

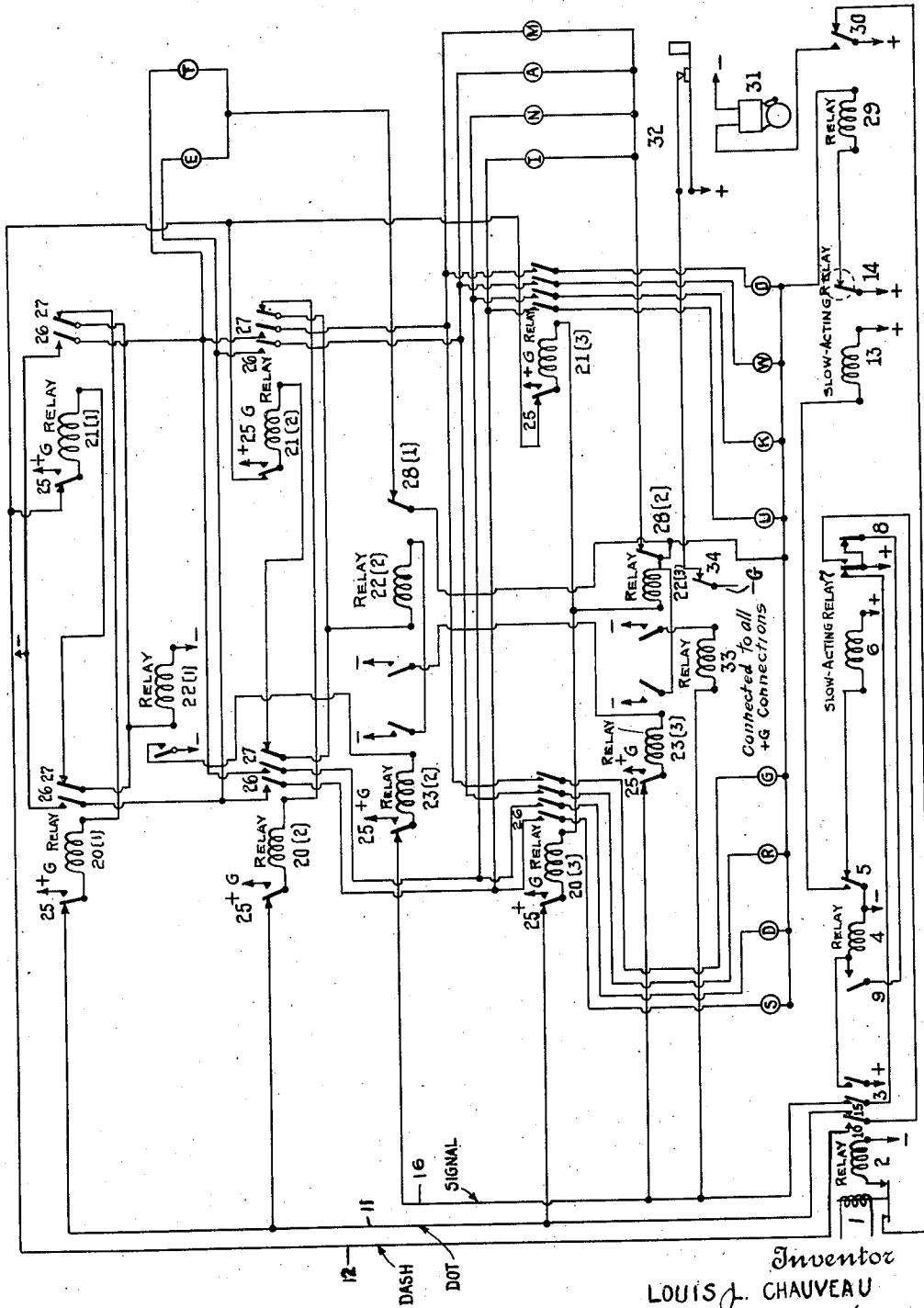
Dec. 18, 1928.

