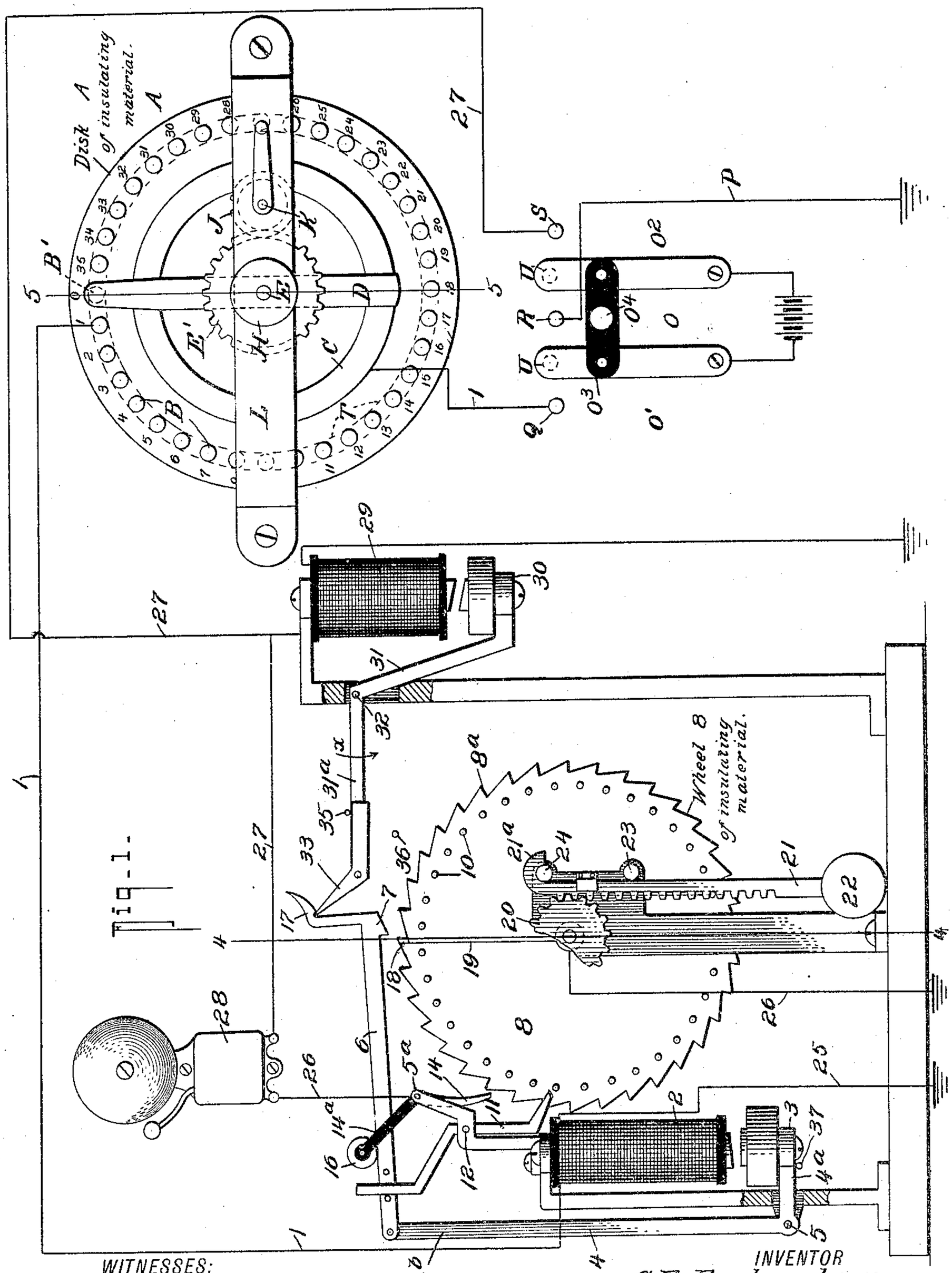
No. 793,578. PATENTED JUNE 27, 1905.

C. E. FREDERICKSON.

ELECTRICAL SIGNALING SYSTEM.

APPLICATION FILED AUG. 1, 1904.

