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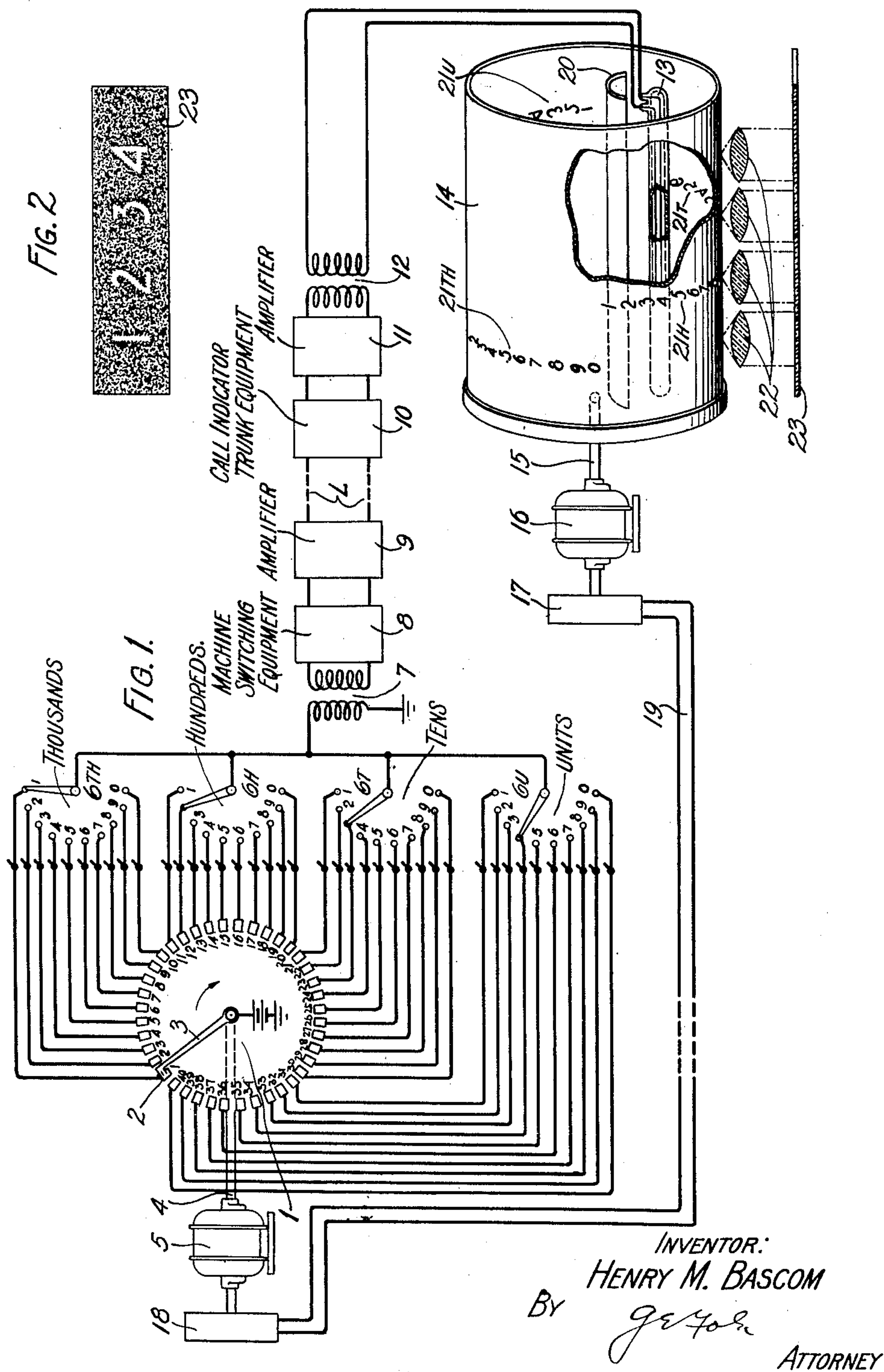
H. M. BASCOM

