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PATENTED DEC. 29, 1903.

F. B. HERZOG & S. S. WHEELER.
ELECTRIC SIGNALING APPARATUS.

APPLICATION FILED JAN. 25, 1886.

NO MODEL.

Fig. 1.

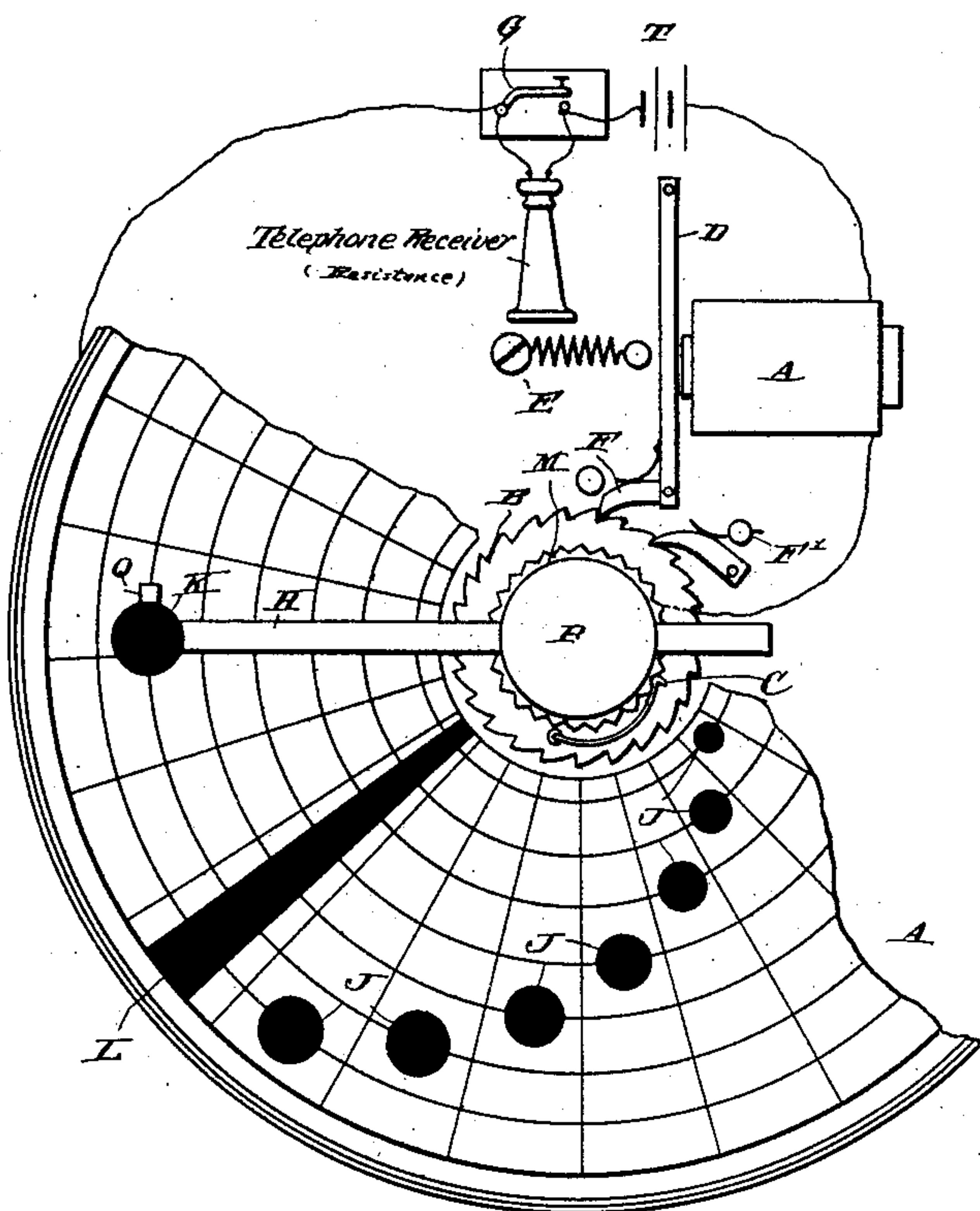
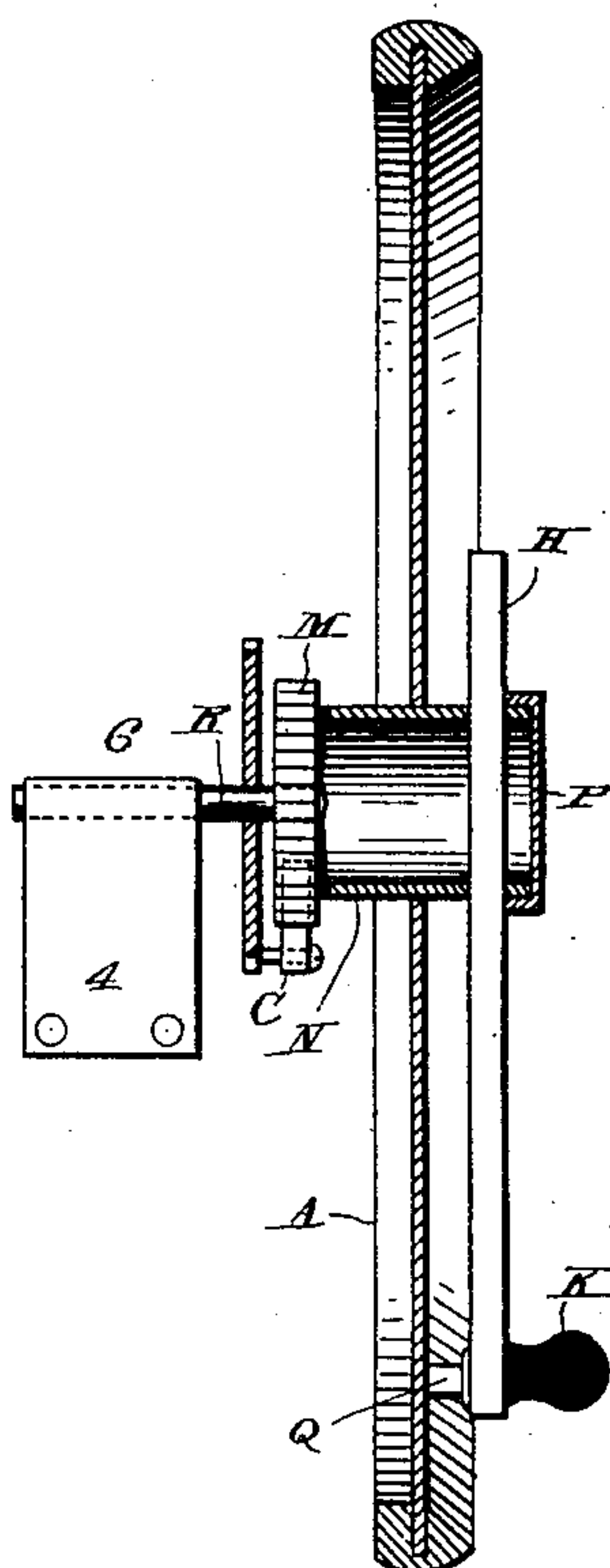