4 SHEETS—SHEET 1.



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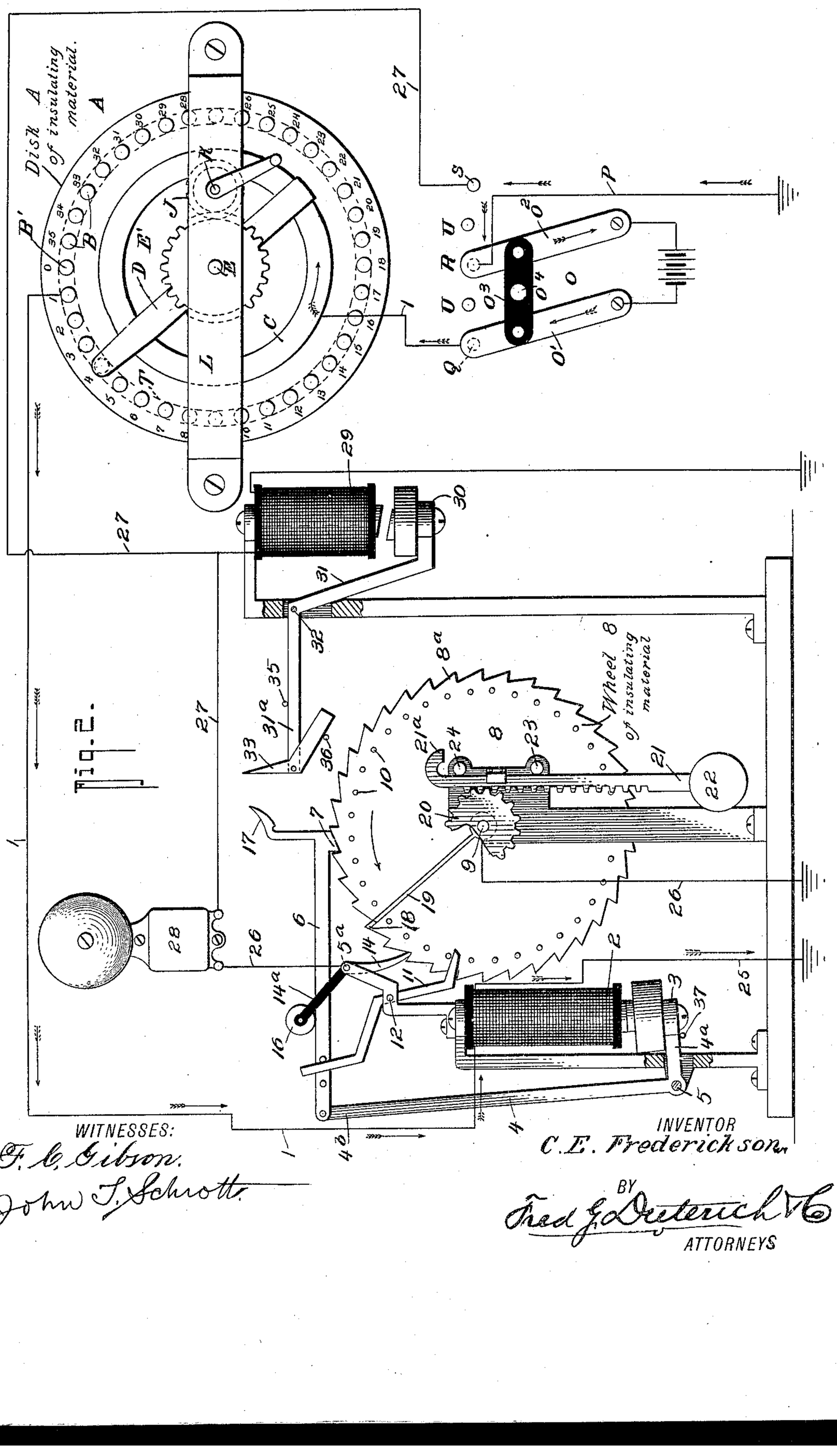


Fig. 2.

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4 SHEETS SHEET 3.

