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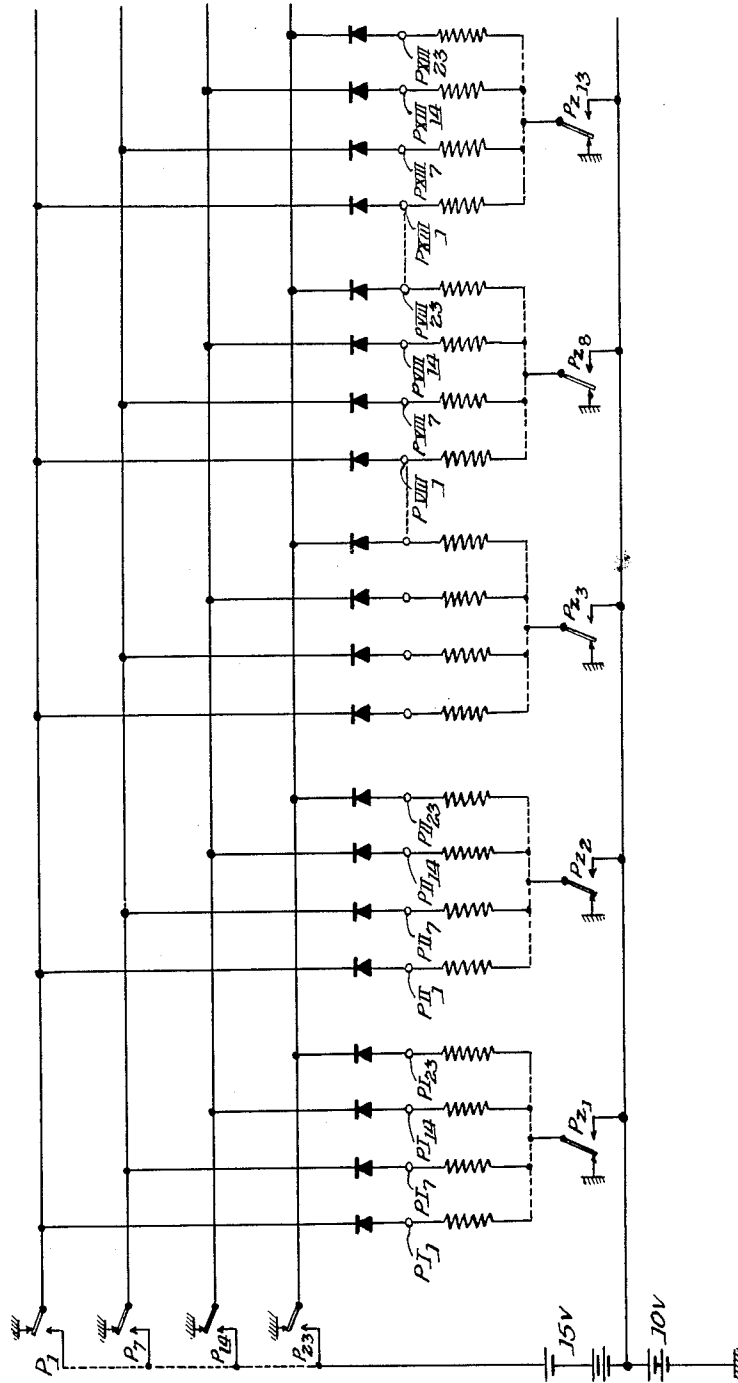
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MARKER IMPULSE GENERATOR FOR SIGNALLING SYSTEMS

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2 Sheets-Sheet 1

Fig. 1.