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SIGNALING SYSTEM

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2 Sheets-Sheet 1



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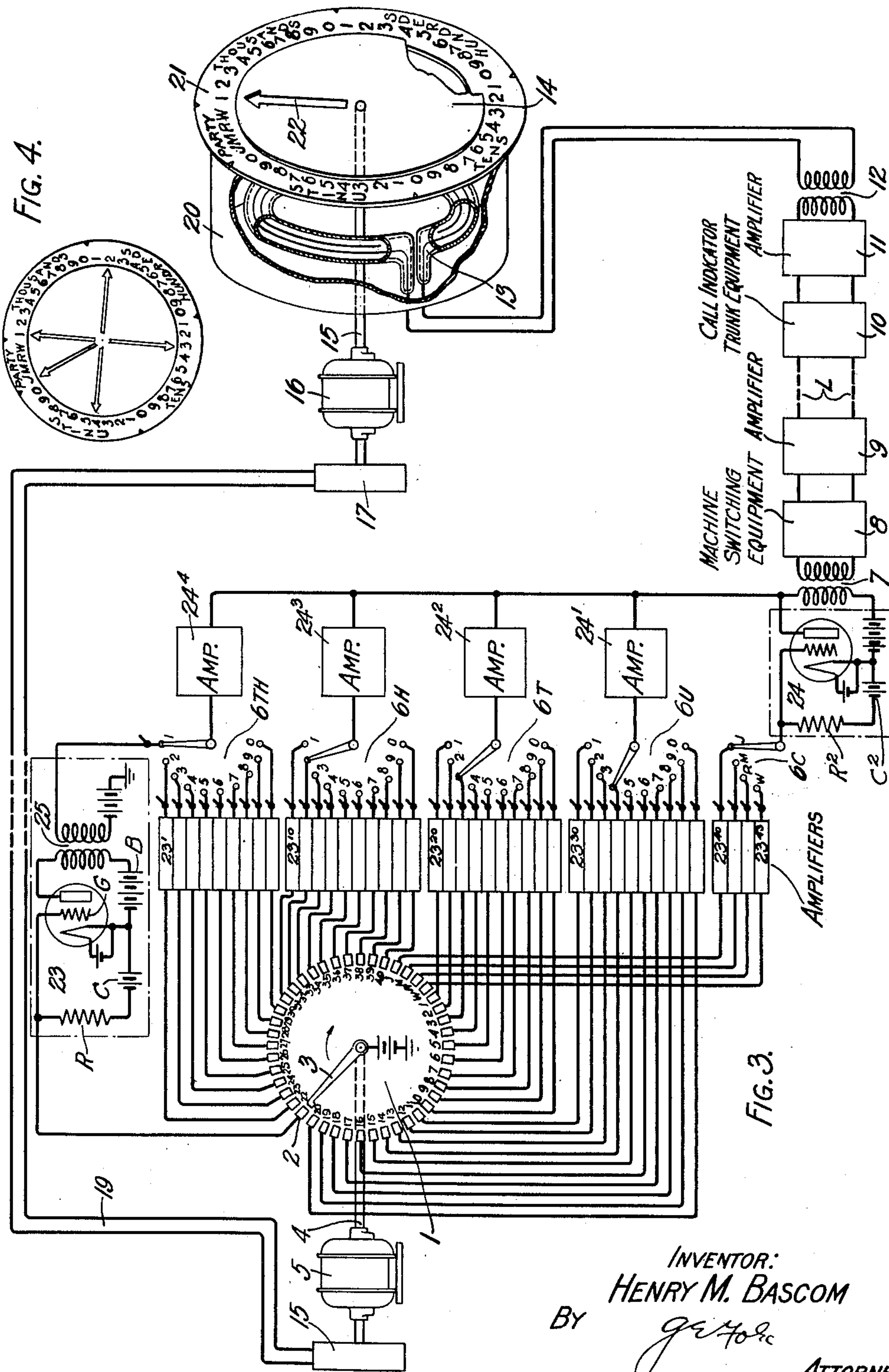
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UNITED STATES PATENT OFFICE

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SIGNALING SYSTEM

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5 Claims. (Cl. 177—337)

This invention relates to indicating systems for the display at one point of numbers, characters, or other symbols in response to the actuation of a suitable sending device at a distant point, and more particularly to a system for indicating to an operator at one switchboard position the number of a wanted telephone line which is set up at another operator's position or at a subscriber's station by a suitable device, such as an operator's keyboard or a calling dial, preferably through the use of a synchronous distributor system.

Call indicating systems now employed are not in general adapted to transmit impulses over lines equipped with voice frequency repeaters, and an object of the present invention is to provide a system which makes use of shorter impulses than heretofore, and of such duration that they may be effectively transmitted over any circuits capable of transmitting voice frequency currents.

