.)

2 Sheets—Sheet 1.

J. L. McCASKEY.
ELECTRIC PROGRAMME CLOCK.

No. 463,843.

Patented Nov. 24, 1891.



Witnesses

L. C. Hills.

H. Sutherland

Inventor:

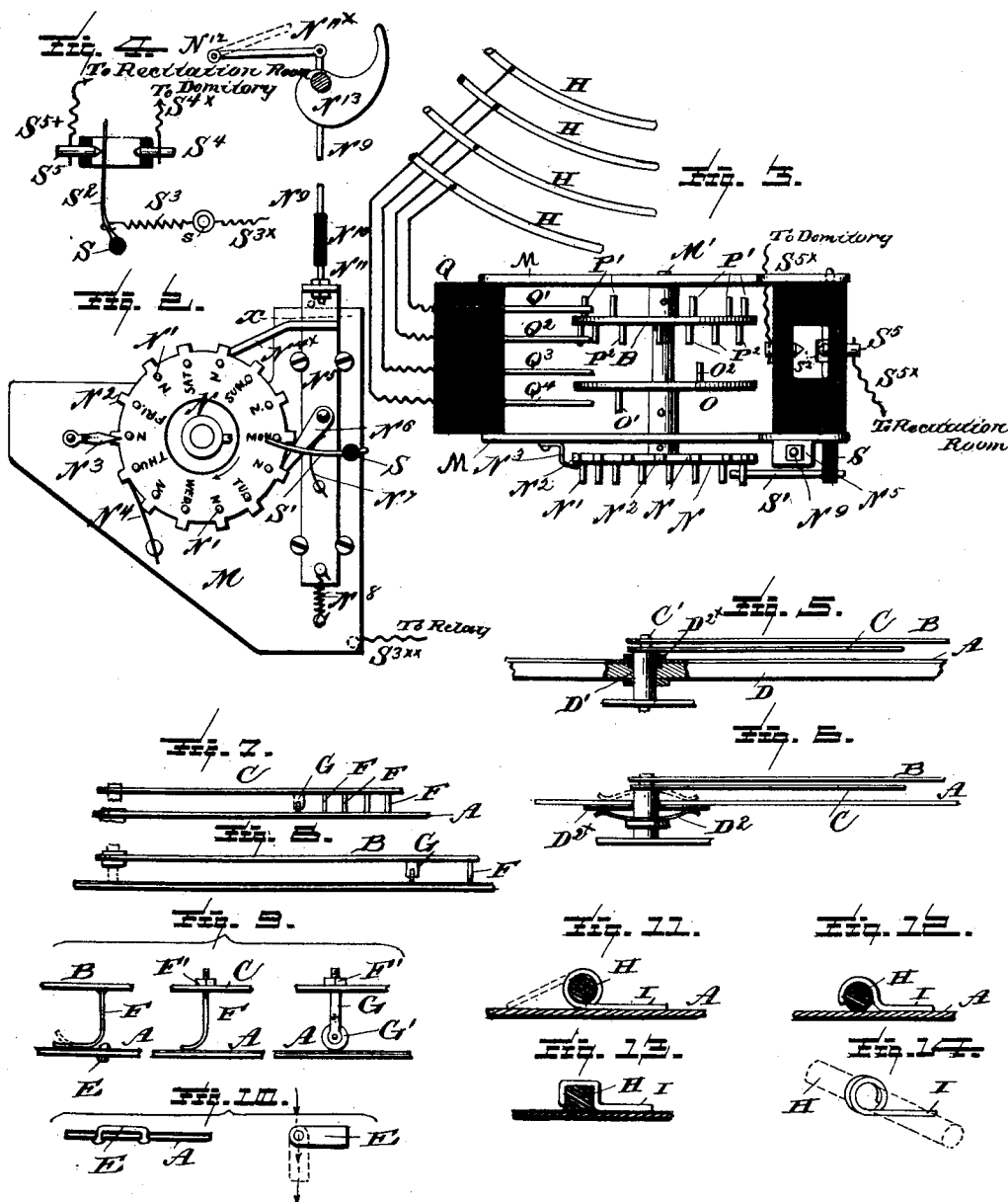
John L. McCaskey.

