(No Model.)

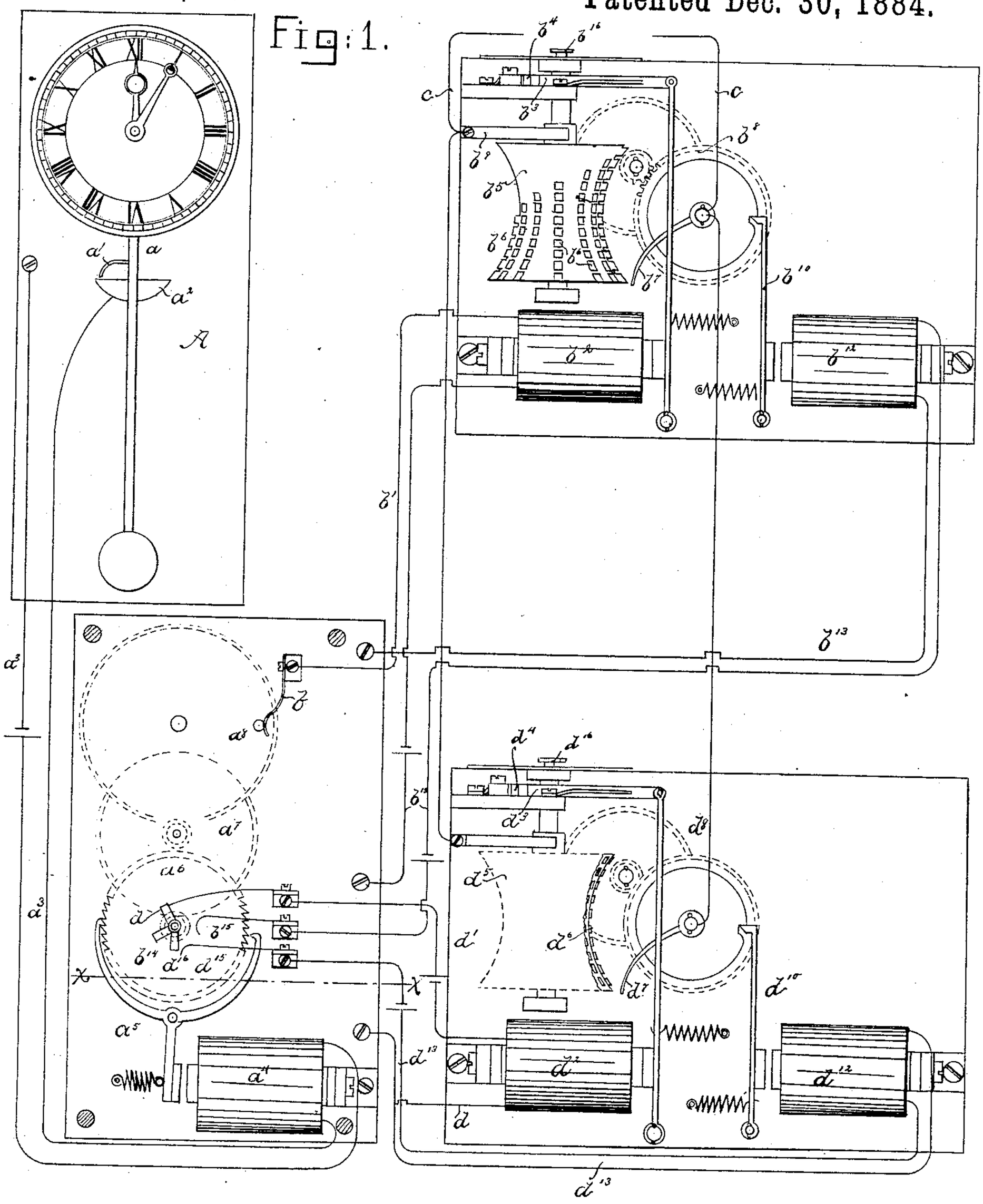
2 Sheets—Sheet 1.