Fig. 2.



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FELIX BENEDICT HERZOG AND SCHUYLER SKAATS WHEELER, OF NEW YORK, N. Y.; SAID WHEELER ASSIGNOR TO SAID HERZOG.

ELECTRIC SIGNALING APPARATUS.

SPECIFICATION forming part of Letters Patent No. 748,501, dated December 29, 1903.

Application filed January 25, 1886. Serial No. 189,666. (No model.)

To all whom it may concern:

Be it known that we, FELIX BENEDICT HERZOG and SCHUYLER SKAATS WHEELER, citizens of the United States, and residents of New York city, in the county of New York and State of New York, have invented certain new and useful Improvements in Electric Signaling Apparatus, of which the following is a specification.

10 This invention relates to a signaling or circuit-controlling apparatus adapted to transmit or control separate effects at one transmission or operation as well as to perform other functions. Considered narrowly as a
15 signaling apparatus, the mechanism is fitted with a dial having indications arranged in two substantially intersecting directions and an index or pointer adapted to be placed at the indication at any intersecting point. Such an
20 apparatus may be used either at one station connected with a second provided with substantially similar or other suitable apparatus, or, as shown in a generically similar apparatus in our Patent No. 573,591, it may be used as
25 one of a number of such mechanisms at substations connected with a central station, and if so used, for instance, by guests in the rooms of a hotel the indications would be those of suitable wants or orders which the guest will
30 specify by moving the pointer to the desired one and suitable mechanism at the connected station would enable the signal so selected to be noted thereat. Considered with reference to our Patent No. 573,591, this is an improvement or modification especially adapted
35 for certain organizations or systems and differs from that in many particulars, among which are to be noted especially that the manipulator or pointer may be rotated in either
40 direction instead of being obstructed by the rib shown in that patent; also, in that the operation of receiving the signal acts also to indicate upon the transmitter (at that moment used as the equivalent of a receiver) an "answer back" consisting of a replacement or
45 restoration of the pointer to the position which marked the signal, or, considering this effect from another point of view, the apparatus operates as a transmitter, which after
50 it is once set may be released or caused to transmit the signal not once only, as in the

case of the apparatus of the patent referred to, but repeatedly. Considered not from the point of view of its functions as a signaling
55 apparatus, but from the point of view of its construction as a circuit-controlling apparatus, the apparatus discloses, among other points of novelty, a circuit-terminal movable
60 to and fro in each of two intersecting directions, and it discloses, further, such an apparatus where a part of this motion is controlled magnetically from a distant station or manually from the home station.