E. B. Storking
Attorney

2 Sheets—Sheet 2.

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L. C. Hills.
Hutchinson

by *John L. Mc. Caskey.*
E. B. Stocking
Attorney

UNITED STATES PATENT OFFICE.

JOHN L. McCASKEY, OF WAYNESBOROUGH, PENNSYLVANIA.

ELECTRIC PROGRAMME-CLOCK.

SPECIFICATION forming part of Letters Patent No. 463,843, dated November 24, 1891.

Application filed May 12, 1890. Renewed July 6, 1891. Serial No. 398,604. (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 Automatic Electrical Programme-Clocks, of which the following is a specification, reference being had therein to the accompanying drawings.

This invention relates to programme-clocks, the construction, mode of operation, and advantages of which will be hereinafter described, and the novel features of the invention will be particularly pointed out in the claims.

Referring to the drawings, Figure 1 is an elevation of a programme-clock constructed in accordance with my invention and a diagram of its application to a use in connection with four compartments having audible alarms therein. Fig. 2 is a front elevation of an automatic calendar-switch which may be employed in connection with the clock. Fig. 3 is a plan of the switch shown in Fig. 2 and of its connection with the annuli of a programme-clock. Fig. 4 is a vertical section taken on the line x of Fig. 2 and through the portion shown at the extreme right of Fig. 3. Fig. 5 is a plan and partial section illustrating the means employed for steadying the hour-hand and minute-hand spindles. Fig. 6 illustrates the means for preventing end shake of the hour and minute hand spindles. Figs. 7 and 8 are details of the hour and minute hands provided with contact-points. Fig. 9 is a modification of the contact-points and hand-supports. Fig. 10 is a section illustrating the construction of the fixed contact-points on the clock-dial and a plan illustrating the movable contact-point on the dial. Figs. 11 and 14 are a section and perspective, respectively, of one form of movable and adjustable contact-points, which in use are arranged upon the annuli; and Figs. 12 and 13 represent modifications in the form of such contact-points whereby they are removable.

Like letters and numerals refer to like parts in all the figures of the drawings.

A represents the dial of any ordinary clock, and A' its case.

B is the minute-hand, C the hour-hand, and

C' the spindle upon which said hands are mounted in the usual manner. In ordinary clock-movements the spindle C' is so loosely mounted that it may be easily shaken endwise or sidewise, and when it is attempted to apply to such movements electrical programme mechanism I have found by experience that a failure in operation often results by reason of the liability of the hands to travel in other than a uniform distance from the dial and from the center thereof radially, so that contact-points carried by the hands will fail to touch the stationary contacts arranged upon the dial, and hence no signal is given, either visible or audible, at a predetermined time. In order to remedy this existing defect, I provide a bar D, (see Fig. 5,) which extends across the opening in the dial through which the hand-spindle projects, and through this bar I form an opening D', which shall fit the sleeve of the hour-hand as snugly as possible without producing undue friction. To prevent end shake in the spindle and hands, I provide an elliptical or other shaped spring D², Fig. 6, to bear against either the hand or a shoulder on the hand-spindle, or the wheel inside works in connection with this spindle and against the dial. Insulating-fillings D^{2x} are provided in the opening in the dial through which the hands pass and against the back of the dial or works where the spring D² passes thereon.

