

No. 746,998.

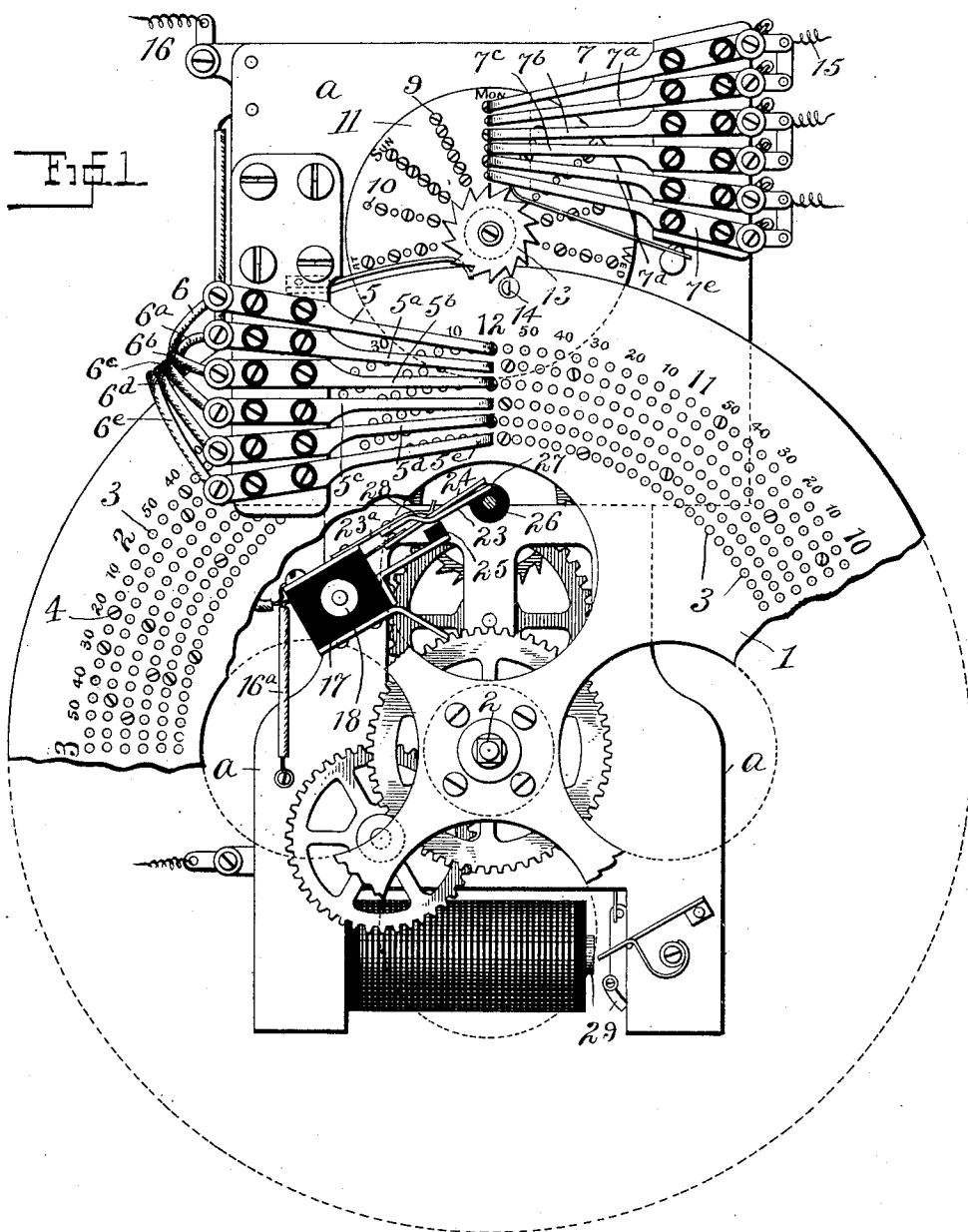
PATENTED DEC. 15, 1903.

F. M. SCHMIDT.
PROGRAM CLOCK.

APPLICATION FILED NOV. 22, 1902.