Many of the features referred to above and others generally described hereinafter we consider broadly new, and the apparatus chosen
65 for illustration is as to many of these points merely a typical embodiment, and therefore the broad features may be widely varied without departing from our invention.

In the drawings, Figure 1. shows a front elevation of the transmitter or circuit-controller, a part of the face being broken away
70 to show other portions of the mechanism, and it also shows one of the methods of circuit connection to a distant station, as well as a simple form of receiving mechanism located at such distant station. Fig. 2 shows a side
75 elevation of such portions as are not clearly shown in the first figure.

Referring to the figures in detail, R is the main arbor, suitably supported, as in the journal 6, on frame-piece 4. At its upper end it has rigidly fixed to it a star-wheel M, and fixed
80 to this is the hub N, projecting through a suitable dial-plate A, suitably held in a frame-work. This hub is perforated, so as to admit the passage of a sliding arm H, and a cap P surmounts this hub. Loosely supported in
85 any suitable manner upon the arbor R is the step-wheel B, and fixed to this is the spring-clip C, of such shape and tension that it will engage with the teeth of the wheel M sufficiently to enable this to be driven when the
90 step-wheel is driven, but also enabling the wheel M to be turned, notwithstanding the fact that the step-wheel B is locked. This wheel B, in connection with the magnet A, retractile spring E, armature D, impelling-pawl F, and retaining-pawl F', forms a step-
95 by-step motor, which acts at successive energizations of the magnet A to impel the wheel
100

in a contra-clockwise direction. The face A when the apparatus is used to transmit arbitrary signals is divided into columns corresponding in number to the teeth on the wheels M and B, and for convenience may further be marked off into circles in correspondence with the functions of the spots J, to be described hereinafter, and each circle will represent a different signal. The face or dial plate is of metal, and in contact with it is the brush Q, fastened to the arm H, and above it is fixed the knob K. The circuit leads from the battery at the distant station to the magnet, thence to the metal of the shaft and to the arm, (all of these parts being insulated from the dial except at the point of contact of the brush with the dial,) thence to the receiving-station. The apparatus of the receiving-station comprises in series with this wire and the battery a high resistance, conveniently shown in the particular form chosen for illustration as the coil of a magneto-telephone receiver. Bridged across this is a normally open key adapted to be short-circuited across this resistance. The relation between the normal strength of current, the power of the magnet, and the resistance is such that normally the magnet cannot be energized; but at each depression of the key the magnet will be energized by the increase in the current. The step-by-step motion is produced by the retractile spring E at the subsequent deenergization following upon the restoration of the normal position of the key.

35 In one of the columns or radii of the dial is placed an insulated ray or strip L, and at successive radii corresponding to the arcs of the teeth of the wheels are other insulated spots J, each spot, counting from the ray L, being nearer to the center by one circular division.

40 The operation of the parts described is as follows: The setting operator may rotate the arm in either direction all around the dial without obstruction. When he rotates it clockwise, he will turn the star-wheel M, because he overcomes the tension of the spring-click C, although at that time the step-wheel B is obstructed by the pawls. When he turns the pointer manually contra-clockwise, the pawls will idle over the step-wheel. He can also move the pointer to and fro from the center of the periphery, and therefore as he is able to move this pointer without obstruction over the entire area it follows that he

55 can set it or leave it at any desired point, and hence if the apparatus be used for transmitting arbitrary signals marked on the dial he can set it at any such signal. When once set, there is no tendency to move, except when

60 operated magnetically as the result of action at the distant station, as follows: The operator at the receiving-station listens at the telephone and depresses his key repeatedly while counting the number of such depressions. If the apparatus has been set, as in the drawings, the first two depressions will