The faces of clock-dials which are enameled are non-conductors, and in them—that is, in and upon and around the said dial—I locate terminal plates or points E. (See Fig. 10.) One form consists of a staple of copper wire E, the legs of which are passed through openings formed in the body of the dial and are riveted or upset at the back of the dial. The latter being metal serves as a conductor for the electric current from point to point around the dial. In Fig. 1 these contacts E are arranged diametrically, so that when a contact carried by a hand of the clock passes thereover the length of time through which the signal, whether audible or visible, shall operate is comparatively short. Therefore to provide for a longer ringing of a bell or exposure of a visible signal I may construct these contacts E to be swung upon a pivot, as

clearly illustrated at the right of Fig. 10, so that by turning it, as indicated in full lines, the contact-point of a hand will remain in connection therewith for a longer or shorter period, as desired.

Each of the hands of the clock is provided with contact-points F and with a support G, which may or may not be provided with an anti-friction roller G', as desired. The object of the support G, which is arranged, preferably, at a desired distance from the hand-spindle and which is intended to bear upon the dial as the hand passes therearound, is to maintain the hand throughout its length at a uniform distance from the dial, which support, in connection with any provision for preventing the end or side shake of the hand-spindle, renders the making of contact of the points of the hands with the nodes, poles, or contact-points on the dial or on any of the annuli thereon positive and certain. By this construction a failure to produce an alarm at a predetermined time is avoided so far as the correct performance of the devices already described is concerned.

Instead of regulating the length of time of exposure of a visible or sounding of an audible signal by means of a pivoted node or pole on the dial, as above described, I have devised other methods of producing the same result. By reference to Fig. 9 it will be seen that in the form of contact-point F illustrated at the left thereof the end of the point may be lengthened and extended in a form to continue in connection with a node E for a longer or shorter time. If for a shorter, it may be bent up, as shown by dotted lines. Another form of adjusting the contact is by means of threading the end of a resilient contact-point, which passes through the hand of the clock, and providing a jam-nut F' to secure the same in an adjusted position. The same means may also be applied to the hand-support G. By employing the bent or the resilient hand-contact and the pivoted dial-contact very long signals may be produced.

Upon the face of the clock I arrange any desired number of annuli H, and on each annulus I mount, in a manner hereinafter described, contact points or nodes I, and for facility in adjusting and arranging said contact-points to operate at a predetermined hour, fraction of an hour, or minute I may provide the dial proper of the clock with a supplemental dial or dials J J', the former in this instance representing by its divisions five-minute periods and, if desired, again subdivided into periods of lesser duration, and the latter gaged to indicate minute-spaces and, if desired, fractions thereof. The sub-dial J co-operates with the hour-hand and with the annuli, while the sub-dial J' co-operates with the minute-hand and the fixed nodes E on the clock-dial.

The annulus H consists in each instance of a ring or circle of electrically-conductive material, and it is insulatedly mounted upon the

dial and concentric therewith. Each annulus carries a series of contact pieces or nodes I.

Referring to Figs. 11, 12, 13, and 14, it will be seen that I have provided an annulus-node which is adjustable either longitudinally or circularly upon the annulus, whereby it can be moved to register with any subdivision of the dial J, which, as a matter of course, has settled relation with the dial proper of the clock and which node may be also turned on the annulus in either direction, so as to be thrown either out of or into the path of the contact-point F of the clock-hand traversing a circle adjacent to said annulus. By this construction I facilitate to a material degree the adjustment of a programme-clock to a desired duty, and I may also as readily prevent the performance of that duty at will. One form of the adjustable node is that of a coiled wire mounted on the annulus H and having one end extended in the form of an indicator or finger. In Fig. 11 this form is shown in full lines as in a position to make connection with a hand contact-point, while in dotted lines it is shown as thrown out of operative position. In order to provide a node for the annuli which can be applied or removed with ease, so as to increase or decrease the capacity of the clock as to the number of the signals which can be given during the complete rotation of the hour-hand, I construct said nodes in the form illustrated in Figs. 12 and 13, wherein the body is adapted to embrace less than all of the sides or circumference of the annulus and yet be capable of retention thereon, while at the same time it may be bodily removed or reversed to throw it out of duty. The dial might be a non-conductor, and then I use the same annulus and sliding spur for the minute-hand to strike as is shown for the hour-hand contact.