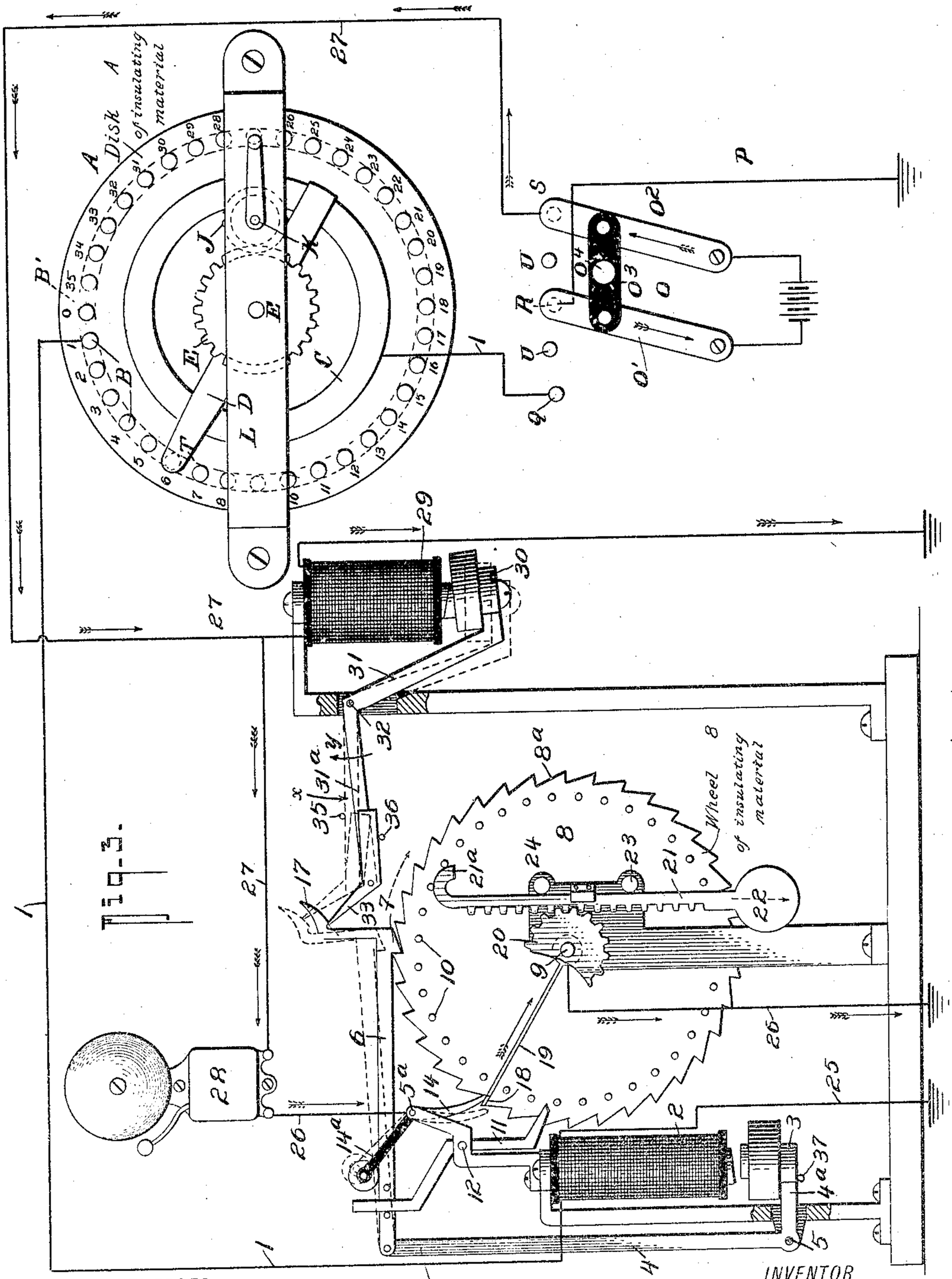


Fig. 3.

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4 SHEETS—SHEET 4.

Fig. 4.

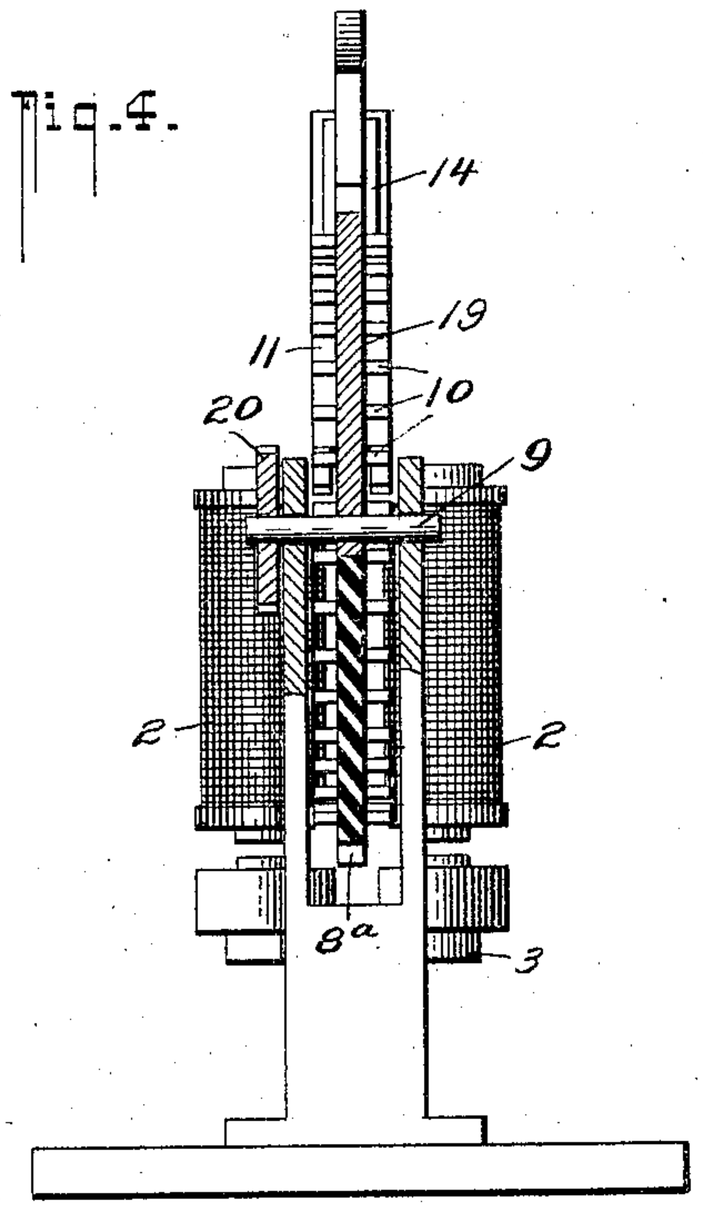


Fig. 5.

