Nov. 22, 1932. E. BRÄUER 1,888,904

STATION CALLING DEVICE

Filed Oct. 12, 1929

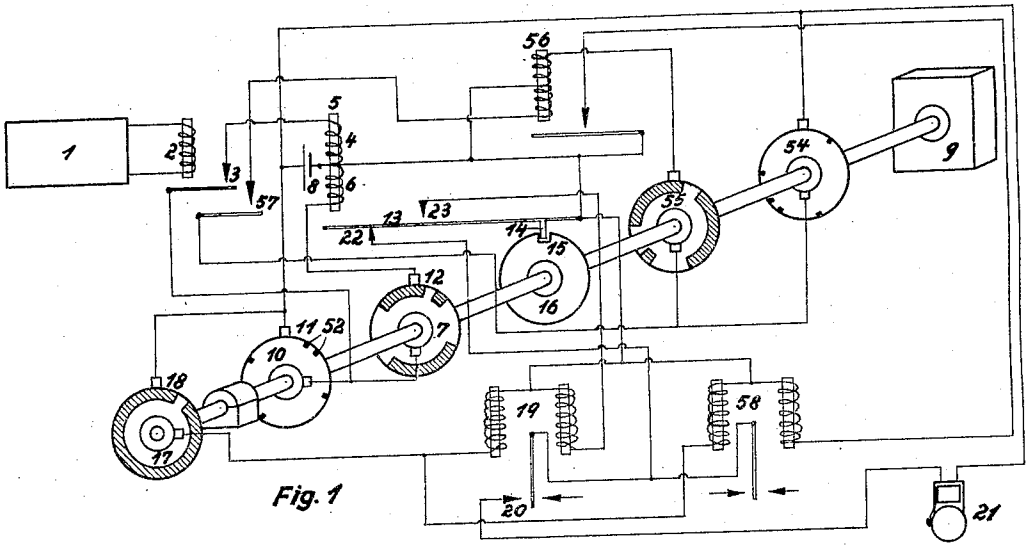


Fig. 1

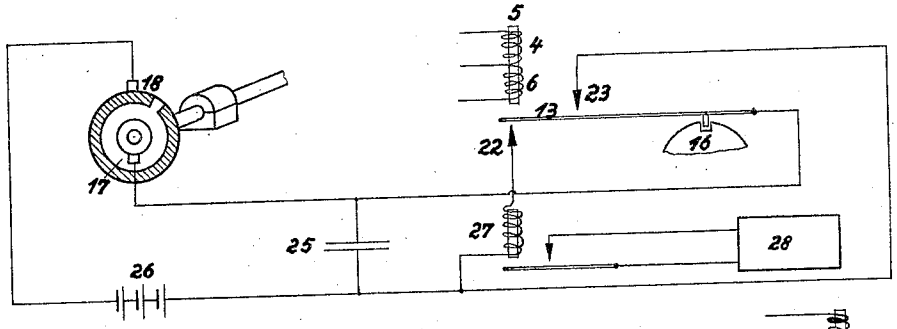


Fig. 2

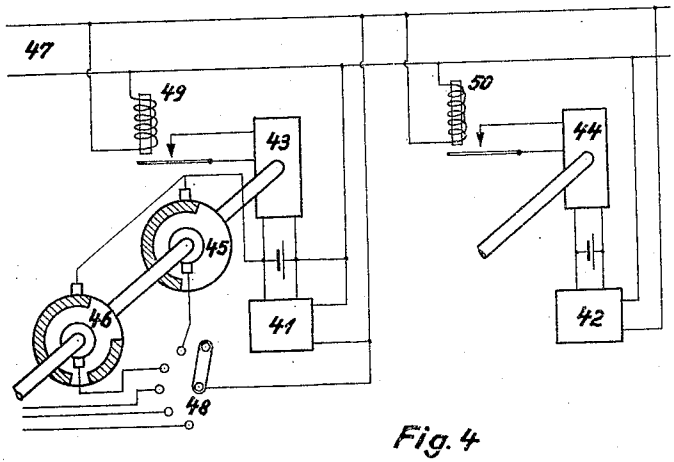


Fig. 4

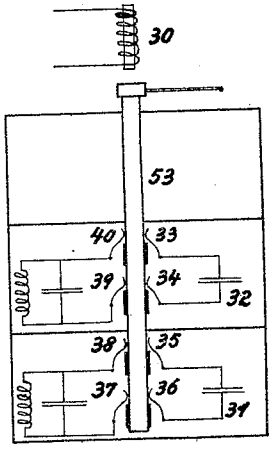


Fig. 3

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UNITED STATES PATENT OFFICE

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STATION CALLING DEVICE

Application filed October 12, 1929, Serial No. 399,269, and in Germany October 16, 1928.