L. L. CHAUVEAU

CALL SELECTOR

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Inventor

LOUIS J. CHAUVEAU

By his Attorney *Draftman*

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LOUIS L. CHAUVEAU, OF PARIS, FRANCE.

CALL SELECTOR.

Application filed January 8, 1923, Serial No. 611,538, and in France January 19, 1922.

This apparatus has for its object to indicate at the station receiving a call over wires or by means of wireless telegraphy, which station is sending the call.

5 For this purpose a system is provided in which each one of a plurality of stations calls another station by sending a characteristic letter or a group of letters, called the call indication. This indication may, for instance,
10 be formed by Morse signals, that is groups of long and short signals.

The call indication displaying device comprises as many lamps or visual signals as there are stations in the system and these
15 lamps or visual signals are controlled in such a manner that when a call indication is sent, the lamp or visual signal corresponding to this indication is actuated. At the same time an audible signal is also actuated.

20 The calling station sends out the indication and the called station is provided with a call indicator displaying device indicating which station is sending a call in the same manner as is the case in usual telephone practice in
25 which the calling lamp of a station is lighted.

For the purpose of exemplifying the invention and explaining the system, one embodiment of the apparatus forming the object of the invention will be disclosed. The
30 accompanying drawing shows the circuit arrangement of the call indicator displaying device.

For the sake of simplicity the description and the drawing disclose an apparatus by
35 means of which Morse signals composed of three or less signals may be received. It will be obvious to those skilled in the art that the apparatus is applicable to Morse signals composed of more than three signals without departing from the spirit of the invention.

40 The call indicator displaying device which must respond to Morse signals comprises two groups of elements. The operation of these elements will first be described in general
45 and the circuits will be traced in detail later.

The first group is provided for determining the nature of a signal received; whether it is a dot or a dash.

50 The second group controls the order in which the successive signals forming the call indication are received. Depending on such order this group of elements establishes a suitable circuit for the purpose of actuating the corresponding lamp or visual signal.

55 The group of elements provided for the purpose of determining the nature of the sig-

nals received (dot or dash) is like the one described in my copending application, Serial No. 611,537 filed Jan. 8, 1923, entitled "Call selector."

60 The first group comprises a relay contact mechanism 1, whose coil may be energized by means of a circuit comprising a telegraph key in a wire telegraph system or it may be energized by connection in a radio receiving
65 system. Contact mechanism 1 controls the magnet 2 which in turn controls by its contact 3 the locking relay 4. When this relay is energized it opens at 5 the circuit of the slow release magnet 6. After the expiration
70 of a certain period of time the magnet 6 restores its contacts 7 and 8. Through the contact 8 of the magnet 6 and the contact 9 of the locking magnet 4, the magnet 4 is maintained energized until the magnet 6 fully
75 restores its contacts. As soon as the contact 7 is restored the plus pole of the battery is connected with contact 10 of the magnet 2.

80 The second group comprises dot magnets 20 and dash magnets 21, the number of each being equal to that of the signals composing the call indication to be received.

All the dot magnets are connected to the dot line 11 and all the dash magnets are connected to the dash line 12. A magnet 22 is
85 connected in series with the common return path of the dot magnet and the dash magnet of the same signal. The signal magnet 22 will therefore operate simultaneously with the dot magnet or the dash magnet of the
90 same signal.

In general, the purpose and operation of the series of signals E, I and S are to show specific indications for a given sequence of dots, dashes and spaces. This is accomplished
95 by the use of the multiple selector relays of which specific embodiment is shown in the drawing. Here one out of the 14 signals may be selectively operated and the bell 31 operated in connection with any one of them.

100 To operate either signal E or T a single signal is sent and then if a sufficient non-signalling period occurs, relay 13 will be de-energized and the signal E or the signal T will be operated depending upon whether the
105 impulse is a dot or a dash. The circuit for E may be traced from + at armature 14, relay 29, armature, 28 (1), signal E, armature 26 of dot magnet 20 (1) and to -. The circuit for T is from + at armature 14, relay
110 29, armature 28 (1), signal T, armature 26 of dash magnet 21 (1) and then -.