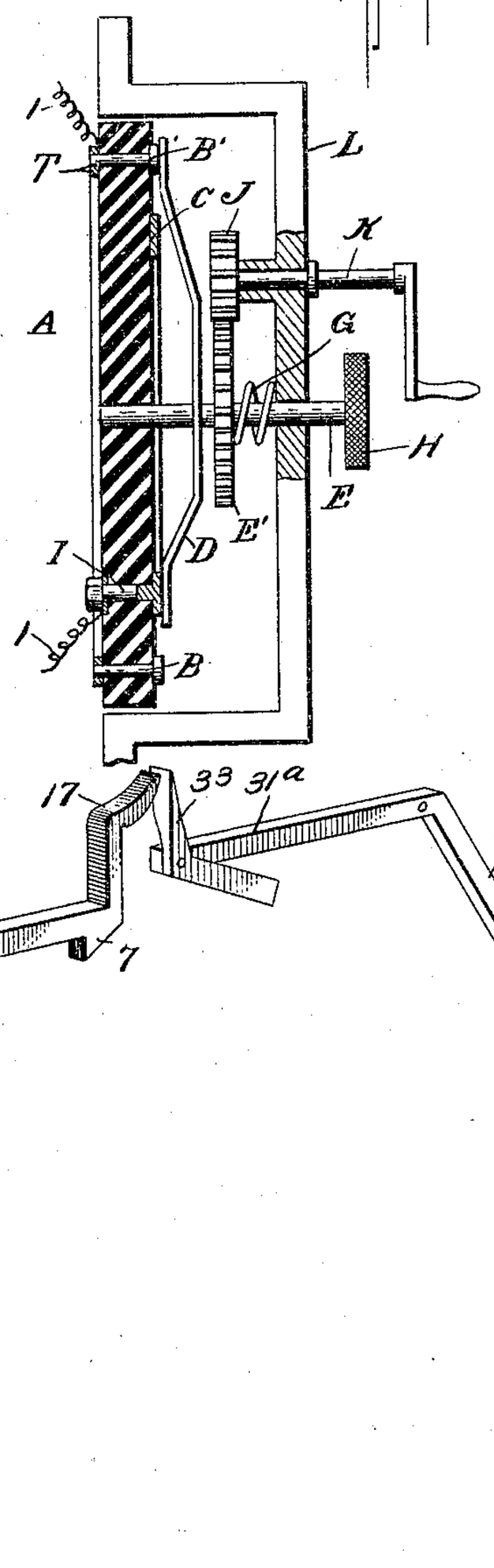


Fig. 6.

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No. 793,578. Patented June 27, 1905.

# UNITED STATES PATENT OFFICE.

CLAYTON E. FREDERICKSON, OF DENVER, COLORADO, ASSIGNOR OF ONE-HALF TO JEAN F. WEBB, OF DENVER, COLORADO.

## ELECTRICAL SIGNALING SYSTEM.

SPECIFICATION forming part of Letters Patent No. 793,578, dated June 27, 1905.

Application filed August 1, 1904. Serial No. 219,113.

*To all whom it may concern:*

Be it known that I, CLAYTON E. FREDERICKSON, residing at Denver, in the county of Denver and State of Colorado, have invented a new and Improved Electrical Signaling System, of which the following is a specification.

This invention relates to improvements in that character of electric signaling mechanisms in which the several parts are especially designed for conveniently and accurately making selective calls, whereby a signal may be transmitted from one station to any particular one of a number of other stations in the same electrical circuit without interfering with the said other stations.

My invention in its generic nature comprehends an improved construction and coöperative arrangement of parts, including a rotary spacing-disk, a stationary indicator-disk having the designations or places to which the signals can be selectively sent therein, a rotary switch for coacting with the indicator-disk, and electrically-controlled means for actuating the several parts in such manner whereby the calls or signals can be quickly and conveniently effected.

My invention also seeks to provide a mechanism for the purposes stated of a simple, inexpensive, and durable construction and which in its subordinate features consists in certain details of construction and peculiar combination of parts, all of which will hereinafter be fully explained, pointed out in the appended claims, and illustrated in the accompanying drawings, in which—

Figure 1 is a diagrammatic view of my complete system, the several parts being in their normal position. Fig. 2 is a face view of the rotary spacing-disk and the coöperative electromechanical devices for actuating the same, the actuating lever and pawl devices for turning the spacing-disk being shown shifted through the energy of the magnet 2. Fig. 3 is a face view of the said parts, showing their relative position when the signaling-current is on for setting in operation the signal. Fig. 4 is a transverse section thereof, taken substantially on the line 4 4 of Fig. 1. Fig. 5 is a cross-section of the same on the line 5 5 of Fig. 1. Fig. 6 is a detail perspective view of the rotary-disk-actuating lever 4, the pitman 6, with pawls 14 and 11, and the tripping-lever devices 31 33, that coact therewith and hereinafter particularly referred to.