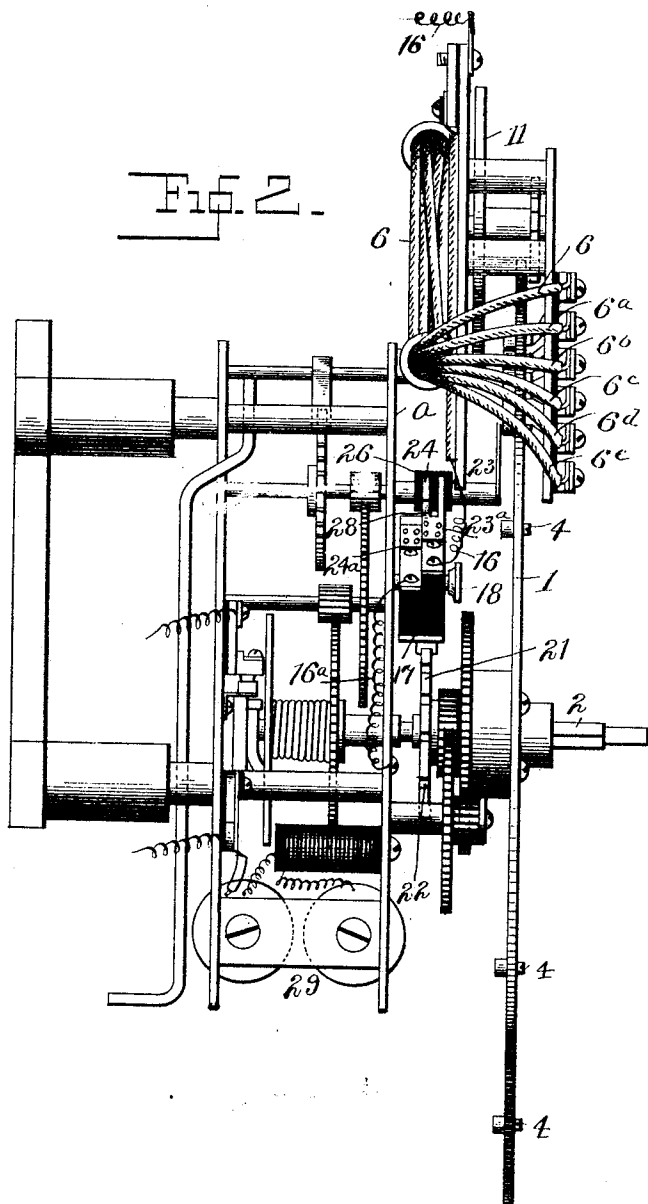
NO MODEL.

4 SHEETS—SHEET 1.



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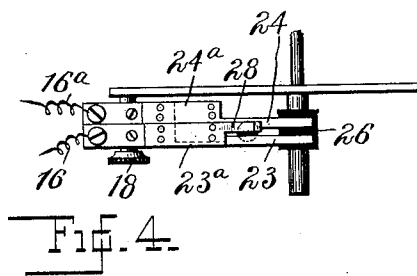
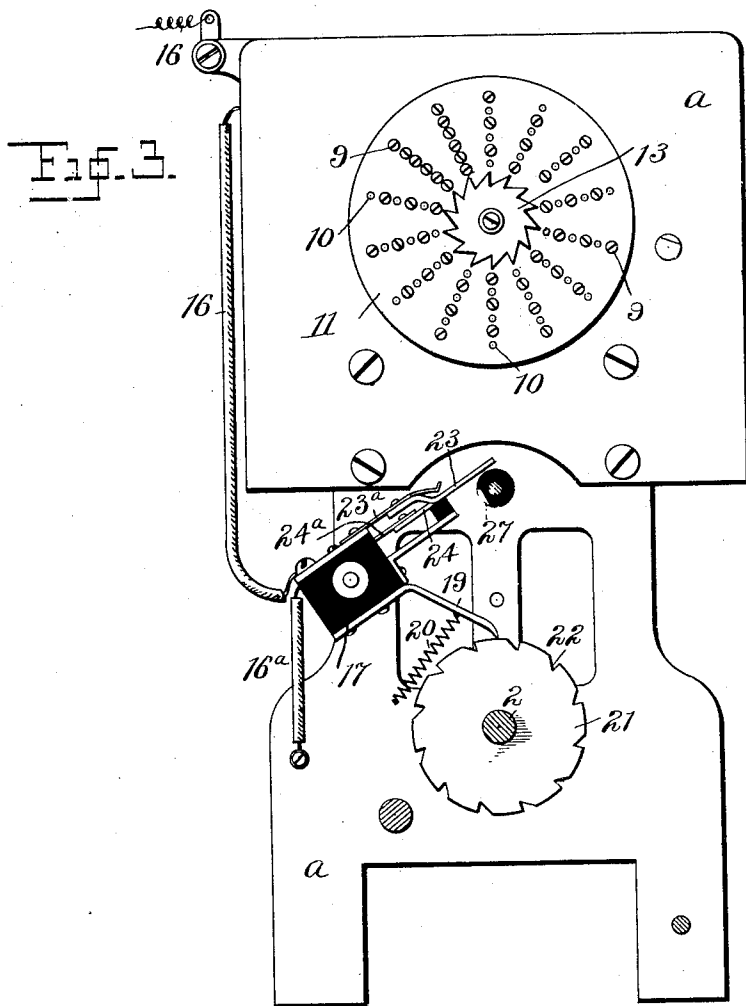
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NO MODEL.