The electrical connections of a clock constructed as hereinbefore described comprise any one form of battery K, which is directly connected with the metallic or conductive portion of the dial A of the clock, which serves to conduct the current to each and all of the fixed or dial nodes E, so that in the passage of the minute-hand B, provided with its contact-point F, along over the dial the current will follow said minute-hand to the center-spindle and from thence through the hour-hand to the contact-points F thereon. Each of the annuli is connected by conductors a b c d with the several signals 1 2 3 4 of the series to be employed, and these may be increased or decreased in number at will by employing a desired number of annuli. These signals, whether audible or visible, may be arranged either in one or different compartments of a building or buildings, as desired.

As thus far described, it will be seen that whenever the minute and hour hands simultaneously arrive at points where their contacts connect with nodes the circuit will be complete. If a node I of the outer annulus H

(shown in Fig. 1) is in contact with the point F of the hour-hand—for example, the node I adjacent to the “4” hour-mark and the node E at the “12” hour-mark being in contact with the point on the minute-hand—the circuit will be completed from the battery K, through the conductor K', through the dial A to the fixed node E, through the hands B C and the adjustable node I to the annuli H, thence through the conductor *a* to the signal 1, and from thence through conductor K² back to the battery. If the hour-hand makes contact with a node on the second annulus, the course is through the conductor *b* to signal 2, and from thence back to the conductor K² and the battery. In this manner the alarms are given from each of the annuli arranged on the dial.

If desired, a hand-switch may be introduced at any desired point in the circuits to throw out of the series one or more of the signals. If desired, the source of electricity may be other than the battery K. If such source is of a strength which would injure any of the mechanism employed, a relay L may be inserted in the circuit to prevent such injury.

As far as described the programme-clock is adapted to repeat the same programme from day to day when once adjusted, while in schools, seminaries, and institutions of learning Saturday is generally a holiday, in which case it is desirable to either dispense with or change the programme. So, also, the same object may be desirable in connection with day and night programmes, and, furthermore, in business and commercial houses a change of programme or a dispensation thereof is desirable on Sundays.

At M, Fig. 1, is arranged what I denominate a “calendar-switch,” the functions and duties of which are to automatically change the programme announced by the clock on Saturdays or Sundays or at or during any other desired periods. This calendar-switch is connected with the annuli by the conductors *a'* *b'* *c'* *d'* and with the bells or other signals by the conductors *a b c d* or by those lettered *a²* *b²* *c²* *d²*. In this instance a series of bells 1^a 2^a 3^a 4^a (shown connected by proper conductors with the relay L) are in turn properly connected with the dynamo or other source of electricity. It now remains to describe the particular construction of calendar-switch employed in this instance, although I do not limit my invention to its use, but deem the substitution therefor of any automatic calendar-switch as within the scope of my invention. In a suitable frame-work M there is a shaft M', Figs. 2 and 3, carrying a series of disks (in this instance three in number) and indicated by letters N O P. The disk N has fourteen pins projecting from its face and fourteen square-faced teeth N² on its periphery. Each of the pins and teeth represents a twelve-hour period. The disk O has two pins O' and O², while the disk P has five pins P' on one side and seven pins P² on the other side. The