In the practical construction my invention includes a rotary selecting or spacing disk 8, having a ratcheted or notched peripheral edge $8^a$, and the said disk is mounted upon a stud, spindle, or shaft 9 to turn therewith. The disk 8 is also provided with a series of transversely-projecting pins or studs 10, that project at each side and of which there is one for each peripheral notch and whose total number equals that of the indicating members on the signal-selecting disk, hereinafter referred to, and at one side the said disk has an axial cog-wheel 20, that rotates therewith and which meshes with the rack-bar 21, guided by the studs 23 24, and which is automatically returned to its normal position, a weight 22 on the lower end of said bar 21 being shown for such purpose. The upper end of the bar 21 has an outturned hook $21^a$ to engage the stud 24, which limits the drop movement of the bar 21, as will be hereinafter more fully explained.

4 designates what I term the "spacing-disk-actuating lever," which lever is in the nature of an angle-bar pivotally mounted at its angle on a pivot-pin 5. The short arm $4^a$ of said lever carries an armature-block 3, that forms a part of the electromagnet 2, from which magnet passes the ground-wire 25 and with which magnet connects the main circuit-wire 1, as shown. The long end $4^b$ of the lever 4 is pivotally connected to a pitman 6, that extends inwardly from over the upper edge of the disk 8 and drops upon its peripheral edge, as shown, and its end terminates in the dog 7 for engaging the notches $8^a$ of the disk 8 and with an upwardly-projecting notched heel 17, the purpose of which will presently appear.

The spacing-disk 8, it should be stated, is formed of a non-conducting material, while its lateral pins are of metal, and one of its selected cogs or notches has a metal face 18, which joins through a conductor 19 with the metal axis 9, on which the disk 8 rotates.

14 designates a metal pawl or dog pivotally suspended at $5^a$ on the supporting-frame and having a bifurcated end $14^a$, made of non-conducting material, that straddles the pitman 6 and in which is mounted a friction-roller 16, that rides upon the said pitman 6. The dog 14 is provided to prevent the spacing-disk 8 from turning backward when the circuit is broken. When the disk 8 is in the position shown in Fig. 3, the said dog engages with the metallic-faced notch 18 of the disk 8, (the spacing-disk having been properly shifted,) and thereby closes the circuit from the bell or indicator 28 to the ground.

11 designates a stop-pawl pivotally supported at 12 and having a toe turned adapted to project across the pin 10, whereby to limit the forward movement of the disk 8 one notch each time the lever 4 is actuated. The pawl 11 is arranged to be actuated by the movement of the lever 4 through its pitman 6, and for such purpose the said pawl 11 is notched to fit over the pitman 6 between the two lateral pins which hold the said locking-pawl in place and transmit the reciprocable movement of the pitman to the said pawl 11. To provide for a quick return of the disk 8 after it has been set to admit of actuating the signal, I use a means for tripping the said pitman 6, whereby to lift its pawl out of engagement with the disk 8 to free the disk or wheel and allow it to be rotated backward to its normal position, it being understood that when the pitman 6 is lifted the pawl 14 is sufficiently rocked to slip free of the notched periphery of the disk 8. The tripping devices referred to are actuated by a magnet 29, which is energized by a negative current 27, which is brought into action in a manner hereinafter explained. To the armature-piece 30 of the magnet 29 is connected one end of the bell-crank lever 31, pivoted at its angle on a stud 32 and having its arm $31^a$ extended over the upper edge of the disk 8 in the direction of the pawl end of the pitman 6. Upon the outer end of the arm $31^a$ is pivotally mounted a detent or tripper pawl 33, which is so weighted as to gravitate to its normal position. (See Fig. 2.) By reference to Fig. 3 it will be also noticed that the said tripper-pawl 33, the lever 31, and the notched heel 17 on the pitman 6 have such correlation that when the magnet 29 is energized the lever 31 will be rocked in the direction indicated by the arrow *x*, and in consequence the tripper-pawl 33 will ride under the said notched heel 17 and engage and interlock with the said notched heel 17; but so soon as the magnet 29 is de-energized, by reason of the lever 31 rocking back in the direction indicated by the arrow *y*, the tripper-pawl 33 will lift the said notched heel 17, and with it the pitman 6, high enough to elevate the pawl or dog 7 and free it from the notched edge of the disk 8, which disk then returns to its normal position.

35 designates a pin in the supporting-frame that prevents excess motion of the rocking lever 31.

36 designates a stop-pin for the tripper-pawl 33. 37 is a similar stop for limiting the drop of the lever 4.

The signal-selecting mechanisms consist of a stationary disk A, of non-conducting material, suitably mounted in a U-shaped frame, the face of which has numbers or other designation characters that indicate the stations or places to be selected and signaled to. Mounted in and disposed circumferentially on the disk A is a series of metallic pins B, that pass entirely through the disk A, (see Fig. 1 and Fig. 5,) and all of the pins are in electrical connection with the main circuit-wire 1, that joins with the metal ring T, that connects all of the pins B, as shown.

C designates a metallic ring mounted on the front face of the disk A, which connects through the pin I with the main circuit-wire 1.