4 SHEETS—SHEET 3.



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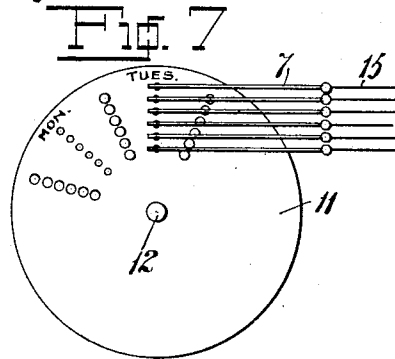
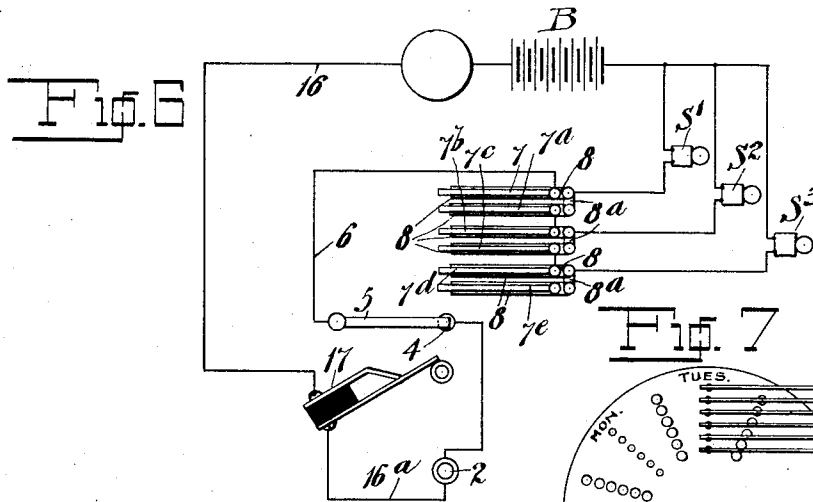
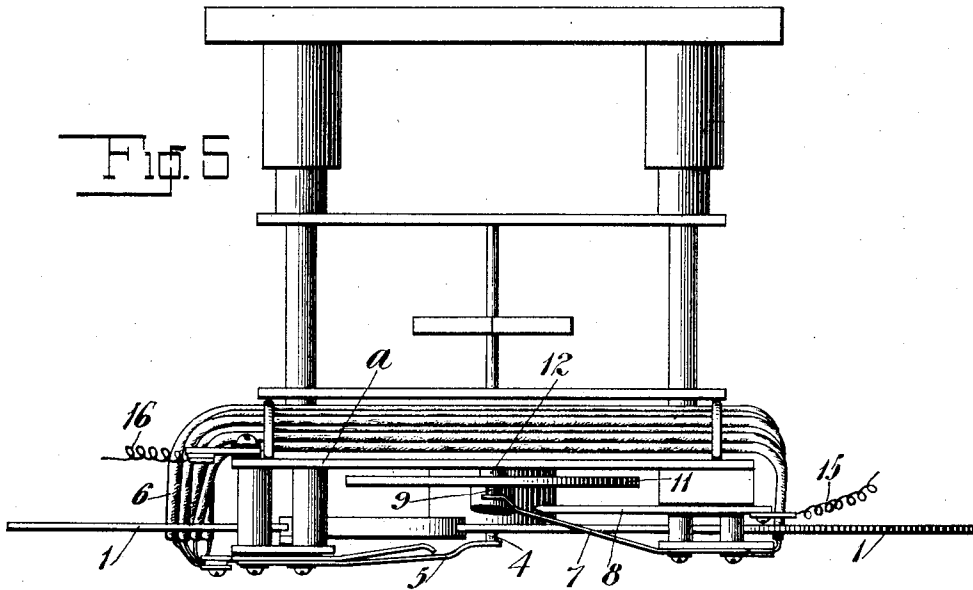
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F. M. SCHMIDT.
PROGRAM CLOCK.