The present invention relates to a device for calling a certain station among several, all of which receive the signals of the sending station.

If a given signal is received by several receivers, but it is intended only for certain of these receivers or for a single receiver only, it becomes necessary to arrange the signal itself in such a manner and to provide the receivers with such mechanical devices, that a signal which is, for instance, intended for a single receiver, may produce some reaction at all the receivers, but which will produce an effect decisive for the reception only at that intended receiver. This decisive reception effect may consist in the ringing of a bell or in the operation of a writing machine. This condition prevails if the connections are effected between the stations by electric waves, as well as over electric line wires or by means of light or acoustic signals.

The present invention consists in providing a set of apparatus and in the application of the same in the case that the signals are composed of Morse signals, that is, that they vary essentially between the strength of zero and a maximum intensity. Such a signal may, for instance, consist in the fact that from a permanent source of light, flashes of fixed duration are sent out between which the source of light is completely obscured, or in impulses of electro-magnetic waves of approximately equal intensity and intermediate pauses.

For this purpose, certain apparatuses are known but are limited in their application to those signals consisting of effective impulses of definite lengths. Other arrangements have the disadvantage of requiring an exact agreement between the releasing signal and the basic signal, which is practically impossible of accomplishment.

The present invention admits of using signals for calling receiving stations, which signals are composed of impulses and pauses of definite lengths, and at the same time, make it possible to render those signals of the corresponding receiver ineffective, which differ in their lengths by even only one impulse, which hereinafter will be referred to as a "Morse dash" or briefly, a "dash" or by a single short pause of a definitely fixed size.

According to the invention, the dashes of the call signal are converted in a well known manner into a direct current, which flows during the duration of the dash. This is preferably done with electro-magnetic waves in such a way that they are converted, after amplification into direct current impulses by means of a rectifier, detector, or the like. With light signals, the conversion into direct current impulses, is accomplished in a well known manner by photo-electric cells, magnifiers, or the like.

The invention aims to provide an apparatus adapted to produce in the receiver, a signal analogous to the signal received, and formed of direct current impulses and pauses, and which make the signal act together with the received signal upon a connecting element. Since perfect equality between the produced and the received signal cannot be accomplished by technical means, the activity of the apparatus is accordingly, suspended for a moment at the meeting points of an impulse and a pause through well known means.

In order that the invention and its mode of operation may be readily understood by those skilled in the art, I have in the accompanying drawing and in the detailed description based thereon, set out possible embodiments of the invention.

In this drawing:

Figure 1 is a schematic representation of one form of the invention;

Figure 2 is a modification of the embodiment of parts shown in Figure 1;

Figure 3 is a further modification of the same, and

Figure 4 illustrates a form of application of one of the embodiments for the transmission of signals by telephone or telegraph currents represented in connection with a double conduit.

Referring more specifically to the drawing, in which like characters of reference will designate corresponding parts throughout, and with particular reference to Figure 1, I have shown an embodiment of the inven-

tion, wherein a receiving apparatus 1 for wireless telegraphic signals activates a relay 2, which closes the contact 3 during the period of the dashes. This contact 3 is situated in the circuit of one of the windings 4 of a two-coil electro-magnet 5. This circuit passes from the battery 8 by way of the coil or winding 4, conduit 60, contact 3, conduits 63 and 62, brush collector 78, interrupter disk 10, brush collector 11 and conduit 61 back to the battery. The other coil winding 6 of the same magnet 5 is in a circuit, which leads from the battery 8 by way of coil 6, conduit 64, contact brush 12, signal disk 7, contact brush 79, conduit 62*a*, contact brush 78, interrupter disk 10, brush collector 11 and conduit 61 back to the battery 8.

The peripheral portion of the signal disk 7 is formed with conducting and non-conducting portions, which close and open the current in such a succession, that a signal is produced which is exactly like the signal intended for the call, when this disk is rotated by means of the clock-work 9. The interrupter disk 10 mounted on the same shaft 24 as the disk 7 has insulated places 52 upon its circumference arranged to correspond to the conducting portions of the signal disk 7, whereby said insulated places 52 of the interrupting disk 10 are always touched by the brush 11, and the two mentioned circuits of the battery 8 including the coils 4 and 6 are correspondingly interrupted at that moment when the edge of one of the insulated portions of the signal disk 7 contacts with the brush 12. In this manner, small differences between the signal received by the receiver 1 and that produced by the signal disk 7 do not effect the electro-magnet 5.