D is a spring plate-switch that is fixedly connected to and rotates with the spindle E, mounted in the frame L and the disk A, and for conveniently turning it the said spindle has a milled wheel or head H. The spindle E also has a limited longitudinal movement for a purpose presently described and is held to its inner or normal position by the coil-spring G, which is mounted upon the spindle E, as shown.

The plate-switch D has one end arranged to sweep over and contact with the pins B and its tail end to sweep upon the ring C, such arrangement providing for conveying the current from the disk A to the magnet 2.

E′ designates a pinion on the spindle E, with which meshes a pinion J on a crank-shaft K, mounted in the frame L.

O designates a two-current switch adapted to change the polarity of the ground-wire P, and the said switch consists of two parallel plates $O'$ $O^2$, connected by a bridge-piece $O^3$, having a knob or handle $O^4$. The ends of the plates $O'$ $O^2$, which normally rest on the non-conducting points U U, are arranged to be alternately brought into connection with the contact-points Q, R, and S, of which Q is connected to the main circuit-wire 1, R with the ground, and S with the signaling-wire 27.

Operation: When the apparatus is not being used, the point of the switch D of the controlling-board or indicator-disk rests upon an unnumbered point B′, the adjustable switch O rests on the non-conducting points U U, and the spacing-disk 8 is now in its normal position. (See Fig. 1.) When an operator desires to signal a station, he moves the switch O from the non-conducting points U U to the contact-points Q and R, which then brings into operative connection with the main circuit-wire 1 and battery the magnet 2 and the selecting or signaling disk A, which energizes the magnet 2, and this in turn through the at-

traction of armature 3 actuates the lever 4, which pulls the notched heel 17 of the pitman 6 off of the tripper-pawl 33 and drops dog 7 of pitman 6 into the cogs $8^a$ of the disk 8, but does not rotate disk 8. By now turning the crank K on the controlling-disk A the operator rotates the switch D over the contact conducting-points B and alternately breaks and closes the circuit through the wire 1. Each closing of the circuit through the wire 1 causes the magnet 2 to attract armature 3 and actuate the lever 4, which in turn pulls backward pitman 6, whose stationary dog 7 causes the spacing-disk 8 to revolve one notch at each electric impulse through the wire 1. The movement backward of the pitman 6 causes the rocking pawl 11 to push forward and prevent the spacing-disk from revolving more than one notch, while dog 14 drops into the cogs of the disk and prevents it from turning back when the impulses are broken. At each breaking of the circuit the weight of the armature 3 pulls the rocker or lever 4 forward and pushes the pitman 6 inward, whose pawl or dog 7 drops into the succeeding cog of spacing-disk. When the switch D on the controlling-disk A reaches that contact-point B representing the desired station, the spacing-disk 8 will have rotated at that particular station sufficiently to make a connection between the terminals of the wire 26 through the dog 14, the metallic cog 18, the conductor 19, and the axis 9. When the connection is made, the switch O is moved from the contact-points Q and R to contact-points R and S, which sends a negative current through the wire 27 and through magnet 29, which attracts the armature 30, drawing up the rocker or lever 31, whose outer end then swings down and pushes the dog 33 under the notched heel 17 of pitman 6 and at the same time sends a current through the wire 27 to the bell 28 or other signaling devices and thence through the ground-wire 26. When the signal has been given as long as it is desired, the switch O is moved from the contact-points R S to the non-conducting points U U, thus breaking the signaling-circuit, which causes the magnet 29 to release the armature 30 and the attached rocker arm or lever 31, which as it returns to normal position through the dog 33 raises the notched heel 17 of the pitman 6, and thus lifts the pawl 7 and the movable dog 14 out of the cogs of the spacing-disk 8. The spacing-disk 8 being freed, the weight 22, with its cog-bar 21, that meshes with the cog-wheel 20, pulls the spacing-disk back to its starting-point. Then the knob H on the controlling device is pulled outwardly, so that the cog-wheel E′ is out of way of the cog-wheel J, and the switch D is then turned back to its starting-point, after which the spring G throws the cog-wheels J and E′ into mesh again.

It should be clearly understood that the metallic cogs 18 and the conductors 19 of the various signaling-disks are so arranged around the arc of a circle with respect to each other as are the various contacting points 1 2 3, &c., of the disk A. In other words, assuming the disk 8, as shown in the drawings, to correspond with the notch 6 of disk A, then the metallic cog 18 of signal-station No. 5 (not shown) would be located one notch in advance of that of signal-station 6, &c. As the contact-arm D is moved from the position shown in Fig. 1 to notch 1 all the disks A at all of the signal-stations will move forward one notch. The metallic cog 18 of the disk 8 of signal-station No. 1 will then be in operative connection with its respective signaling-bells. As the switch D is moved to notch 2 station No. 1 is disconnected and station No. 2 brought in connection. In other words, when the parts are in the position shown in Fig. 3 stations Nos. 1 to 5, inclusive, have been each in turn brought with their metallic cogs in contact with their respective dogs 14. However, as the switch O is not moved onto the contacts U and S until the proper signal-station has been brought into connection—viz., station No. 6 in the drawings—no current will flow through the signal-bells 28 of stations 1 to 5, inclusive, and as these stations (1 to 5, inclusive) have been cut out ere station 6 is in operative connection therefore no station except the station desired (No. 6 in the drawings) will be signaled, thus making the system a selective one.