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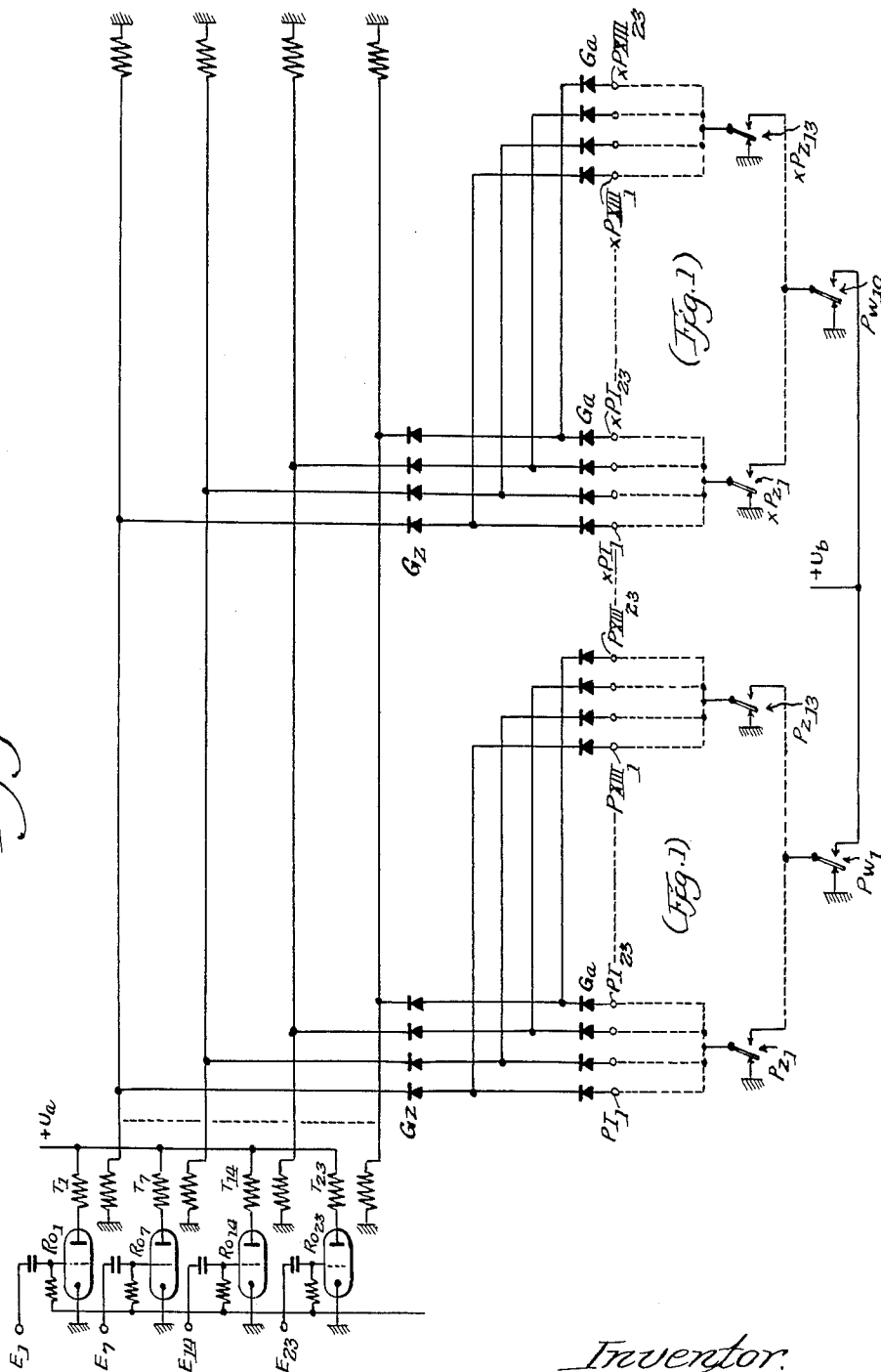
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Fig. 2.



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MARKER IMPULSE GENERATOR FOR SIGNALLING SYSTEMS

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13 Claims. (Cl. 179—18)

This invention is concerned with an impulse generator for producing successive current impulses serving as marker impulses in a signalling system, for example, in a telephone system.

One of the objects of the invention is to provide a marker impulse generator device which has a relatively small number of circuit closure or switching means as compared with the number of outlets serving for the utilization of the marker impulses produced.

This object is realized by the coordinate cooperation of successively operable circuit closure or switching means combined in a first group, which are repeatedly operable in a certain time sequence, with a second group of circuit closure or switching means which are successively operated, each during a cycle of operation of the means of the first group, for the purpose of connecting potentials to outlets or impulse receiving terminals serving for receiving the corresponding marked impulses. The circuit closure or switching means may be contacts or electronic tubes. A coincidence circuit may be connected with each impulse receiving terminal comprising, for example, a rectifier, for producing an impulse at the corresponding terminal upon coincident actuation of the switching means in said first and said second groups.

Two examples of the invention are diagrammatically illustrated in the accompanying drawings, Figs 1 and 2.

The impulse generator illustrated in Fig. 1 comprises a first group of contacts $P_1 \dots P_{23}$, only four of these contacts being shown for convenience, which are suitably actuated, for example, by cams on a rotating shaft (not shown), and a second group of similarly actuated contacts $P_{21} \dots P_{213}$, of which only five are shown for convenience. The contacts $P_1 \dots P_{23}$ in the first group are in a predetermined rhythm actuated from their normal positions in which they are shown to their operated positions, while the contacts $P_{21} \dots P_{213}$ in the second group are similarly actuated, but in another rhythm. The time of contact closure is such that the contacts $P_1 \dots P_{23}$ are successively actuated to their operated positions, each contact once, during the time when any one contact $P_{21} \dots P_{213}$ is in its operated position. For example, during the time when the contact P_{21} is in its operating position, contacts $P_1 \dots P_{23}$ will be successively actuated. This cycle is repeated with contact P_{22} in operated position after restoration of contact P_{21} , etc. The contacts are connected in a working circuit over the impulse receiving terminals and cooperate in coordinate fashion.