The invention has its preferred embodiment, specifically stated in a transmitting mechanism comprising a rotary distributor adapted to connect a source of direct potential to its segments in rapid succession, said segments being associated, respectively, with contacts of a selector switch which is set by means of a keyboard or dial in accordance with the number to be called and the brushes of which are associated with the line, whereby corresponding properly spaced impulses are transmitted. At the receiving end of the line is a mechanism rotating in synchronism with the distributor and controlling the light from a glow lamp, which is momentarily lighted by each received impulse, to thereby set up the desired number on a translucent screen by means of an optical system.

In the drawings Figure 1 illustrates the preferred form of the invention just referred to;

Fig. 2 is a front view of the ground glass screen of the indicator of Fig. 1 and shows projected thereon a four-digit number;

Figs. 3 and 4 show an alternative arrangement which differs principally from the arrangement of Figs. 1 and 2 in that the indicator employs an opaque revolving disc instead of a cylinder on which appears a transparent arrow which is illuminated by the glow lamp and points to a number on a stationary number plate surrounding the revolving disc, and that, in the distributor, instead of the brush making direct contact with the segments, it passes before the segments without actually touching them but sufficiently close to cause an inductive disturbance in an associated output amplifier circuit.

A detailed description of the invention will now be given.

Referring to Fig. 1 of the drawings, 1 is a rotary distributor similar to equipment employed in printing telegraphy, etc. having a plurality of contact segments 2 wiped over by brush arm 3 driven at a rate of speed, of the order of 6000 revolutions per minute, through the medium of a shaft 4 by a motor 5. A grounded battery is connected to the brush arm 3. The number of distributor segments or contacts is determined by the number of digits in the number to be transmitted and assuming a four digit number, a minimum of forty segments is required.

Associated with the distributor, and assuming provisions for transmitting a four-digit number, are four selective switches 6—U, 6—T, 6—H, and 6—TH, each of which consists of a bank of ten contacts, one contact for each of the ten digits in the units, tens, hundreds, and thousands groups. These switches may be well-known step-by-step switches used in automatic telephony, each having a movable contact arm or brush adapted to be set on any desired one of the ten segments by well-known means controlled by a dial or operator's keyboard, not shown. Each of the forty switch contacts is individually wired to one of the distributor segments, as shown.

The contact arms of the switches are connected in multiple to one terminal of a winding of a transformer or repeating coil 7, the other terminal of which is connected to ground.

It will now be obvious that for any setting of the switch arms on the contacts of switches 6—U, 6—T, 6—H, and 6—TH, the brush arm 3 of the distributor in making one complete revolution will close a circuit from battery through the winding of transformer 7, four times, i. e., when the brush contacts with segments 1, 12, 23 and 34, thereby transmitting four alternating current impulses over the line L in which may be located amplifiers 9 and 11 for compensating for losses occasioned by the characteristics of the line and equipment, indicated at 8 and 9, through which the current impulses must pass.

At the distant end of the line a second transformer 12 may be inserted, the secondary winding of which is connected to the terminals of a neon tube or lamp 13, which has the property of responding promptly to the connection and disconnection of electrical potential.

Surrounding the lamp 13 is an opaque cylinder 14 rotating on a shaft and driven by a motor 16 which operates in synchronism with the motor

5 at the transmitting end of the line. Any suitable means well known in the art, such as used in printing telegraphy, may be employed for maintaining the two motors in synchronism, for example, a line 19 terminating in synchronizing equipment 17 associated with each motor may be utilized, but as the method of synchronizing forms no part of the present invention, it has not been described in any detail.

10 Around the circumference of the cylinder 14 are four rows of translucent digits 21—TH, 21—H, 21—T and 21—U and so staggered that a line drawn at any point on the cylinder, parallel to its axis, would pass through but one digit.

15 Behind the neon lamp 13 is a reflector 20 arranged so as to cause a narrow band of light to shine on the inner surface of the cylinder parallel to its axis. Obviously, this band of light will illuminate the translucent digit which is opposite this point in the cylinder at the instant the lamp is lighted.

20 Outside the cylinder and in line with each row of digits is a stationary lens 22 and in front of the row of lenses is a stationary ground glass screen. The lenses 22 are so constructed and arranged as to project, on the screen, the illuminated digit somewhat enlarged in size.