Having thus described my invention, what I claim, and desire to secure by Letters Patent, is—

1. In a signaling system of the character described, a rotatably-mounted spacing or signal-selecting disk of non-conducting material, said disk having an arbitrarily-arranged peripheral ratchet and a series of lateral pins, one for each ratchet, and means for rotating the disk back to its normal position, a shiftable pawl mechanism for engaging the ratchet edge of the disk and moving it forward one notch at each electric impulse, an electric circuit, an electromagnet device for actuating the pawl adapted to be energized at each electrical impulse through the aforesaid electric circuit, a supplemental pawl controlled by the movement of the shiftable pawl mechanism and adapted to be projected between a pair of pins of the disk at each degree of movement of the said disk, an interrupter in the electric circuit, a signal, a separate circuit for energizing the said signal, and a circuit-closure controlled by the rotary movement of the disk for closing the signal-actuating circuit at predetermined times for the purposes specified.

2. In a selective signaling system, a source of electric energy, a main circuit and a supplemental circuit, a switch for shunting the energy into either of said circuits, an interrupter in the main circuit, a step-by-step contact-wheel, an operating-pawl for moving said

step-by-step wheel, a signaling-bell in the supplemental circuit, a contact member on said step-by-step wheel and adapted to be connected in the supplemental circuit, a circuit-closing member in said supplemental circuit adapted to contact with said step-by-step contact member at predetermined times, means for normally holding said operating-pawl out of engagement with said step-by-step disk, and means connected in the main circuit for releasing said operating-pawl to engage said step-by-step disk to operate the same, substantially as shown and for the purposes described.

3. In a selective signaling system, a source of electric energy, a main circuit and a supplemental circuit, a switch for shunting the energy into either of said circuits, an interrupter in the main circuit, a step-by-step contact-wheel, an operating-pawl for moving said step-by-step wheel, an electromagnet for releasing and actuating said operating-pawl, said electromagnet being connected in the main circuit, a signaling-bell in the supplemental circuit, a contact member on said step-by-step wheel and adapted to be connected in the supplemental circuit, a circuit-closing member in said supplemental circuit adapted to contact with said step-by-step contact member at predetermined times, means for normally holding said operating-pawl out of engagement with said step-by-step wheel and said holding means including an electromagnetically-operated pawl mechanism controlled by said supplemental circuit.

4. In a selective signaling system, a source of electric energy, a main circuit and a supplemental circuit, a switch for shunting the energy into either of said circuits, an interrupter in the main circuit, a step-by-step contact-wheel, an operating-pawl for moving said step-by-step wheel, an electromagnet for releasing and actuating said operating-pawl, said electromagnet being connected in the main circuit, a signaling-bell in the supplemental circuit, a contact member on said step-by-step wheel adapted to be connected in the supplemental circuit, a circuit-closing member in said supplemental circuit adapted to contact with said step-by-step contact member at predetermined times, means for normally holding said operating-pawl out of engagement with said step-by-step disk, said holding means including an electromagnet connected in multiple with said signaling-bell in said supplemental circuit.

5. In a selective signaling mechanism, a source of electric energy, a main circuit and a supplemental circuit, a switch for alternately shunting the current into said main and into said supplemental circuits, a make-and-break circuit-closing device in said main circuit, a step-by-step contact-wheel, a signaling-bell in said supplemental circuit, said supplemental circuit being normally broken, means for operating said step-by-step contact-wheel, said means including an operating-pawl and an electromagnet in the main circuit for releasing and operating said pawl, means for normally holding said operating-pawl out of engagement with said step-by-step wheel, and means coöperating with said holding means for moving said operating-pawl out of engagement with said step-by-step contact-wheel at predetermined times, said last-named means comprising an electromagnet connected in multiple with said signaling-bell in the supplemental circuit, all being arranged substantially as shown and for the purposes described.

6. In a selective signaling mechanism, a source of electric energy, a main circuit and a supplemental circuit, a make-and-break circuit-closing device in said main circuit, a signaling-bell in said supplemental circuit, a switch common to both circuits for alternately switching the current into the main circuit and into the supplemental circuit, a step-by-step contact-wheel, a contact member carried thereby, said contact member of the contact-wheel adapted to be connected in series with the supplemental circuit, an operating-pawl for said step-by-step contact-wheel, a contact-pawl and a signaling-bell connected in series in said supplemental circuit, means controlled by the main circuit for operating said operating-pawl to operate the step-by-step contact-wheel, means for normally holding said operating-pawl and said contacting pawl out of engagement with said step-by-step contact-wheel and the contact member, said operating-pawl operating means serving to release said operating-pawl to engage said step-by-step contact-wheel.