If it is, for example, assumed that only contact P_{21} is in its operated position, current will flow from the 10-volt battery over all resistors connected with contact P_{21} and also over the rectifiers disposed in series with these resistors (coincidence circuit control means) to ground over the contacts $P_1 \dots P_{23}$ which happen to be in normal position. If contact P_1 is now actuated to its operated position, an opposing current from the 15-volt battery will be connected to the associated circuit, which will block the corresponding rectifiers in such circuit. Accordingly, at the point PI_1 , which is one of the many

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marker impulse outlets or impulse receiving points or terminals of the generator, there will momentarily occur a potential of ten volts. Such current impulses will therefore occur at the marker impulse outlet or receiving terminals or points $PI_1 \dots PI_{23}$ coincident with the successive actuation of the contacts $P_1 \dots P_{23}$, and thereafter in the indicated rhythm also at the marker impulse outlet or receiving terminals or points $PII_1 \dots PIII_{23}$ responsive to successive operation of the contacts $P_{22} \dots P_{213}$.

A potential of ten volts will thus be connected in impulse fashion to the marker impulse receiving points or terminals $PI_1 \dots PIII_{23}$, each at a different instant, thus making available 299 marker impulses. The number of outlets or impulse receiving points or terminals is equal to the product of the number of contacts in the first group and the number of contacts in the second group. The marker impulse receiving terminals are subdivided into a number of groups which corresponds to the number of contacts in the second group.

The impulse generator shown in Fig. 2 has electronic circuit closure or switching means in place of the contacts $P_1 \dots P_{23}$ of the embodiment of Fig. 1, namely, the tubes $Ro_1 \dots Ro_{23}$. The inlet leads $E_1 \dots E_{23}$ connect with a suitable impulse device (not shown) which is adapted to transmit 23 impulses which are displaced as to time. The contacts $P_{21} \dots P_{213}$ with their associated marker impulse outlets are multiplied, and each multiple is switched in successively by auxiliary contacts such as $Pw_1 \dots Pw_{10}$. The number of marker impulse outlets or receiving terminals can in this fashion be increased to $xPI_1 \dots xPII_{23}$. Upon becoming conductive responsive to receiving the initiating impulses over their associated leads $E_1 \dots E_{23}$, the tubes $Ro_1 \dots Ro_{23}$ deliver successive impulses over their respective coating transformers $T_1 \dots T_{23}$ which are connected to the anode circuits thereof for blocking the rectifiers in the corresponding circuits in the same manner as such blocking was effected by the cam-controlled contacts $P_1 \dots P_{23}$ of Fig. 1. Successive current impulses are therefore produced at the marker impulse receiving terminals $PI_1 \dots xPII_{23}$ just like in the embodiment according to Fig. 1. Corresponding marker impulse receiving terminals of the various groups of Fig. 2 are connected over auxiliary rectifiers Gz . If such rectifiers were not provided, there would occur an undesirably great load on account of the rectifiers Gz which are in parallel circuit on the marker impulse outlets.

The designation "switching means", or similar language as used in the appended claims is intended to embrace contact means such as the contact shown in Fig. 1 and also switching means including electronic means such as shown in Fig. 2.

Changes may be made within the scope and spirit of the appended claims.

I claim:

1. An impulse generator comprising a plurality of groups of impulse receiving terminals each group comprising several terminals, a plurality of first switching means corresponding in number to the number of terminals in each group of terminals, circuit means for connecting several of said terminals with each of said first switching means, said circuit means comprising current control means for each terminal, a plurality of second switching means corresponding in number to the number of groups of said terminals, each of said second switching means being individual to one of said group of terminals, resistor means connected with each terminal in each group of terminals, means for connecting said resistor means in each group of terminals in multiple to the second switching means which is individual thereto, means for repeatedly sequentially and cyclically operating said first switching means, and means for actuating one of said second switch-

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ing means during each cyclic operation of all of said first switching means for coordinating the operations of said first switching means with the operation of said second switching means to produce successively individual impulses at said impulse receiving terminals.

2. An impulse generator comprising a plurality of groups of impulse receiving terminals each group comprising several terminals, a plurality of first switching means corresponding in number to the number of terminals in each group of terminals, circuit means for connecting several of said terminals with each of said first switching means, said circuit means comprising current control means for each terminal, a plurality of second switching means corresponding in number to the number of groups of said terminals, each of said second switching means being individual to one of said group of terminals, resistor means connected with each terminal in each group of terminals, means for connecting said resistor means in each group of terminals in multiple to the second switching means which is individual thereto, means for repeatedly and cyclically operating said first switching means, and means for actuating one of said second switching means during each cyclic operation of all of said first switching means for coordinating the operations of said first switching means with the operation of said second switching means, said second switching means connecting a predetermined potential over said multiplied resistor means to the respectively associated impulse receiving terminals and said first switching means connecting an opposing potential to said impulse receiving terminals over said current control means to produce successively individual impulses at said terminals.