The electro-magnet 5 attracts the armature 13, when one of the two coils 4 and 6 are excited. This armature 13 carries a pin 14 adapted, when the apparatus is at rest, to engage a notch or groove 15 of the locking disk 16 also carried by the shaft 24, whereby said pin holds against operation, the clock-work together with the disks on the shaft 24.

The conducting and non-conducting portions of the signal disk 7 are so arranged upon its periphery, that the brush 12, when the apparatus is in its resting position, contacts with the part causing interruption, that is, with a non-conducting portion shortly before passing on to a conducting section. If a signal is then received by the receiver 1, and in consequence thereof a closure of the contact 3 is effected by the relay 2, a current from the battery 8 passes through the coil 4, whereby the armature 13 is attracted by the electro-magnet 5 and the pin 14 is lifted out of engagement with the groove 15 of the locking disk 16. The clock-work 9 may then set in motion the shaft 24 and its disks. If the received dash or impulse lasts long enough, the brush 12 passes over upon a conducting section of the circumference of the signal disk 7. The coil 6 then receives current, since the circuit passing through the signal disk is closed and the electro-magnet 5 becomes de-energized since the two windings 4 and 6 are traversed in opposite directions by a current of equal intensity. The de-energizing of the magnet 5 will cause the armature 13 to drop and the pin 14 will slide ineffectively upon the circumference of the locking disk 16 while the clock-work 9 operates without stopping or hindrance. At the same time, the contact 22 is opened, which in the rest position of the apparatus and as long as the pin 14 sat in groove 15, was closed. However, while the pin 14 slides upon the circumference of the disk 16, the contact 23 is not yet closed, but becomes so only when the electro-magnet 5 attracts the armature 13. After a short rotation, the contact of another disk 17 upon the shaft 24 is closed through the brushes 18 and 80. This latter contact is used for starting the desired final effect which, as shown in the embodiment illustrated in Figure 1 of the drawing, may consist in the ringing of a bell 21. By this contact, the coil 82 of the relay 19 inserted in the circuit 8, 61, 65, 18, 17, 80, 66, coil 82 of the relay 19, 67, 81, 69, 8, is excited whereby the armature 29 is moved towards the contact 20 and closes the same. If, during the entire period of the signal, lasting about as long as one revolution of the disks, current continues to pass simultaneously in the coils 4 and 6, or if no current flows through both coils, the armature 13 will not be attracted from its median position between the contacts 22 and 23, and after completion of one full revolution, drops again causing the pin 14 to fall into the groove 15 of the locking disk 16. At this moment, contact 22 is closed and hence, the bell circuit 8, 90, 88, 91, 13, 22, 70, 71, 29, 20, 72, 21, 73, 81, 69, 8 disclosed, whereby the mentioned final effect, that is, the sounding of the bell is produced. But, if after closure of the contact 20 and during the rotation of the shaft 24 and its disks, only one of the two coils 4 and 6 should alone become excited, in consequence of a difference between the received signal and the signal produced by the disk 7, the armature 13 is attracted by magnet 5, the contact 23 is closed and the coil 83 of the relay 19 is excited by the circuit 8, 90, 88, 91, 13, 23, 84, 83, 67, 81, 69, 8 in such a way that the armature 29 is moved away from the contact 20 and the final effect, namely, the ringing of the bell 21 fails to take place.

Instead of moving the armature 29 through the relay 19, the final effect may also be accomplished by closing contacts 17 and 18, whereby a condenser 25 (Fig. 2) is charged by a battery 26 because the circuit 26, 74, 18, 17, 80, 75, 76, 25, 77, 26 is closed. When closing contact 22 by way of relay 27, the con-

denser 25 is discharged causing the desired final effect, for instance, the switching in of a suitable known writing apparatus 28, because then the circuit 25, 76, 75*a*, 13, 22, 27, 77*a*, 25 is traversed by a current for a short period. If a difference between the received signal and the signal produced by the disk 7 occurs, the closing of contact 23 also takes place which, however, is then used for the purpose of short circuiting the condenser 25 through the circuit 25, 76, 75*a*, 13, 23, 85, 77*a*, 25 to discharge said condenser and to prevent the final effect.