APPLICATION FILED NOV. 22, 1902.

NO MODEL.

4 SHEETS—SHEET 4.



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UNITED STATES PATENT OFFICE.

FREDERICK M. SCHMIDT, OF NEW YORK, N. Y., ASSIGNOR TO SELF WINDING CLOCK CO., OF BROOKLYN, NEW YORK, A CORPORATION OF NEW YORK.

PROGRAM-CLOCK.

SPECIFICATION forming part of Letters Patent No. 746,998, dated December 15, 1908.

Application filed November 22, 1902. Serial No. 132,368. (No model.)

To all whom it may concern:

Be it known that I, FREDERICK M. SCHMIDT, a citizen of the United States, and a resident of the borough of Brooklyn, city and State of New York, have invented a new and useful Improvement in Commutable-Disk Program-Clocks, of which the following is a specification.

The subject of this invention is an electric program-clock, preferably self-winding and synchronizing, provided with means for commutating the circuit from one circle of contacts to another, so as to change from a twelve-hour to a twenty-four hour program, or vice versa.

The invention further relates to details in construction of the commutating device and means for utilizing the same as an interchangeable seven-day cut-out, whereby any or every circuit may be cut in or out for a particular day or days of the week.

In the accompanying drawings, Figure 1 is a front view of the parts of the clock to which my invention relates, the dial being partly broken away to expose the working parts. Fig. 2 is a side view with some parts removed. Fig. 3 is a detail front view of the circuit-closing device of program-disk and of the commutator-wheel, parts in front thereof being removed. Fig. 4 is a detail top view of the circuit-closer and seconds-arbor. Fig. 5 is a detail plan view showing the circuit-closing device of the commutator-disk and of the program-disk. Fig. 6 is a diagrammatic plan of the circuit. Fig. 7 is a diagram illustrating the arrangement of the commutator mechanism for a simple twelve-hour program on six circuits, as hereinafter described.

In practice my invention is embodied in an electric self-winding and synchronizing clock; but the winding and synchronizing devices will not be described in detail, as they form no part of the improvements herein claimed.

The program or signal-sending disk 1 is carried by the hour-arbor 2 of the clock, revolving once in twelve hours. This disk is graduated in five-minute sections, making twelve divisions to an hour, as shown in Fig. 1, and on each of the radial lines representing the five-minute intervals the disk is perforated with any desired number of holes 3 for the reception of movable contact-pins 4.

In the present illustration six such contact-pin holes 3 are shown on each radial line. A corresponding number of insulated contact brushes or springs 5 5^a 5^b 5^c 5^d 5^e, &c., here shown six in number, are mounted on the frame in position to make contact with any of the pins 4 which may be inserted in the holes 3 in the respective circles corresponding with said brushes, and said contact-brushes are connected with individual conducting-wires 6 6^a 6^b 6^c 6^d 6^e, &c., extending to contact-brushes 7 7^a 7^b 7^c 7^d 7^e, normally resting on contact-bars 8, but adapted to be lifted out of contact by movable pins 9, set in holes 10, arranged in concentric circles in the commutating-disk 11, which is carried by an arbor 12, rotated step by step by a ratchet-wheel 13, mounted on said arbor and engaged by a pin 14 on the face of the program-disk 1, so that each rotation of the program-disk moves the ratchet-wheel 13 and commutating-disk 11 the distance of one tooth. The teeth of the ratchet-wheel 13 are fourteen in number, and the commutating-disk 11 has the same number of radial lines of holes 10 corresponding with the number of half days or twelve-hour periods in a week. The apparatus is thus adapted for a twelve-hour program for six stations, or by coupling together in series the contact-bars 8 of two adjacent brushes of the commutator by conducting-plates 8^a and arranging the contact-breaking pins 9 in alternating position in the successive radial lines of holes 10 the apparatus may be adapted for a twenty-four-hour program for three stations, as will presently be explained. This is illustrated in Fig. 1, and the several circuits are indicated diagrammatically in Fig. 6.