25 Due to the speed of the distributor or impulser at the transmitting station, which as before stated is of the order of 100 revolutions per second, the lamp 13 will be illuminated and extinguished so rapidly that the eye is unable to distinguish the flashes and it therefore appears as a steady light. Now if the cylinder 14 is in such a position that 30 digit 1 of row 21—TH is opposite the lamp 13 and reflector 20 at the instant distributor arm 3 passes over segment 1 of the distributor, and assuming that the brush of selective switch 6—TH is set on contact 1, the digit 1 will be illuminated and projected on the screen 23, where it will be 40 visible to an operator and if the cylinder rotates in synchronism with the arm of the transmitting distributor or impulser and the digits are properly spaced around the circumference of the cylinder, this digit will continue to be displayed so 45 rapidly as to appear as a steady number on the screen as long as the selective switch is set on contact 1 or until the circuit is broken in some other manner.

50 Now, for example, if the brushes of switches 6—TH, 6—H, 6—T and 6—U representing the thousands, hundreds, tens and units digits of a number to be transmitted are set on contacts 1, 2, 3 and 4, respectively, to transmit the number 1234, these same respective digits on the cylinder 14 55 will be successively illuminated as they pass in front of the lamp 13 and will be individually projected on the screen 23, as shown in Fig. 2.

60 In case it is desired to transmit a party line code designation, such as the letters W, R, M or J, a fifth switch, not shown, and four additional segments would be required at the transmitting station and a fifth row of translucent digits and a corresponding lens would be required in connection with the indicator.

65 An alternative arrangement embodying the same fundamental principles as previously described is shown in Figs. 3 and 4.

70 Referring to Fig. 3 a single rotary segment at the outer end of the distributor arm 3, driven by the motor 5, passes before each of the stationary contacts 2, but does not actually come in contact therewith.

75 In each lead from the segments to the contacts of the selector switches 6—TH, 6—H, 6—T,

6—U and 6—C, an amplifier 23, 23', 23², etc., is introduced. These amplifiers consist of a vacuum tube having a grid battery C and a plate battery B together with an associated output coil 25. The rotating segment of the distributor is connected to battery and as it passes before any one of the stationary segments, the potential of that segment, as determined by the C battery of the corresponding amplifier 23 is changed by virtue of the fact that the high resistance R, which serves as a grid leak, is introduced in series with the grid battery.

80 The battery connected to the rotary segment is, of course, of a different potential than the C battery of the amplifier, and consequently, the potential on the grid G of any particular tube is increased when the rotating member of the distributor passes the stationary contact to which the grid is connected and is restored to normal after the rotating member has passed by the segment in question.

85 This change of grid potential causes a single amplified impulse to be sent to the associated selector switch, such as 6—TH. The switches 6—TH, 6—H, etc. are set in accordance with any desired number, and party line designation, as, for example, 1234J, by the action of a dial or operator's keyboard as previously mentioned.

90 From the brushes or contact arms of the switches 6—TH, etc. leads are run to vacuum tubes 24¹, 24², etc., which serve as one-way paths for the current impulses. The plate circuits of all these tubes are connected in parallel with output transformer 7.

95 Without the use of these one-way tubes in the selector switch brush leads, it would be possible, for example, for a pulse incoming to contact 1 of the switch 6—TH to cause a change in potential on contact 2 of 6—H, contact 3 of 6—T, contact 4 of 6—U and contact J of 6—C, thereby effecting, falsely, the contacts of other multiple selective switches which are also adapted to control impulses from the common distributor or impulser 1.

100 The one-way tubes 24, etc., are provided with a C battery C² and a resistance R² for the purpose of maintaining the potential of the associated selective switch brush at normal while it is being rotated during the setting operation.

105 The secondary winding of the transformer 7 is connected to the line L which may be equipped with additional amplifiers 9 and 11.

110 Wires from the secondary winding of transformer 12 are run to a circular-shaped neon tube or lamp 13 which is lighted for each digit transmitted as in the previously described arrangement.

115 The neon lamp is inclosed in a casing 20. In front of the lamp is a plate 14 which is opaque except for a transparent arrow 22. This plate is rotated by a motor 16 which operates in synchronism with the motor 5 of the transmitting distributor or impulser 1.

120 A stationary circular number plate 21 is mounted on the casing 20 and surrounding the rotating plate 14. On this number plate is indicated the units, tens, hundreds and thousands digit of a four-digit number and also the four party letters, W, R, M and J, or any other desired code.

125 With motors 5 and 16 operating in synchronism the transparent arrow is steadily illuminated and points to the digit or a letter corresponding to the setting of the selective switch. Five steady illuminated arrows (Fig. 4) will point to the digits and letter corresponding to the 130 135 140 145 150

setting of the selective switches 6—TH, 6—H, etc.