In addition to the working arrangement already described, it may be advantageous and desirable to provide a plurality of signal disks and interrupter disks as is indicated respectively at 55 and 54 in Figure 1 of the drawing, which may be all driven by the clock-work 9. A plurality of double coiled magnets may also be used, as shown at 50 and the relay 2 may be made to work a plurality of suitably arranged contacts as illustrated at 57. Likewise, a plurality of relays may be provided as shown at 58. In this latter arrangement, the coils of the magnet 56 are connected in parallelism to the coils of the magnet 5 and through the battery 8, and the signal disk 55 is inserted in the circuit of one of the windings, while the working contact 57 is inserted in the circuit of the remaining winding. Likewise, relay 58 is connected parallel to relay 19, and contact 86 to contact 23. Now, if the signal is received by the receiver 1 which signal corresponds to the conducting and non-conducting sections of the circumference of the disk 55, the relay 19 will not keep the contact 20 closed, in consequence of the difference of this signal from the signal of the disk 7, but the relay 58 will keep its final effect contact 87 closed, so that another bell or writing apparatus or the like may be actuated. A single set of disks 17 and 16, it will be understood, is sufficient for the operation of the final desired effect. This arrangement is particularly desirable when it is intended that the apparatus should respond to different arriving signals and to release different final effects assigned to any particular signal. For example, the apparatus may serve to connect by means of the wireless receiver, several definite telephonic conduits to one receiver. Further, the apparatus may serve to receive besides the call number of a station, a distress signal such as an S. O. S., and to transmit it to an alarm. In this case, the contacts 87 and 20 may be connected in parallelism so that both act upon the bell 21.

Furthermore, the apparatus may be used in particular for the purpose of making a tuning re-arrangement of a receiver to a particular wave of the human voice. The arrangement can then be made so that the magnet 30 corresponding to relay 27 in Fig. 3, moves a rod 53 passing through receiver 1 and made of insulating material, which rod, by means of collector rings 33 to 40, respectively, electro-magnetically connects or disconnects suitable condensers as shown at 31 and 32 to or from the various vibration circuits of the receiver. If the added capacities are in a definite relation, the wave lengths of the tuning of the receiver will be changed through this alteration of the connection.

Furthermore, it may be advantageous to fix upon the shaft of the clock-work 9 a transmitter device consisting of signal disks 45 and 46 similar to the signal disk 7 of Figure 1. In Figure 4, the reference characters 43 and 44 designate, each, an apparatus corresponding to that disclosed in Figure 1. The reference characters 8*a* and 8*b* indicate the batteries replacing the battery 8 shown in Figure 1. Upon the shaft 24*a* of the apparatus 43 are mounted a plurality of signal transmitter disks as shown at 45 and 46, adapted to be switched in by the switch 48 and to send a call signal into the double conduit 47 upon actuation of the clock-work. Upon the shaft 24*b* of the apparatus 44, there may also be arranged a plurality of signal disks. Reference characters 49 and 50 indicate the calling relays of telephone subscribers 41 and 42. The apparatus 43 and 44 have the effect, that of the signals passing over the line 47, only one very definite signal will call a determined telephone subscriber.

The described apparatuses can be employed advantageously with automatic exchange centrals for telephone operation instead of the customary manually operated connectors or switches. From this, the advantage is gained that for operation, a much lower current intensity suffices than that required for the operation of a manually operated switch, and further, the advantage that not only the number of the wave impulses determines the choice of the signal, but also that the signals can be distinguished from one another through the different lengths of the wave impulses. For example, a very great number of different signals may consist simply of a single impulse whose length, however, varies. Such a signal corresponds to the disk 45. In the operation of automatic exchanges and in other cases, it may be advantageous to choose an arrangement which is otherwise well known, through which the march of the clock-work can be automatically regulated and synchronized. For this purpose, there may be provided several grooves 15 upon the circumference of the disk 16. The pin 14 drops successively into these grooves and stops the rotation, until the next dash signal or impulse is received causing an operation of the apparatus and releasing the same.

Manifestly, the construction shown and described is capable of many modifications

and those modifications that are within the scope of the claims, I consider within the spirit of my invention.