7. In a selective signaling mechanism, a source of electric energy, a main circuit and a supplemental circuit, a make-and-break circuit-closing device in said main circuit, a signaling-bell in said supplemental circuit, a switch common to both circuits for alternately switching the current into the main circuit and into the supplemental circuit, a step-by-step contact-wheel, a contact member carried thereby, said contact member of the contact-wheel adapted to be connected in series with the supplemental circuit, an operating-pawl for said step-by-step contact-wheel, a contact-pawl, an electromagnet in the main circuit for releasing and operating said operating-pawl to operate the step-by-step contact-wheel, means for normally holding said operating-pawl and said contacting pawl out of engagement with said step-by-step contact-wheel and the contact member, and a check-pawl controlled by said operating-pawl, all being arranged substantially as shown and described.

8. A selective signaling system of the character described, comprising a source of electric energy, a main circuit and a supplemental circuit, a make-and-break contact member in

said main circuit, a switch common to both circuits for alternately switching the current into the main and the supplemental circuits, a step-by-step contact-wheel, a contact member on said contact-wheel, a contacting pawl for coöperating with said contact member, a signaling-bell, said signaling-bell, said contacting pawl and said contact member adapted to be connected in series in the supplemental circuit, means for operating said step-by-step contact-wheel, said means being operated by the main circuit, means controlled by the supplemental circuit for normally holding said step-by-step contact-wheel-operating means out of operative connection with said wheel, all being arranged substantially as shown and for the purposes described.

9. In a selective signaling system, a source of electric energy, a main circuit and a supplemental circuit, a make-and-break circuit-closer in said main circuit, a switch common to both circuits for switching the current either into the main circuit or into the supplemental circuit, a signaling-bell, a contact-pawl and a step-by-step contact-making wheel adapted to be connected in series in said supplemental circuit, means for operating said step-by-step contact-wheel, said means being operable by the main circuit, said contact-pawl being coöperatively connected with said step-by-step wheel-operating mechanism, a stop-pawl also coöperatively connected with said step-by-step wheel-operating mechanism and means for normally holding said step-by-step operating mechanism and said contact-pawl out of operative connection with said step-by-step contact-making wheel, means cooperating with said holding means for moving said operating-pawl out of engagement with the step-by-step contact-making wheel at predetermined times, said last-named means including an electromagnet operable by and connected in said supplemental circuit in multiple with said signaling-bell and said step-by-step wheel all being arranged substantially as shown and for the purposes described.

10. In a selective signaling system, a source of electric energy, a main circuit and a supplemental circuit, a make-and-break circuit-closer in said main circuit, a switch common to both circuits for alternately shunting the current into the said main and said supplemental circuit, a signaling-bell in said supplemental circuit, a step-by-step contact-making wheel having peripheral teeth, a contact member carried by said step-by-step wheel, an operating-pawl for moving said step-by-step wheel forward, an electromagnet in said main circuit for operating said operating-pawl, a check-pawl for coöperating with said step-by-step wheel and controlled by said operating-pawl, a contacting pawl also controlled by said operating-pawl, said contacting pawl adapted to be connected in series with said signaling-bell in said supplemental circuit, means for moving said operating-pawl out of engagement with said step-by-step wheel and to move said contact-pawl out of coöperative engagement with said step-by-step wheel, said means including an electromagnet connected in multiple with said signaling-bell and in the supplemental circuit, all being arranged substantially as shown and for the purposes described.

11. In a selective signaling system, a source of electric energy, a main circuit and a supplemental circuit, a make-and-break circuit-closer in said main circuit, a switch common to both circuits for alternately shunting the current into the said main and said supplemental circuits, a signaling-bell in said supplemental circuit, a step-by-step contact-making wheel having peripheral teeth, a contact member carried by said step-by-step wheel, an operating-pawl for moving said step-by-step wheel forward, an electromagnet in said main circuit for operating said operating-pawl, a check-pawl for coöperating with said step-by-step wheel and controlled by said operating-pawl, a contacting pawl also controlled by said operating-pawl, said contacting pawl adapted to be connected in series with said signaling-bell in said supplemental circuit, means for moving said operating-pawl out of engagement with said step-by-step wheel and to move said contact-pawl out of coöperative engagement with said step-by-step wheel, said means including an electromagnet connected in multiple with said signaling-bell and in the supplemental circuit, and means for returning said step-by-step wheel to its normal position, all being arranged substantially as shown and for the purposes described.

12. A selective signaling mechanism comprising a source of electric energy, a main and a supplemental circuit, a current-shunting switch common to both of said circuits for shunting the current into either of said circuits, a circuit-closing member, means controlled by the main circuit for operating said circuit-closing member, a signaling-bell, said signaling-bell and said circuit-closer member being connected in series in the supplemental circuit, means connected in the supplemental circuit in multiple with the signaling-bell and circuit-closing member for rendering said circuit-closing-member-operating means inoperative, substantially as shown and for the purposes described.

CLAYTON E. FREDERICKSON.

Witnesses:
LLEWELYN JONES,
JEAN F. WEBB, Jr.