J. C. WILSON.

TIME INDICATING APPARATUS FOR ELECTRIC CIRCUITS.

No. 310,106. Patented Dec. 30, 1884.

Fig. 1.



Witnesses.
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(No Model.) 2 Sheets—Sheet 2.

J. C. WILSON.

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Fig: 4.

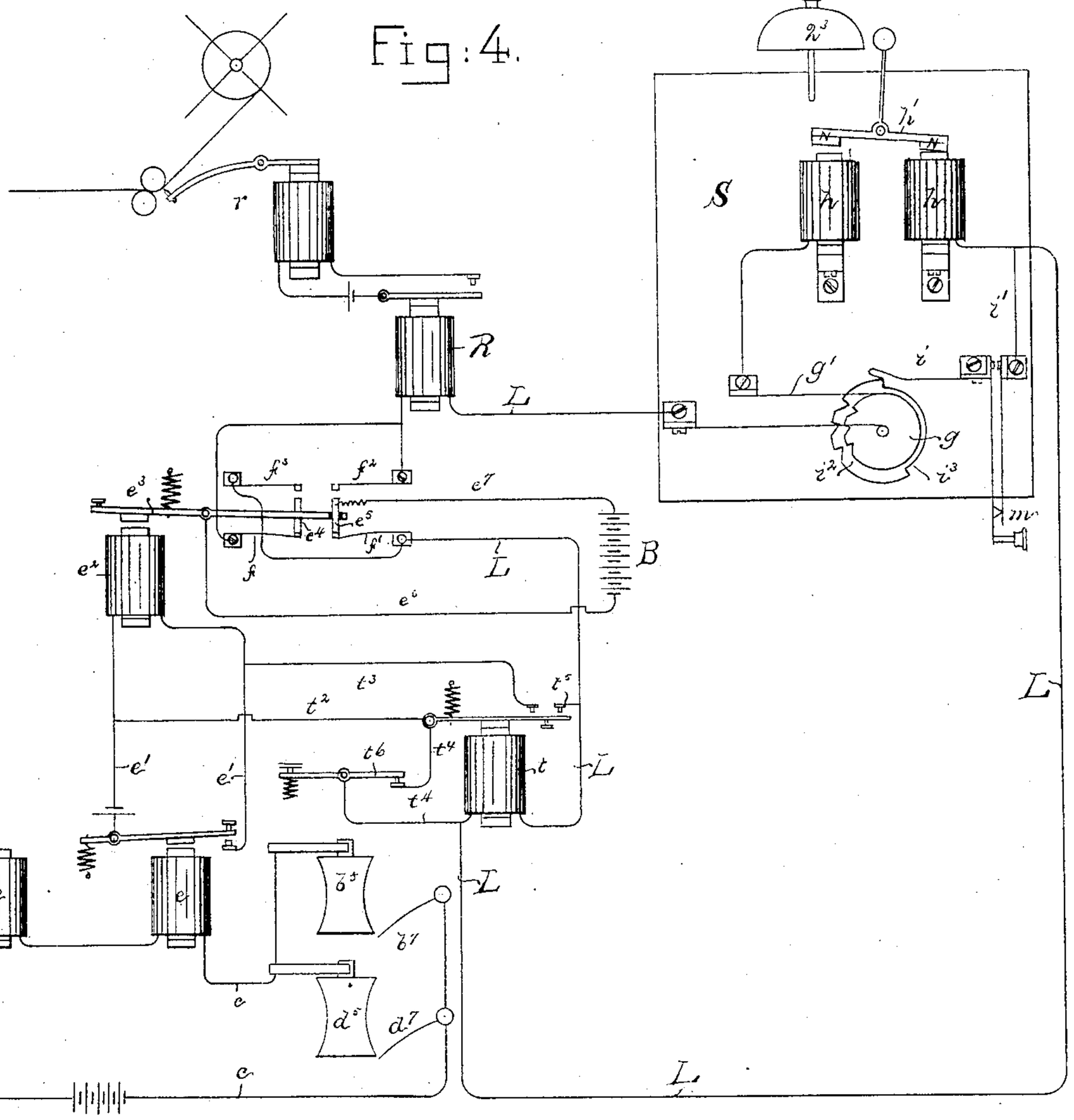


Fig: 2.