Wires 15 conduct the current from the respective contact-springs 8 of the commutating-brushes to relay-batteries in the several stations S' S² S³, from whence it is conducted to one pole of the common battery B. A conducting-wire 16 leads from opposite pole of the battery to an oscillating circuit-closer 17, from which it passes through the wire 16^a and frame *a* to the arbor 2 of the program-

disk 1 and thence by such of the pins 4 as are in position to the corresponding program-brushes 5 5^a, &c.

To enable the sending of signals by such of the contact-pins 4 as are in position, the oscillating circuit-closer 17 is operated at five-minute intervals by the following means: The body of the circuit-closer is of insulating material, mounted to oscillate on a pivot 18 and having an arm 19 drawn downward by a spring 20 and resting on the periphery of a minute-wheel 21, rotated by the clockwork once an hour and having on its periphery twelve notches 22, the passage of which permits the circuit-closer to drop every five minutes. The contact-arms 23 24 of the circuit-closer are connected by light springs with plates 23^a and 24^a, separately mounted on the insulating-body of the circuit-closer and respectively connected by binding-post with the incoming wire 16 and the wire 16^a, which conducts the current to the frame *a*. The spring-arms 23 24 are kept out of electrical contact while the circuit-closer is elevated by resting on an insulating-boss 25; but when the preliminary drop is permitted by successive five-minute notches 22 in the minute-wheel 21 said arms in falling are lifted from the boss 25 by contact with a small insulating-disk 26, carried by the seconds-arbor. A notch 27 in this disk, registering with the spring-arm 23 only and passing beneath the said arm once in a minute and timed to follow a few seconds after the arrival of each of the five-minute notches 22 in the minute-wheel, permits the spring-arm 23 to drop relatively to the arm 24, causing spring 28 on the arm 23 to rest on the arm 24, thus completing closure of the circuit and sending the signal.

If the program-disk 1 has been arranged so that there is a plug under one or more of the brushes 5 5^a, &c., which overhang the disk, the said signal will go over the circuit of said brush or brushes. The signal continues for a length of time depending on the length of the notch 27 on the seconds-arbor. When the seconds-arbor moves a slight distance, it raises the oscillating contact-spring 23, 28 breaking the contact, and the continued rotation of the minute-wheel lifts the whole oscillating contact device 17, so that it cannot fall down again until the five minutes have passed. This is to prevent the sending of a signal repeatedly if the contact between the brush and plug on the program-disk should outlast the brief period between the times of contact permitted by the passage of the notch in the seconds-arbor. Each rotation of the program-disk sends forward one notch the notched wheel connected with the commutating-disk of the seven-day commutator. There is a line of contact-controlling devices for each notch of said wheel, and as the wheel is given a single-notch movement every twelve hours the wheel rests twelve hours with circuit

closed through such of the commutator-brushes as are not lifted by pins 9.

By connecting in series the contact-springs of two adjacent brushes of the commutator and alternating the contact-breaking pins in the corresponding circles on the commutator-wheel, as illustrated in Fig. 1, different programs may be arranged for the successive twelve hours on adjacent circles of contacts of the program-disk. The mechanism is thus arranged for a twenty-four-hour program changeable each alternate twelve hours.

If each brush is connected to its own separate outgoing circuit, as illustrated in Fig. 7, the instrument is adapted for a twelve-hour program.

With six circles of holes in the program-disk six distinct circuits of bells covering a period of twelve hours can be operated and the remaining twelve hours of the day rendered silent by a complete radial row of cut-out pins in the commutator-disk, or the six-circuit twelve-hour instrument can be changed, as above described, to a three-circuit twenty-four-hour instrument capable of sending a signal every five minutes in twenty-four hours and operating three distinct circuits. It may also be changed to operate a single twenty-four-hour circuit and four twelve-hour circuits or two twenty-four-hour circuits and two twelve-hour circuits by coupling in series more or less pairs of the program-brushes and arranging the cut-out pins of the commutator-disk and the contact-pins of the program-disk as required.