If two signals were sent out and then a sufficient non-signalling period occurs, relay 13 will be de-energized and a circuit will be closed for one of the signals, I, N, A, M, depending upon whether . . . , - . . , . - . , or - - . , respectively, are transmitted. The circuit for I is from + at 14, relay 29 armature 28 (2), signal I, armature 26 of relay 20 (2) armature 26 of relay 20 (1) and to -. This will occur when the signals consist of a two dots since relays 20 are dot relays. The circuit for signal A, actuated by . - is from + at 14, relay 29, armature 28 (2), signal A, armature 26 of relay 21 (2), armature 26 of relay 20 (1) and to -. This circuit will be closed after the signals consist of first a dot and then a dash. Similar circuits may be traced for N and M, M energizing on two dashes and N on a dash and then a dot. The signals E and T will not be operated when two signals are sent in succession, for the reason that at the end of the first signal relay 13 will not have sufficient time to release and therefore the circuits for these signals will be open at 14 and at the long pause after the second signal the circuits while closed at 14 will be open at 28 (1).

When three signals are sent in succession one of the eight lower signals will be operated. The circuit for W, for instance, will be from 14, relay 29, signal W, second armature from right of relay 21 (3), armature 26 of relay 21 (2) armature 26 of relay 20 (1) and to -. This corresponds to a succession of signals comprising a dot and two dashes as will be obvious.

The circuit for the 8 signals and the codes corresponding thereto, as obvious from the previous description, will be . . . , - . . , . - . , - - . , - - . , - - . , - - . , - - . for S, D, R, G, U, K, W and O, respectively in order stated. The signals E and T will not operate when three signals are sent in succession for the reason stated before in connection with the sending of two signals. The signals I, N, A, M, will not be energized at the end of the second signal for the reason that relay 13 will not have sufficient time to close armature 14 before the third signal arrives. At the long pause after the third signal, the circuits for these signals will be completed at 14 but these circuits will then be open at armature 28 (2).

Since the relay 29 operates in connection with any one of the signals, the bell 31 will operate and the selector will be permanently disconnected from relay 1 until key 32 which includes the master ground connection is operated to break all the locking circuits. If more than three signals are sent in succession relay 33 will operate to open all the locking circuits and the selector will be restored to normal without operating any one of the signals.

When the apparatus is in its normal posi-

tion the series magnet 22 (1) of the first signal is the only one that is connected to the - pole. Due to this, the first signal can cause the actuation of only the magnets of the first signal. However, at the beginning of each signal the signalling line 16 is traversed by current in the above described manner whereby at the beginning of the second signal, the signal magnet 23 (2) of the second signal will be energized and will connect the - pole to the magnet 22 (2) of the second signal. This second signal will therefore be registered by the dot magnet 20 (2) of the second signal. At the beginning of the third signal, the magnet 23 (3) is energized and connects the - pole to the magnets corresponding to the third signal.

The dot magnets 20, (1), (2), (3), the dash magnets 21, (1), (2), (3), and the signal magnets 23 (2), (3) are each provided with a locking contact 25. After the receiving of the signal these magnets will be locked up and only the magnets corresponding to the signals received are energized.

The dot magnets 20 (1), (2), (3), and the dash magnets 21, (1), (2), (3), are provided with a certain number of contacts 26 which control the circuit of the lamps or visual indicators: E, T, I, N, A, M, S, D, R, G, U, K, W, O. These contacts are so arranged that they will close only the circuit of the lamp or visual signal corresponding to the signal received. The closing of this circuit occurs only when the last signal received is followed by a silent period or space which is sufficiently long to permit the slow acting magnet 13 to release its armature. The lamp will then be lighted or the visual signal will be actuated.

The dot magnet 20 (1) and 20 (2) of a signal opens in 27 the circuit of the dash magnet representing the same signal and vice versa. This arrangement is for the purpose of guarding against faulty operation.