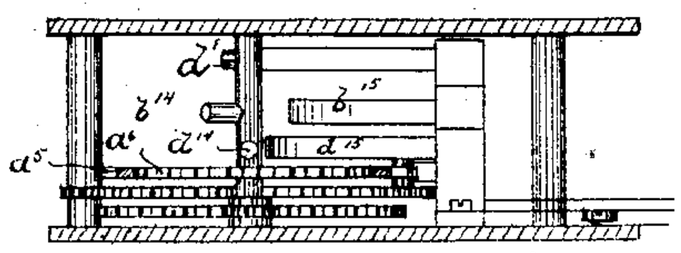
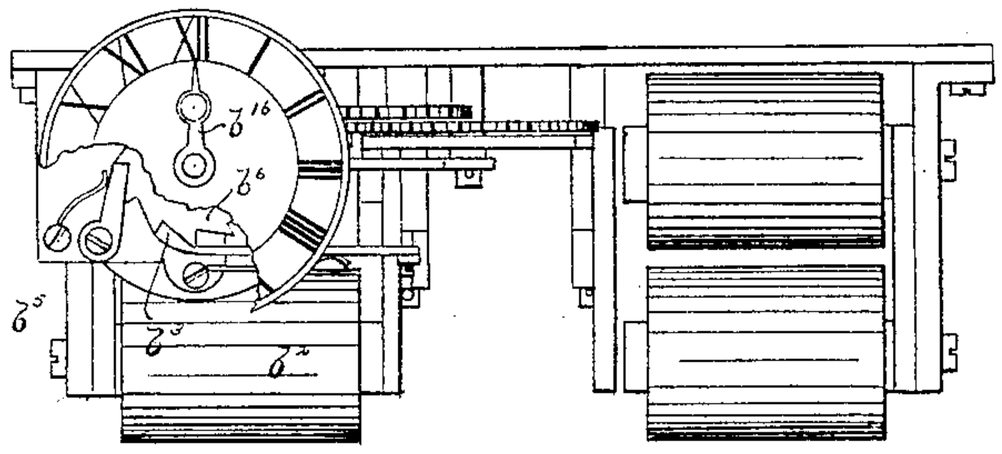


Fig: 3.



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UNITED STATES PATENT OFFICE.

JOHN CORNELIUS WILSON, OF BOSTON, MASSACHUSETTS.

TIME-INDICATING APPARATUS FOR ELECTRIC CIRCUITS.

SPECIFICATION forming part of Letters Patent No. 310,106, dated December 30, 1884.

Application filed January 23, 1884. (No model.)

To all whom it may concern:

Be it known that I, JOHN C. WILSON, of Boston, county of Suffolk, and State of Massachusetts, have invented an Improvement in Apparatus for Indicating Time on Electric Circuits, of which the following description, in connection with the accompanying drawings, is a specification, like letters on the drawings representing like parts.

My invention relates to an apparatus for indicating time on an electric circuit, the correct time being denoted by a proper signal at any one of the signal boxes or stations of an electric circuit, without interfering with the employment of the said circuit for transmitting other signals.

The transmitting apparatus for the time-signals consists, mainly, of two multiple signaling devices, one having a series of signaling-surfaces corresponding to the hours of the day, and being actuated once in an hour to present a new surface, the signal of which corresponds to the hour just begun, and the second multiple signaling device having signaling-surfaces corresponding to each minute, and being moved once a minute to present the surface corresponding to the minute which will next be arrived at. The said signaling devices are actuated by electro-magnets the circuits of which are controlled by a standard clock, and the contact springs or devices co-operating with the said multiple signaling-surfaces to produce the desired signals are actuated by motors the circuits of which are also controlled by the said clock, and which are so arranged that the last stroke or electrical impulse of the minute-signal will take place exactly in the minute. By this transmitting apparatus electric impulses are transmitted over one or more electric circuits capable of producing on a suitable signal-receiving instrument signals which will be understood as representing hours and minutes, the said signals being preferably a number of taps on a bell or sounder corresponding to the number of the hour last passed, followed by a slight pause, and then a number of taps corresponding to the minute which is just arriving, the units and tens of the minutes being preferably separated like the well-known fire-alarm signals.