The commutator-disk, with its removable and changeable contact-controlling pins, provides a seven-day cut-out arranged so that any combination of days can be effected by the simple method of inserting or removing a screw-plug from the seven-day cut-out disk.

Two holes are provided for each twenty-four hours, and by omitting the two screw-plugs signals will be sent for the full twenty-four-hour period. By inserting one screw-plug twelve hours are made silent, and by inserting two plugs the entire twenty-four hours are made silent. This change can readily be effected for each or for any one of the seven days in the week and for any one circuit on the instrument.

The self-winding mechanism 29 and the going-wheels of the clock mechanism (shown in Fig. 1) do not require specific description, because they have no necessary connection with my invention and are well known in the art.

Having thus described my invention, the following is what I claim as new therein and desire to secure by Letters Patent:

1. In a commutable-disk program-clock, the combination of a suitable clock-movement, an electrical signal device operated thereby consisting of program-disk 1 having contact-controlling devices arranged on a plurality of concentric lines and movable on said lines

to determine intervals of contact, a commutator-disk 10 movable step by step by rotation of the program-disk and having a corresponding set of radially-arranged removable contact-controlling devices, and connections 5 8^a for coupling a plurality of said commutator connections in series whereby diverse programs may be transmitted alternately over the same circuit, as explained.

10 2. The combination with a suitable clock-movement of a rotating program-disk 1 controlled thereby and carrying concentric series of contact-pins 4 movable in angular position in the disk for different programs, the 15 contact-brushes 5, 5^a, 5^b, for the several concentric sets of contact-pins; the commutator-disk 11 rotated step by step at each revolution of the program-disk; commutator-springs 7, 7^a, 7^b, severally connected with the respective 20 program-brushes 5, 5^a, 5^b; contact-plates 8 for closing the circuit through the respective springs 7, 7^a, &c., concentrically-arranged pins 9 carried by the commutator-disk and movable thereon, engaging with the respective 25 springs 7, 7^a, &c., and controlling the closure of circuit therethrough at determined and variable periods, and wires 15, 16 connecting with the several signal-stations S, a suitable source of electricity and with circuit-closing pins 4 carried by the program-disk, substantially as and for the purposes set forth.

3. In a commutable-disk program-clock, the combination of a suitable clock-movement; a 35 program-disk operated thereby having a plurality of concentrically-arranged and changeable contact devices and brushes with which they engage, whereby diverse and variable signal-programs may be transmitted by the 40 several concentrically-arranged contact devices; a commutating-disk rotated step by step by the program-disk, having a plurality of concentric sets of movable contact-controlling devices, commutator-brushes engaging 45 respectively with the different circles of movable contact-controlling devices and severally connected with the respective contact-brushes of the program-disk; conductors coupling a plurality of the commutator-brush 50 connections in series; and signal-wire con-

ducting from the coupled commutator connections, whereby diverse programs may be transmitted over the same wire in successive periods of the day or week, as explained.

4. In a commutable-disk program-clock, the 55 combination of a rotatable commutating-disk having a plurality of movable contact-controlling devices arranged thereon concentrically and on radial lines; a series of brushes engaged by said contact-controlling devices in the rotation of the disk; connections by which 60 a plurality of such brushes are coupled in series for alternative use; an outgoing wire connected with such connected brushes so as to transmit a signal from either of them; a 65 program-disk carrying concentrically-arranged movable contact devices; a clock-movement rotating said program-disk; and brushes making contact with the contact devices of the program-disk and severally connected with the respective coupled brushes 70 of the commutator-disk, whereby diverse program-signals may be successively transmitted through such coupled commutator-brushes, as explained.

5. In a commutable-disk program-clock, the 75 combination of a suitable clock-movement; a program-disk carried by the hour-arbor of said clock-movement and having a plurality of concentric sets of contacts movable in angular direction so as to be variable in time 80 distance asunder; brushes engaging with the contacts in the respective circles in the rotation of the disk; a set of commutator-brushes separately connected with the contact-brushes 85 of the program-disk; conductors connecting a plurality of such program-brushes in series; an outgoing signal-wire common to such connected commutator-brushes; and a rotatable commutator-disk having removable contact- 90 controlling devices engaging with such connected commutator-brushes, whereby either of such connected commutator-brushes may be cut out and variable programs transmitted through the common signal-wire, as explained. 95

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