Magnet 22 (2) of the second signal opens in 28 (1) the circuit of the lamp or visual signal corresponding to the letters E. T. composed of a single signal. The magnet 22 (3) at the third signal opens in 28 (2) the circuit of the lamps or visual signals corresponding to the letters I. N. A. M. composed of two signals.

The lamps or visual indicators are connected in series with magnet 29 which through its contact 30 closes the circuit of the bell 31 and opens the circuit of the magnet 2. The bell rings and the signals received have no further effect on the apparatus which is restored to normal by means of a key 32 which opens the current path of the whole arrangement.

Finally, a signal magnet 33 connected with the signalling line controlled by the series magnet 22 (3) of the last signal opens in its contact 34 the current feeding path of the

apparatus, designated by -G, if the number of signals received is higher than the one for which the apparatus is adjusted.

The operation of dot, dash selecting relays will be better understood by assuming the reception of a certain signal, for example: the letter D comprising a dash followed by two dots. Upon the reception of the first impulse comprising a dash, relay 2 is energized which in turn energizes relay 4 to close its contact 9 and to move its contact member 5 to the left de-energizing slow-acting relay 6, which starts its movable contact 7 and 8 moving slowly toward the right. The impulse received being a dash a circuit is now completed from the plus of movable contact 7 to stationary contact 10 of relay 2, the said relay being still energized owing to the fact that a dash impulse has been received. The dash line 12 is consequently energized, which in turn energizes the first dash magnet 21 (1) through the interlocked contacts 27 and the minus terminal of relay 22 (1). The dash relay 21 (1) consequently closes and locks itself in independent of the dash line by means of its upper contacts 25 and +G, the relay 22 (1) also being locked in through the same contacts.

The system is now ready for the reception of the second impulse which is a dot. The contacts of the relay mechanism 1 close, resulting in the energization of relay 2, which in turn energizes relay 4 to de-energize relay 6. When movable contact 7 of slow-acting relay 6 engages its right hand stationary contact a circuit is completed as follows: from plus terminal to movable contact 7 to stationary contact 15 of relay 2, as the dot impulse received was not of sufficient duration to keep the movable contact of relay 2 in its left-hand position until relay 6 releases. Both the dot line 11 and the signal line 16 are, therefore, energized, the signal line 16 being energized prior to the dot line. The energization of the signal line results in the energization of relay 23 (2) through the contacts of relay 22 (1). The energization of relay 23 (2) results in the preparation of the circuit for relay 22 (2). The dot line now being energized results in the energization of the second dot magnet 20 (2) through the interlocking contacts of the second dash magnet 21 (2), the relay 22 (2) and the right-hand contacts of energized relay 23 (2). Attention is called to the fact that relay 23 (2) when it closes locks itself in through its contacts 25. The second dot relay 20 (2) and the relay 22 (2) are both locked in by means of the locking contacts 25 of the relay 20 (2). The system is now ready for the reception of the third signal impulse, which is also a dot. The signal line 16 is energized in a similar manner as explained above, which results in the energization of relay 23 (3) through the left-hand contacts of relay 22 (2). Relay

23 (3) is then locked in independent of the signal line by means of its locking contacts 25. The third signal being a dot, the dot line 11 is energized in a manner as already explained above, which results in the energization of the third dot relay 20 (3) through the coil of the relay 22 (3) and the right-hand contacts of relay 22 (3). The dot relay 20 (3) and relay 22 (3) are then locked in independent of the dot line by means of relay 20 (3)'s contacts 25.

The energization of relay 22 (3) prepares the circuit for relay 33, which may or may not be energized. If no other signal impulses are received the relay 33 will naturally not be energized and a circuit through the indicating device marked D, which corresponds to the signal impulses received is completed as follows: from the plus terminal through contacts 14, which are closed owing to the fact that relay 13 is de-energized, through relay 29 through indicating device D, through second contacts from the left of relay 20 (3), through second contacts from the left of relay 20 (2) and through the first left-hand contacts of relay 21 (1) to the minus terminal. Attention is also called to the fact that the energization of relay 29 also completes a circuit through the audible signalling means 31.