five pins on the one side are arranged intermediate the seven pins on the other side, with the exception of those of the seven pins which are at points adjacent to the two pins on the disk O. Insulated blocks Q and R form the spacers or tie-bars of the frame M. In the former there are mounted spring-contact rods or “feather-bars” Q² Q³ Q⁴. The face of the disk N may bear indications of the days and nights of the week, and a pointer on the frame indicates the day or night for which the clock is set. A spring-detent N⁴ prevents a backward rotation of the disks by contacting with one side of the teeth N', while a non-resilient detent N^{4x} prevents an undue forward rotation of the disks, it being mounted on a slide N⁵, carrying a pawl N⁶, adapted to take against the teeth N' by a spring N⁷ and to pass over said teeth when the slide N⁵ is raised. A spring N⁸ (or it may be gravity) serves to move the slide in a downward direction. A rod N⁹ passes into or is connected with a piece N¹⁰ of insulating material, which is itself connected with the slide by a rod N¹¹. The rod N⁹ passes above the calendar into the clock-case and is pivotally connected to a rock-arm N^{11x}, pivoted at N¹² to any fixed part, so that a cam N¹³, mounted on the hour-hand or spindle, will at each rotation of the hour-hand spindle come in contact with a lateral projection at the junction of the rod N and rock-arm N^{11x} and raise the slide N⁵. In this manner intermittent rotation is given to the disks at every complete rotation of the hour-hand. Each of the feather-bars is electrically connected, as shown, with each of the annuli H of the clock-face, as clearly indicated in Fig. 3, and each annulus is brought into the circuit or released, as desired, by the action of the disk-pins upon the feather-bars. For instance, on Sundays the pin connects with the Sunday annulus by the feather-bar after the Saturday night is released from contact.

S, Fig. 2, is a rock-shaft constructed of non-conducting material and having an arm S'. The rock-shaft S is also provided with an upwardly-projecting contact-arm S², Fig. 4. A coiled spring S³ has a tendency to elevate the arm S', and thereby throw the contact-arm S into electrical connection with the terminal S⁴ in a circuit; but when the arm S' is held down by one of the day-pins on the dial N the contact-arm S² is put into electrical connection with the terminal S⁵. A current of electricity passes through the conductor S^{3x} and the binding-posts (shown in Fig. 4) and thence through the coiled spring S³ to the arm S². The conductor S^{3x} (shown at the lower right-hand corner of the frame M in Fig. 2) is for completing the circuit between the spring S³, the frame of the switch, and the battery or other source of electricity. It will be seen, therefore, when the arm S' is in contact with a day-pin the contact-arm S² will send the current through the point S⁵ and conductor S^{3x} to a room or compartment occupied in the day-time, whereby signals in accordance with

the predetermined programme arranged on the annuli of the clock will be given during the day. In the following night, the cam N^{13} having reciprocated the plate N^5 , and the disk N having been rotated the distance of one tooth, the arm S' is brought into connection with a night-pin of the calendar and its disk N , so that the contact-arm S^2 makes connection with the opposite terminal S^4 , and the current flows through the conductor S^{4x} to a compartment or room used in the night-time.

The particular operation of the automatic calendar-switch, so far as the selection of predetermined signals is concerned, is as follows: In Fig. 2 the arm S' is in contact with the Monday pin. Therefore the contact-arm S^2 , Fig. 3, is in electrical connection with the pin S^5 and conductor S^{5x} , and therefore the various signals of the day programme, as arranged on the desired annuli on the face of the clock will be sounded in a compartment used in the day-time—for example, a recitation-room—and such signal will be operated as often as the hands of the clock make the connection hereinbefore described with the dial-nodes E and the adjustable nodes I of the proper annulus. When the hour-hand has completed a circuit, it operates, through the medium of the cam N^{13} , the disk-rotating devices, thereby bringing the Monday-night pin into contact with the arm S' , so that the arm S' is by said night-pin depressed, so as to throw the contact-arm S^2 over into connection with the conductor S^5 S^{5x} , which produces the announcement of signals in a room employed in the night-time—as, for example, a dormitory—such signals being predetermined by an arrangement of the adjustable contacts or nodes on the annulus electrically connected with the feather-bar Q' , so as to complete the circuit through the pins and the frame-work of the machine to and through the conductor S^{3xx} , Fig. 2. This automatic calendar-switch may be employed without the use of the day and night programme selecting devices just described, as a switch operated by hand to connect electrically with the conductors leading to separate compartments may be employed. There are various other modifications which may be made in the specific construction and arrangement of the principle elements of this calendar automatic switch without departing from the spirit of my invention, and I therefore do not limit the same to the exact construction shown and described.