Figure 1 represents a sufficient portion of the transmitting apparatus at the main or central station to illustrate this invention, the clock mechanism being shown mainly in front elevation, while the hour and minute signaling devices are shown in plan to more clearly illustrate their main operative parts. Fig. 2 is a detail of a portion of the clock mechanism, it being a horizontal section on line x x, Fig. 1, looking upward; Fig. 3, a front elevation of the hour-signaling mechanism; and Fig. 4, a diagram of the circuit containing the said time-transmitting mechanism, a signal-box, means for receiving the time-signals at the said box, and means for transmitting signals from the said box independently of the mechanism for producing time-signals.

The transmitting apparatus (best shown in Fig. 1) consists, mainly, of a standard clock, A, the pendulum-rod a of which is provided with a contact-point, a', which at each vibration of the pendulum enters mercury in a cup, a^2, thereby closing a local circuit, a^3, through an electro-magnet, a^4, which actuates the escapement-anchor a^5 of secondary train a^6 a^7 a^8, the wheel a^6 of which is thus caused to rotate once a minute and the wheel a^8 once an hour. During the last minute of each hour the wheel a^8 causes an electrical contact to be made with a spring, b, thus closing the circuit b' through a magnet, b^2, the armature-lever of which actuates a pawl, b^3, (see Fig. 3,) engaging a ratchet, b^4, fast upon the arbor of the hour-signaling device b^5, consisting of a concave drum having at its periphery a series of notched signaling-surfaces, b^6, which extend lengthwise of the drum, and are successively brought by the partial rotation of the said drum, produced by the pawl b^3, one at a time, within range of the co-operating contact-spring b^7, which at the proper time is revolved by a suitable motor or train of wheel-work, b^8. The said spring b^7 and drum b^5 control the circuit c, one portion of which is connected by a suitable contact-spring, b^9, with the said drum, and the other portion of which is connected with the spring b^7, so that the said circuit c is closed when the spring b^7 touches a projecting portion of the signaling-surface b^6, and is broken when the said spring passes across between two such projections, thus electrically breaking and closing the circuit to produce signals of the character commonly used in fire-alarm

and district telegraph systems. A suitable retaining-pawl, engaging the ratchet b^4, prevents backward rotation of the drum b^5. It will be seen that during the last minute of each hour the drum b^5 is thus moved to present the signaling-surface for the next hour, and that the said surface will remain in position during the whole hour, so that whenever the spring b^7 revolves it will send the signal indicating the said hour. The arbor of the wheel a^6 is provided with a stud, d, which, once at each revolution of the said wheel—or, in other words, once a minute—closes a local circuit, d', through the actuating-magnet d^2 of a signaling-drum, d^5, similar in construction and operation to the one b^5, except that instead of twelve signals it has sixty, corresponding to each minute of the hour, and the ratchet-wheel d^4, by which it is actuated, has sixty teeth. At the same time, during each minute, and preferably just after the end of the minute, the magnet d^2 is charged, and causes the pawl d^3 to engage the ratchet d^4 and move the drum d^5 to present the signal for the next minute in position to co-operate with the spring d^7, actuated by the motor d^8, the said spring d^7 co-operating with the said surface of the drum d^5 to open and close the same circuit, c, that is controlled by the drum b^5 and spring b^7 of the hour-signaling device.