Now if the third impulse should be followed by another impulse, the signal line will energize relay 33, which will in turn open contacts 34, to disconnect all the various relay coils from the -G terminal with the result that the same will give no indication whatsoever. This -G terminal is connected to all of the +G terminals thereby preventing a + ground connection from these +G terminals, except through -G. It should be understood that the invention is not limited to the particular type of apparatus herein described. It is readily applicable to systems in which the signals to be received are composed of more than three signals. Without departing from the spirit of the invention the apparatus may be applied for the selection of signals of a code composed of more than two different durations (dot and dash) or in which the signals are differentiated by some other characteristic than their duration, (intensity, frequency, etc.). The construction of the quick or slow acting relays is immaterial as long as these devices perform their above described functions.

The slow acting magnet 6 is adjusted in such a manner that the back contact of 7 is closed only after a period of time which is longer in duration than a dot but shorter than a dash. Under these conditions if the signal received is a dot, the contact 10 of the sending relay is in its normal position and the dot line 11 is traversed by current. On the other hand if the signal received is a dash the contact 10 is in its actuated position

and the dash line 12 is traversed by current.

Through its front contact 5, the locking magnet 4 controls the slow acting magnet 13 and the latter determines the duration of the silent period separating the signals. If these silent periods are sufficiently long the magnet 13 releases its contact 14 whereupon the lamp will be lighted or the visual indicator displayed.

10 In addition to the above described apparatus which has been used in the "call selector" forming the object of the above mentioned application, the armature 7 of the slow acting magnet is provided with a front contact and the magnet 2 is provided with an additional contact 15. Through the front contact 7 and the contact 15 the signalling line 15 is traversed by current at the beginning of each signal.

20 By means of the above described arrangement, the following operations may be performed:—

(1) Either the dot line 11 or the dash line 12 is traversed by current depending on the signal received.

(2) The signalling line 16 is traversed by current at the beginning of each signal.

The group of elements provided for the purpose of controlling the order of arrival of the successive signals forming the indicator is analogous to the one that performs the same function in the apparatus disclosed in applicant's U. S. Patent No. 1,597,763 for printing telegraphy, dated Aug. 31, 1926.

35 Having described my invention I declare that what I claim is:

1. In a call selector adapted to select a call made up of from one to n impulses, each impulse being either relatively long or short, a plurality of groups of selecting means, means whereby the first group is arranged to respond only to the first received impulse, means whereby the second group is arranged to respond only to the second received impulse, and means whereby the n th group is arranged to respond only to the n th impulse received, and means for restoring the system to initial condition on the receipt of the $n+1$ impulse within a predetermined time after the termination of the n th impulse.

2. In a call selector, a plurality of groups of selectors, a plurality of groups of indicators, one group of indicators corresponding to each group of selectors, means for causing the first group of selectors to respond only to the first signal impulse to select an indicator of the first group only, means to cause the second group of selectors to respond only to the second signal impulse to select an indicator of the second group, only, means to cause the n th group of selectors to respond only to the n th signal impulse to select an indicator of the n th group only and means for causing the restoration of the system to normal upon the reception of the $n+1$ signal

within a predetermined time after the termination of the n th signal.

3. In a call selector, a plurality of groups of selectors a plurality of groups of indicators, one group of indicators corresponding to each group of selectors, means for causing the first group of selectors to respond only to the first signal impulse to select an indicator of the first group only, means to cause the second group of selectors to respond only to the second signal impulse to select an indicator of the second group only means to cause the n th group of selectors to respond only to the n th signal impulse to select an indicator of the n th group only, means for causing the restoration of the system to normal upon the reception of the $n+1$ signal within a predetermined time after the termination of the n th signal and means for causing energization of the indicator selected at the expiration of a predetermined period of silence after the termination of any signal impulse.