It is understood that the distributor of either Fig. 1 or Fig. 3 may serve as a common impulse device for a number of groups of selector switches 6.

What is claimed is:

1. In a telephone call indicating system, a transmitting station, a receiving station, a line interconnecting them, a mechanism at the transmitting station including a rotary distributor for selectively transmitting to the line a cyclically recurring succession of electrical impulses selectively spaced within the cycle in accordance with a predetermined code corresponding to a plurality of characters which it is desired to simultaneously indicate at the receiving station, said cyclic impulses being transmitted at such a rate that they will be repeated within a time interval not greater than the period of persistence of vision, and a mechanism at the receiving station operating in synchronism with the transmitting distributor for luminously displaying in a row, due to persistence in vision, the plurality of characters transmitted.

2. In a telephone call indicating system, a transmitting station, a receiving station, a line interconnecting them, a mechanism at the transmitting station including a rotary distributor for selectively transmitting to the line a cyclically recurring succession of electrical impulses selectively spaced within the cycle in accordance with a predetermined code corresponding to a plurality of characters which it is desired to simultaneously indicate at the receiving station, said cyclic impulses being transmitted at such a rate that they will be repeated within a time interval not greater than the period of persistence of vision, and a mechanism at the receiving station including an opaque cylinder rotating in synchronism with the distributor at the transmitting station, a plurality of staggered sets of transparent openings arranged in circumferential rows in the cylinder wall, the openings of each set having different characteristic shapes corresponding to the characters to be indicated, a glow lamp connected to the line and positioned within the cylinder, and stationary means associated with the cylinder for restricting instantaneous visibility of said openings to a single row.

3. In a telephone call indicating system, a transmitting station, a receiving station, a line interconnecting them, means at the transmitting station for producing and selectively transmitting a cyclically recurring succession of electrical impulses spaced within the cycle in accordance with a predetermined code corresponding to a plurality of characters which it is desired to simultaneously indicate at the receiving station, said impulses being transmitted at such a rate that they will be repeated cyclically within a time interval not greater than the period of persistence of vision, said means including a rotating distributor for transmitting the impulses to the line and a selector switch adapted to be set to determine the spacing of the impulses transmitted, and a mechanism at the receiving station including an opaque cylinder rotating in synchronism with the distributor at the transmit-

ting station, variously shaped transparent openings in the cylinder wall each representing one of the characters which are to be transmitted, a glow lamp connected to the line and so adapted and positioned within the cylinder as to illuminate said transparent openings with each impulse, and means including a screen and a system of lenses positioned adjacent said cylinder, said openings being so disposed around the wall of said cylinder and said lens system and screen so disposed with respect to the cylinder that during the transmission of character impulses the plurality of characters corresponding to the impulses transmitted will appear in a row on said screen.

4. In a telephone call indicating system, a line, means at one end thereof for producing and transmitting to said line a cyclically recurring succession of electrical impulses selectively spaced within the cycle in accordance with a predetermined code corresponding to a plurality of characters which it is desired to simultaneously indicate at the other end of the line, said means including a rotating device for transmitting said impulses at such a rate that each cyclic impulse will be repeated within a time interval not greater than the period of persistence of vision, an indicating mechanism at the other end of the line including a rotatable opaque screen, means for rotating said screen in synchronism with the means at the transmitting station, a transparent indicator opening in the opaque screen, an electric glow lamp associated with the line and made active by said line impulses, said lamp being so positioned with respect to said screen as to illuminate said opening, and stationary means cooperating with said rotating screen, and bearing representations of the characters which are to be transmitted, said character representations being so positioned that when the opening in said screen is illuminated, character representations on said stationary members will be simultaneously indicated, due to the persistence of vision, which correspond to the code of impulses transmitted.

5. In a telephone call indicator for transmitting and indicating characters, means including a rotating member for producing and selectively transmitting to a line a cyclically recurring succession of electrical impulses selectively spaced within the cycle in accordance with a plurality of desired characters to be transmitted and at a cyclic rate such that each impulse will be repeated within a time interval not greater than the period of persistence of vision and means for receiving said impulses and indicating said character comprising an opaque screen revolving in synchronism with the rotating member at the transmitter, a plurality of staggered rows of transparent openings in said screen, the openings of each row being of various shapes to represent the characters transmitted, a glow lamp responsive to the line impulses and so positioned as to illuminate the transparent openings and a stationary member so positioned with respect to the screen as to restrict instantaneous visibility of said illuminated openings to a single row.

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