produce no abnormal effect, but at the third depression a click will be heard in the telephone as the pointer-brush passes over the ray L, thereby producing a total break in the circuit, which heretofore had been unbroken. The telephone will readily distinguish between the sound made by the attraction of its diaphragm when the key is lifted and the resistance of the telephone is cut in and the sound made by this total break. The fact that this break occurred at the third step will show that the pointer was set in the third column, (counting from that ray as a zero or starting point). The operator continuing his successive short-circuitings, will at the second step thereafter hear a second click, indicative of a break, because as the pointer is set in a radial direction at the second circle from the outside it will take two such steps to cause the brush to pass over the second spot, and in like manner every circle farther from the outside will require one more step of the pointer before it reaches the spot characteristic of that circle. The normal position of rest of the brush and the size of the spots, as well as their location within a column bounded by radii passing through successive teeth of the step-wheel, will be such that at each step the brush will first close the circuit and will again close it thereafter, thus preventing the apparatus from coming to a standstill as the result of a permanent break, which would prevent further operation of the magnet. The operator having thus discovered the exact position at which the pointer had been set (and hence when the apparatus is used for the transmission of arbitrary signals the exact signal intended) is then enabled to continue the step-by-step motion of the pointer, and as he knows the total number of steps or columns of the apparatus he can supplement those already made by adding a sufficient number to bring the apparatus to its original position, thus producing two important results, which are, first, that he thereby indicates to the transmitting operator that he has correctly received the signal, and, second, that the apparatus is replaced in condition where it may again be operated so as to inform him at some later time or another operator at his station (or operators at other stations when the circuit connections are so arranged) what the signal was.

We do not confine ourselves to the specific organizations shown for producing these various results.

We claim—

1. At one station, a circuit-controlling apparatus comprising a manually-movable member—as a knob; devices connecting this to other portions of the apparatus and coacting with these to permit an operator to move the knob back and forth in several intersecting directions; circuit-controlling elements including one which is movable to a varying

extent in accordance with the motion of the knob in at least one of the directions, and a second which is fixed and of sufficient area to be acted upon at all points between the extremes of effective motion of the first; devices acting to vary the area of engagement of these elements so as to correspond with the linear extent of the motion of the knob; means for controlling the production and effect upon receiving apparatus at another station of a variable number of distinct units of current impulses and means whereby the number of such units is determined by the area of engagement between the said movable and the said fixed elements, substantially as described.

2. A signal-transmitter comprising a dial-plate bearing indications grouped in two substantially intersecting directions, and including a pointer suitably supported and adapted to be moved to and from the center of the dial and free to rotate entirely around the dial in each direction, whereby it may be moved to any indication, substantially as described.

3. The combination in one apparatus of signal-transmitting mechanism including a dial having radiating columns of indications and a controlling-arm adapted to be set at any of the indications and being supported from the center of the dial and being movable to and fro radially and back and forth circularly, together with a motor device controlled by a magnet operated from a distant station and adjustments whereby the arm may be controlled from the distant station so that it will be replaced magnetically after operation where it was placed before the operation.

4. A circuit-controlling device comprising a circuit-terminal movable with respect to a central hub both toward and circularly around the said hub, together with a magnet and adjuncts operating to control the circular motion.

5. A variable-signal transmitter comprising a dial-plate bearing indications grouped in two substantially intersecting directions; a manually-operable pointer suitably supported and arranged to be movable to and fro from the center of the dial and to rotate about this center whereby it may be placed at the signal at any intersecting point; mechanism to hold it where placed; together with a magnet as a controlling mechanism, the whole so constructed and arranged as to admit of repeated release or operation electromagnetically under control through a circuit

for every time that the signal has been set locally and manually.

6. A variable-signal transmitter comprising a dial-plate bearing indications grouped in two substantially intersecting directions; a manually-operable pointer suitably supported and arranged to be movable to and fro from the center of the dial and to rotate about this center whereby it may be placed at the indication at any intersecting point; mechanism to hold it where placed; together with a step-by-step mechanism and a magnetic motor comprising an armature constructed to advance the mechanism step by step and circuit connection constructed and arranged to control the motion of the pointer one step for each energization of the magnet.

7. A variable-signal transmitter comprising a number of indications on a dial; means for designating one of these manually by local operation of the sending operator; means for retarding the production until this is controlled from a distant point; an impulse-controlling device to cause a distinct signal to be transmitted for each indication and arranged so that a smaller number of current impulses than of the total number of indications will produce signals recognizably different for each indication; together with a motor comprising a step-by-step movement and a magnet controlled from a distant station.

8. A signal-transmitter comprising means for setting at will and for controlling the production of several distinct variable signals at each transmission; electromagnetic means at the transmitter cooperating in such production and in retarding the operation until this is controlled from a distant point through a circuit; together with step-by-step mechanism combined with a circuit-controlling means and adjustments acting to vary in correspondence with each of the signals selected the duration of the closure of a contact and the number of steps of the mechanism from the beginning of the operation of transmission of each part of the signal until its termination.

Signed at New York, in the county of New York and State of New York, this 22d day of January, A. D. 1886.

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Witnesses:

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