In order to transmit the signals once each minute, so that a person having suitable instruments in the circuit controlled by the apparatus can ascertain the exact time without waiting longer than a minute, the actuating-motors b^8 and d^8 should be released once in each minute, thereby transmitting the hour-signal, followed by the minute-signal. To accomplish this, the said motors or trains b^8 d^8 are controlled by detents b^{10} d^{10}, operated by electro-magnets b^{12} and d^{12}, the former in a circuit, b^{13}, controlled by a circuit-closing stud, b^{14}, and spring b^{15}, closed once at each rotation of the wheel a^6, preferably about fifteen or twenty seconds before the end of the minute. In like manner the detent-magnet d^{12} of the minute-signaling device is in a circuit, d^{13}, controlled by a circuit-closing stud, d^{14}, and spring d^{15}, which close the circuit of the magnet d^{12}, releasing the train d^8 just before the end of a minute, the operation being preferably so timed that the spring d^7 will arrive at the last portion of the co-operating surface d^6 just at the end of a minute. In order to insure this result, the last projections of all the signaling-surfaces are at the end of the drum remote from the spring d^7 when in its normal position of rest. The arbors for the drums b^5 d^5 are preferably provided with pointers b^{16} d^{16}, (see Fig. 3,) which, in connection with suitable dials, indicate their position, so that an attendant may at a glance compare them with the hands of the clock A, and thus ascertain whether they are in the proper position.

By the apparatus thus far described definite signals are produced once each minute, indicating the hour and number of minutes past the hour by a corresponding number of electrical impulses in the circuit c, and where it is intended to use the apparatus merely for indicating the time, the said circuit c might merely extend through all the stations where the time-signals are to be produced, and contain electro-magnetic instruments—such as tap bells or sounders—by which the said signals may be made audible to the observer, such instruments being preferably normally shunted from the circuit, and the shunt of any of them broken when it is desired to ascertain the time. When, however, the circuits are to be employed for other purposes—as for transmitting signals of the usual district-telegraph apparatus—the arrangement shown in Fig. 4 may be adopted. In this figure the drums b^5 d^5 and their co-operating springs b^7 d^7 only of the time-transmitting apparatus thus far described are shown, and the circuit c controlled by them includes a number of electro-magnets, e, corresponding to the number of different circuits over which the time-signals are to be transmitted, one only of such circuits being shown. The armature-lever of the magnet e controls a local circuit, e', including the electro-magnet e^2 of a transmitting instrument, the armature-lever e^3 of which has two contact-pieces, e^4 e^5, the former of which is connected through the said lever and wire e^6 with one pole of the main battery B, and the latter of which contact-pieces, e^5, is insulated from the lever e^3 and connected by wire e^7 with the opposite pole of the main battery B, by which the signals are transmitted over the main-line circuit L. When the armature of the transmitter is unattracted, as shown in Fig. 4, the two contact-points e^4 e^5 are in electrical connection with contact-springs f f', connected with opposite ends of the main line L, thus interposing the battery B in the said line, and when the said armature-lever e^3 is attracted the contact-points e^4 e^5 are brought into connection with springs f^3 f^2 and disconnected with the springs f f', thus reversing the position of the battery B in the main line without opening the said line, the spring f^3 being connected with the same end of the line as the spring f', and the spring f^2 with the same end as the spring f. The transmitter thus produces a series of reversals in polarity of the current traversing the main line L, which may pass through any desired number of signal-boxes S, of any suitable or usual construction, the said boxes being shown in this instance as containing a brake-wheel, g, connected with the line entering the box at one side, and having a spring, g', resting on its notched periphery connected with the line leaving the box at the other side, the said line passing through a magnet, h, having a polarized armature, h', pivoted between the poles of the said magnet in such a manner that it is caused to rock on its pivot by the reversal in polarity of the said magnet h, which is normally shunted by a spring, i, connected by wire i' with the main line L beyond the said magnet.