3. An impulse generator comprising a plurality of groups of impulse receiving terminals each group comprising several terminals, a plurality of first switching means corresponding in number to the number of terminals in each group of terminals, circuit means for connecting several of said terminals with each of said first switching means, said circuit including rectifier means for each terminal, a plurality of second switching means corresponding in number to the number of groups of said terminals, each of said second switching means being individual to one of said group of terminals, resistor means connected with each terminal in each group of terminals, means for connecting said resistor means in each group of terminals in multiple to the second switching means which is individual thereto, means for repeatedly and cyclically operating said first switching means, and means for actuating one of said second switching means during each cyclic operation of all of said first switching means for coordinating the operations of said first switching means with the operation of said second switching means, said second switching means connecting a predetermined potential over said multiplied resistor means to the respectively associated impulse receiving terminals and said first switching means connecting an opposing potential to said impulse receiving terminals over said rectifier means to produce successively individual impulses at said terminals.

4. An impulse generator comprising a plurality of groups of impulse receiving terminals each group comprising several terminals, a plurality of first switching means corresponding in number to the number of impulse receiving terminals in each of said groups of terminals, a plurality of second switching means corresponding in number to the number of groups of said terminals, each of said second switching means being individual to one of said group of terminals, resistor means connected with each terminal in each group of said terminals, means for connecting said resistor means in each group of terminals in multiple to the second switching means which is individual thereto, rectifier means connected with each terminal in each group of said terminals, circuit means for connecting with each of said first switching means at least one terminal in each of said groups of terminals over the rectifier means respectively associated therewith, means for

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successively individually operating each of said second switching means for a predetermined time interval to connect during such interval a predetermined potential to the resistor means respectively multiply connected with the corresponding second switching means, and means for successively operating all of said first switching means during each operating interval of said second switching means to connect a predetermined opposing potential successively to said rectifier means for the purpose of successively producing individual impulses at said impulse receiving terminals.

5. An impulse generator according to claim 1, comprising electronic switching means constituting said first switching means.

15 6. An impulse generator according to claim 1, comprising contact means constituting said first switching means.

7. An impulse generator comprising a plurality of groups of impulse receiving terminals disposed subdivided in a plurality of groups each comprising a predetermined number of terminals, a plurality of electronic switching means constituting first switching means in number corresponding to the number of terminals in each of said groups, circuit means for connecting corresponding terminals of different of said groups with predetermined individual electronic switching means, rectifier means in said circuit means, a plurality of second switching means respectively individual to said groups of terminals, means for connecting the respective second switching means with the corresponding groups of terminals, means for repeatedly sequentially and cyclically operating said electronic switching means, and means for actuating one of said second switching means during each cyclic operation of said electronic switching means for coordinating the operations of said electronic switching means in timed relation to the operation of said second switching means to produce successively individual impulses at said impulse receiving terminals.

8. An impulse generator comprising a first group and a second group of switching means each group comprising a plurality of individual switching means, a plurality of impulse receiving terminals, coincidence circuit control means connected with each terminal, means for interconnecting each of the switching means in said first group with each of the switching means in said second group over paths each including one of said impulse receiving terminals and coincidence circuit control means connected therewith, means for repeatedly sequentially and cyclically actuating the switching means in said first groups, and means for actuating one of the individual switching means in said second group during each cyclic operation of all of the switching means in said first group to produce by operative actuation of each switching means in said first group and coincident operative actuation of one of the switching means in said second group successive impulses at said impulse receiving terminals under the control of the coincidence circuit control means respectively connected therewith.

9. An impulse generator according to claim 8, wherein the number of impulse receiving terminals is equal to the product of the number of switching means in said first group and the number of switching means in said second group.

10. An impulse generator according to claim 8, comprising third switching means for controlling the operatively effective actuation of the switching means in said first and second groups.

11. An impulse generator according to claim 8, wherein said impulse receiving terminals are subdivided in a plurality of groups corresponding in number to the number of switching means in said second group, each group of impulse receiving terminals having a number of terminals corresponding to the number of switching means in said first group.

12. An impulse generator according to claim 8, wherein

electronic switching means constitute the switching means in said first group.

13. An impulse generator according to claim 8, comprising rectifier means constituting said coincidence circuit control means connected with each impulse receiving terminal.

2,117,639
2,541,932
2,664,467

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References Cited in the file of this patent

UNITED STATES PATENTS

Watson	-----	May 17, 1938
Melhose	-----	Feb. 13, 1951
Den Hertog	-----	Dec. 29, 1953