I claim:

1. An apparatus for calling a certain station among several all of which receive the signals consisting of direct current impulses and pauses from the sending station, comprising a source of current in the receiving station, a signal organ in circuit with said source of current and having conducting and non-conducting portions to produce a signal equal to the arriving signal, driving means to drive said signal organ, a differential relay interposed in the circuit and acted upon equally strongly in opposite directions by the received and produced signals, and a current interrupter having its current interrupting portions arranged in relation to the passages between the conducting and non-conducting portions of said signal organ to render ineffective the differences between the received and produced signals occurring at the transition points between the impulses and pauses.

2. An apparatus for calling a certain station among several all of which receive the signals consisting of direct current impulses and pauses from the sending station, comprising a source of current in the receiving station, a signal organ in circuit with said source of current and having conducting and non-conducting portions to produce a signal equal to the arriving signal, a clock-work to drive said signal organ, a differential relay interposed in the circuit and acted upon equally strongly in opposite directions by the received and produced signals, and a current interrupter actuated by the clock-work synchronously with the signal organ, said current interrupter being adapted to disconnect the source of current of the receiving station at the transition points between the conducting and non-conducting portions of said signal organ.

3. An apparatus for calling a certain station among several all of which receive the signals consisting of direct current impulses and pauses from the sending station, comprising a source of current in the receiving station, a signal organ in circuit with said source of current and having conducting and non-conducting portions to produce a signal equal to the arriving signal, driving means to drive said signal organs, a differential relay interposed in the circuit and acted upon equally strongly in opposite directions by the received and produced signals, a current interrupter having its current interrupting portions arranged in relation to the passages between the conducting and non-conducting portions of said signal organ to render ineffective the differences between the received and produced signals occurring at the transition points between the impulses and pauses, a switching element operable for closing the circuit at the receiving station whereby the latter may receive the message.

4. An apparatus for calling a certain station among several all of which receive the signals consisting of direct current impulses and pauses from the sending station, comprising a source of current in the receiving station, a signal organ in circuit with said source of current and having conducting and non-conducting portions to produce signals equal to the arriving signal, driving means to drive said signal organ, a differential relay interposed in the circuit and acted upon equally strongly in opposite directions by the received and produced signals, a current interrupter having its current interrupting portions arranged in relation to the passages between the conducting and non-conducting portions of said signal organ to render ineffective the differences between the received and produced signals occurring at the transition points between the impulses and pauses, and a switching element in said circuit to alter in wireless transmission, the tuning to another wave length.

5. An apparatus for calling a certain station among several all of which receive the signals consisting of direct current impulses and pauses from the sending station, comprising a source of current in the receiving station, a signal organ in circuit with said source of current and having conducting and non-conducting portions to produce a signal equal to the arriving signal, driving means to drive said signal organ, a differential relay interposed in the circuit and acted upon equally strongly in opposite directions by the received and produced signals, a current interrupter having its current interrupting portions arranged in relation to the passages between the conducting and non-conducting portions of said signal organ to render ineffective the differences between the received and produced signals occurring at the transition points between the impulses and pauses, a switching element in said circuit to alter in wireless transmission, the tuning to another wave length and having a non-conducting switching means extending through the various parts of the receiving station, said parts being themselves protected against mutual electro-magnetic influences.

6. An apparatus for calling a certain station among several all of which receive the signals consisting of direct current impulses and pauses from the sending station, comprising a source of current in the receiving station, a signal organ in circuit with said source of current and having conducting and non-conducting portions to produce a signal equal to the arriving signal, driving means to drive said signal organ, a differential relay interposed in the circuit and acted upon equally strongly in opposite directions by the received and produced signals, and a current

interrupter having its current interrupting portions arranged in relation to the passages between the conducting and non-conducting portions of said signal organ to render ineffective the differences between the received and produced signals occurring at the transition points between the impulses and pauses, said signal organ and said current interrupter consisting of disks arranged upon a common shaft.

7. An apparatus for calling a certain station among several all of which receive the signals consisting of direct current impulses and pauses from the sending station, comprising a source of current in the receiving station, a signal disk in circuit with said source of current and having conducting and non-conducting portions to produce a signal equal to the arriving signal, a clock-work to drive said signal disk, a differential relay interposed in the circuit and acted upon equally strongly in opposite directions by the received and produced signals, a current interrupter disk actuated by the clock-work synchronously with the signal disk, said current interrupter disk being adapted to disconnect the source of current of the receiving station at the transition points between the conducting and non-conducting portions of the signal disk, a locking disk for the clock-work and a contact disk in said circuit for simultaneously interrupting the received and produced signals at the receiving station.

In witness whereof I have hereunto set my hand.

ERNST BRÄUER.