I have illustrated in Fig. 1 various applications of hand-switches which may, though not preferred, take the place both partially and wholly of the calendar-switch. On the left of Fig. 1 I have illustrated a system of connections whereby the several annuli may be separately connected with a single series through the means of a hand-switch M^2 , the circuit either passing from the annuli through the conductors $a b c d$, and either one of which may be connected with the conductor c^2 , or a signal c^3 , and from thence to the battery and

to the dial, as clearly shown. This arrangement cuts out the automatic calendar-switch entirely. A conductor C^{2x} may be connected with the switch and with the relay L , and the latter is connected by conductors L' with a dynamo or other source of electricity, the relay performing its well-known function of preventing injury to the apparatus by the current employed to operate the same. Instead of the employment of a dynamo for the source of electricity, independent batteries K^x may be employed in either of the systems mentioned.

From the above description it will be seen that the operation of the apparatus can be controlled to produce signals in accordance with any predetermined programme by simply arranging the movable nodes I on each of the annuli, so that the contact-point of the hour-hand will complete the circuit at the desired time. The time is determined by adjusting the node I upon the supplemental dial, so that it shall rest at the desired time-indicating mark. If circumstances render it advisable or preferable to change programmes in less or greater periods than those of twelve hours each, it is apparent that the cam on the hour-spindle may be provided with two (more or less) operative points, or any other portion of the clock than the hour-spindle may be selected to operate the calendar-switch, provided the selected portion has the desired time of completing a revolution or any multiple thereof. In other words, the calendar mechanism may be connected with any desired portion of the mechanical works of the clock so long as the periods between the movements of the automatic calendar shall be such as is required under circumstances attending the use of the invention.

What I claim is—

1. An annulus having a node adjustable both along and axially about the same, substantially as specified.
2. An annulus having a node adjustable axially thereon, substantially as specified.
3. The combination, with a clock-hand, of an adjustable support for maintaining the same at a uniform distance from the dial, substantially as specified.
4. In a programme-clock, a support for the hour and minute hand spindles and sleeves, substantially as specified.
5. In a programme-clock, a support for the hour and minute hand spindles and sleeves to prevent eccentricity thereof, in combination with a device for preventing end shake of the same.
6. The combination, with the hour and minute hand spindles and sleeves of a programme-clock, of a bar-support through which the sleeve passes and a spring for preventing end shake, substantially as specified.
7. A programme-clock dial provided with a node movable so as to project more or less in the path of a co-operating contact, whereby the length of contact-surface may be varied

and the continuance of the alarm determined, substantially as specified.

8. In a programme-clock, a contact for the hands thereof adjustable between the hand and the face of the clock, whereby the duration of signaling may be varied, as set forth.

9. The combination, with the hands of a programme-clock, of a contact-point adjustable in the hand to and from the clock-face, as set forth.

10. In a programme-clock, and in combination with the ordinary clock-dial, an inner supplemental dial subdivided into minutes, in combination with an annulus having a node mounted thereon for longitudinal and transverse adjustment, substantially as specified.

11. The combination, with the clock-face, of annuli connected with signals, contact-points on the hands, adjustable nodes on the annuli, fixed nodes on the dial, and electrical connections extending from the dial to a battery and from the battery to a signal or signals, substantially as specified.

12. In a programme-clock, annuli for serving different programmes, electrically connected with a signal or signals, contact-points on the hands of the clock, and a switch for changing the current from different annuli to different signals, substantially as specified.

13. In a programme-clock, annuli for different programmes, electrically connected with different signals, and an interposed automatic switch for changing the current, so as to operate in connection with different annuli, substantially as specified.

14. In an electrical programme-clock, two annuli, each being for a different programme, a signal or series of signals, and an interposed electrical switch operated by the clock, whereby at a predetermined time the signals are operated in accordance with a changed programme, substantially as specified.