The said spring rests on a brake-wheel, i^2, notched to correspond with the one g, and having, in addition, a long notch or reduced portion of its periphery at i^3, which leaves the shunt open and the magnet h in circuit after the signal has been given by the notches of the brake-wheel in order to permit a return-signal to be sent from the main office after the signal produced by the brake-wheel has been received there. The shunt i' contains a circuit-breaker, m, which may be opened at any time in order to throw the magnet h into circuit, so that the reversals in polarity of the current traversing the main line produced by the transmitter e^2 e^3 will affect the said magnet h, causing its armature to vibrate and strike a number of taps on the bell h^3 corresponding to the number of movements of the transmitter-armature, or, in other words, to the number of alternate openings and closings of the circuit c, produced by the time-signaling devices before described. The signals transmitted by the brake-wheels g of the signal-boxes or out-stations of the main office or central station are received by a relay, R, the armature of which is not appreciably affected by reversals in polarity of the current, and consequently does not respond to the time-signals, the said armature controlling a local circuit including a recording apparatus, r, of any suitable or usual construction. Although the said relay R is not affected by the apparatus for transmitting the time-signals, it is desirable, nevertheless, to disconnect the time-signaling apparatus from the circuit while other signals are being transmitted, and to accomplish this the main line L passes through another relay, t, which is not appreciably affected by the reversals in polarity, but which, when the circuit is broken by the first notch of the brake-wheel g of the signaling-instrument, permits its armature to fall backward, thus closing a shunt, t^2 t^5, for the magnet e^2 of the transmitter, which is no longer affected by its local circuit. The armature of the relay t, when thus retracted, also closes a shunt, t^1 t^5, around its own coils, so that it will not be again attracted upon the subsequent closing of the main line L at the brake-wheel, and the transmitter e^2 will remain inoperative until the armature of the magnet t is restored to its normal position, which may be done, if desired, by breaking the shunt t^1 by means of a key, t^6, after the signal has been properly received and answered.

I claim—

1. An apparatus for transmitting time-signals, consisting of a signal-transmitting drum having signaling-surfaces extending lengthwise thereof corresponding to the hours of the day, and a similar signaling-drum having signals corresponding to the minutes of an hour, combined with contact-springs co-operating with the said surfaces, and mechanism for turning the said drums to present the different signaling-surfaces in turn at the proper times to the said springs, and motors for revolving the said springs to transmit the signals of the surfaces thus presented to them, substantially as described.

2. A clock or train of wheel-work having a uniform or timed movement, and signal-transmitting drums having circuit-controlling surfaces extending lengthwise thereof for producing hour and minute signals, combined with contact-springs co-operating with the said surfaces, electro-magnets controlling the rotary movements of the said drums and springs, by which movements the different surfaces are presented to the springs and the latter revolved to transmit the corresponding signals, and circuit-controlling devices governing the condition of the said magnets operated by the said clock, substantially as and for the purpose described.

3. A main station and sub-station or signal-box and electric circuit connecting them, containing automatic apparatus for transmitting signals from the sub-station to the main station, combined with transmitting apparatus controlled by a clock for transmitting signals at definite intervals of time to the sub-station, and appliances, as set forth, whereby the clock-controlled signals are automatically removed from the circuit upon the transmission of a signal from the sub-station to the main station, substantially as described.

4. A signal-drum having signaling-surfaces extending lengthwise thereof to produce signals, each representing a definite time, and a contact-spring and motor to transmit signals from the said drum, combined with mechanism to turn the said drum intermittingly to present its different surfaces to the contact-spring and release the said motor, and a clock controlling the said moving and releasing mechanisms, substantially as described.

5. A signal-transmitting device controlled by a clock for transmitting at definite times signals indicating the time of transmission, combined with an electric circuit containing signal-receiving instruments and shunts therefor, provided with circuit-breakers, whereby the said shunts may be opened and the receiving-instrument caused to respond to the next signal of the clock-controlled transmitting-instrument, substantially as described.

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

JOHN CORNELIUS WILSON.

Witnesses:

JOS. P. LIVERMORE,

B. J. NOYES.