15. In a programme-clock, an automatic calendar-switch comprising two or more series of electrically-conductive devices and insulated mechanical devices connected with a part of the movable works of a clock for changing the connection of said conductive devices, whereby different programmes may be automatically announced.

16. The combination, with an electrical programme-clock adapted to render signals in accordance with two or more programmes, of an electrical switch intermittently vibrated mechanically by the clock to change the current of electricity from one set of programme-announcing devices to another, substantially as specified.

17. In an electrical programme-clock adapted to render the signals of a day and night programme, an electrical switch arranged to deflect the current from one to the other of the conductors connecting the day and the night programmes with their respective systems of signals and mechanical devices operatively connecting said switch with the circuits of the clock, substantially as specified.

18. In an electrical programme-clock, and in combination with the hour-hand or spindle thereof, an operative device which acts once in each revolution of said hand or spindle and mechanical devices extending therefrom to and insulated from an electrical switch located in the path of the current employed for operating signals and controlled by programme-annuli, which are in turn brought into action by the hands of the clock, substantially as specified.

19. An automatic calendar-switch for electrical programme-clocks, comprising rotating disks of electrically-conductive material and having projections and a series of feather-bars electrically connected with the annuli of the clock, whereby the rotation of the disks changes the course of the current and the electrical connection of the annuli with systems of signals, substantially as specified.

20. In an automatic switch for electrical programme-clocks, a disk having projections on each of its faces, those on one face agreeing in number with the nights of the week, those on the opposite face agreeing with the same number less two, a secondary disk having two projections, one on each face, a series of feather-bars electrically connected with the annuli of a clock, and means for rotating the disks to change the electrical connection with the annuli, substantially as specified.

21. In an automatic calendar-switch for electrical programme-clocks, a series of disks electrically connected with a source of electricity and with a series of annuli, said disks having projections for changing the course of the electrical current, substantially as specified.

22. In an automatic switch, a series of disks having projections adapted to be brought into or brought out of electrical connection with the programme-determining devices of a programme-clock, in combination with devices, as the levers $S^1 S^2$, and connections for changing the course of the current passing through said disks to different sets of signals, whereby said signals may be announced in different compartments—as, for example, a recitation-room or dormitory—and whereby also the signals announced may be in accordance with different programmes, substantially as specified.

23. In an automatic calendar-switch for programme-clocks, the combination, with the devices thereof for changing the current, of the clock-works and pawl-and-ratchet mechanism electrically insulated from and mechanically connected with said clock-works, substantially as specified.

24. In an automatic calendar-switch, and in combination with the current-changing devices thereof, a disk constituting a ratchet provided with day and night pins, and a switch insulated from the current, as at S , but operatively connected with the ratchet, as at S' , so as to be thrown from one position to another.

other by the pins on said ratchet, substantially as specified.

25. In an automatic calendar-switch, a pawl-and-ratchet mechanism, the ratchet of which is provided with projections or pins, and a rock-shaft electrically insulated from and mechanically connected with said ratchet and carrying a contact-point, whereby the course of the current is changed, substantially as specified.

26. An automatic calendar-switch comprising a rotatable shaft, a ratchet mounted thereon, a reciprocating plate carrying a pawl, suitable detents, a rod connecting the plate with a device on the hour-hand shaft of a clock, insulating means arranged between the plate and said hour-shaft and forming a part of the connection between said parts, and a device

on said hour-shaft for reciprocating the plate in successive predetermined periods, whereby the mechanical works of the clock are utilized to change the automatic switch in desired divisions of the rotation of the selected part of the mechanical works of the clock, substantially as specified.

27. In a programme-clock, an annulus having a node embracing the same and movable axially thereof, substantially as specified.

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

JNO. L. MCCASKEY.

Witnesses:

D. W. BAER,

F. S. BRENISHOLTZ.