4. A call selector consisting of means arranged to respond to received signal impulses, three conductors, one of said conductors arranged to be energized whenever a signal impulse is received on said means, another for dots and another for dashes, timing means associated with said signal responsive means for causing energization of another of said conductors when the received signal impulse is of less than predetermined length, and for causing energization of the third conductor when said impulse is of greater than predetermined length, a plurality of relays arranged to be connected to said dot conductor, a like number of relays arranged to be connected to said dash conductor, the number of each group of relays being equal to the number of impulses in the call having the maximum number of impulses, each relay connected to one conductor having means to open the circuit of the corresponding relay connected to the other conductor, holding means associated with said relays, and the corresponding relays connected to said dot and said dash conductor having a common return circuit, a relay connected in said circuit, a circuit controlled by said relay, and including a relay arranged to cause the connection of the next corresponding group of relays to the dot and dash conductors respectively, contacts controlled by said relays for preparing the circuit of one particular indicating device for a given sequence and number of dots and dashes, a second timing means for causing energization of said indicating device at the expiration of a predetermined time period of silence after the termination of a signal impulse, and means for restoring the system to initial condition upon receipt within said predetermined time period of a signal impulse after the operation of the relay arranged to be operated by the

last signal impulse of the signal having the maximum number of impulses.

5. In a call selector, a plurality of groups of indicators, a plurality of groups of selectors, a plurality of circuits controlled by said selectors for selectively energizing any one of said indicators, means for causing the first group of selectors to respond only to the first signal impulse to prepare a circuit for energizing an indicator of the first group only, means for causing the second group of selectors to respond only to the second signal impulse to prepare a circuit for energizing an indicator of the second group only and to open the circuit previously prepared by the selectors of the first group and means for causing the n th group of selectors to respond only to the n th signal impulse to prepare a circuit for energizing an indicator of the n th group only for opening the circuit previously prepared by the selectors of the second group, and means for restoring the system to initial condition on receipt of the $n+1$ impulse within a predetermined time after the termination of the n th impulse.

6. In a call selector for visibly indicating a call letter transmitted from a sending station, the combination with a relay responsive to the impulses making up the call letter, of a dot line, a dash line and a signal line associated with said relay, a slow release relay controlled by said relay for energizing either the dot line or the dash line depending upon the nature of the received impulse and for energizing the signal line regardless of the nature of the impulse, a series of relays connected to the dot line, another series of relays connected to the dash line, and a series of relays connected to the signal line for preparing the circuits of the dot or dash relays preparatory to the energization of the dot or dash line depending upon the nature of each received impulse of the call letter.

7. In a call selector for visibly indicating a call letter transmitted from a sending station, the combination with a relay responsive to the impulses making up the call letter, of a dot line, a dash line and a signal line associated with said relay, a slow release relay controlled by said relay for energizing either the dot line or the dash line depending upon the nature of the received impulse and for energizing the signal line, except for the

first impulse, regardless of the nature of the impulse, a first set of relays responsive only to the first impulse, a second set of relays responsive only to the second impulse, and an n th set of relays responsive only to the n th impulse, each set comprising a relay connected to the dot line and a relay connected to the dash line, a relay connected to the signal line associated with each set, from the second to the n th set inclusive, for preparing their circuits prior to the energizing of the dot or dash line, and an n th+1 relay associated with the signal line energized by an n th+1 impulse for resetting all the relays to normal.

8. In a call selector, means responsive to received signals, two conductors, a slow release relay controlled by said signal responsive means for selectively energizing said conductors according to the length of the received signal impulse, a plurality of indicating means, means associated with said conductors for selectively preparing the circuits of one of said indicating means in accordance with the received signal, a second slow release relay for causing energization of one of said indicating means at the expiration of a predetermined period of silence after the termination of a received signal, and means for restoring the system to normal on receipt of an impulse received before the expiration of a predetermined silent period after the reception of the maximum number of impulses for which the system is adjusted.

9. In a call selector adapted to select a call made up of from one to n impulses, each impulse being either relatively long or short, a plurality of groups of selecting means, means for causing the first group to respond only to the first received impulse, means for causing the second group to respond only to the second received impulse, and means for causing the n th group to respond only to the n th received impulse, timing means arranged to complete the circuit prepared by said selecting means at the expiration of a predetermined period of silence after the termination of any impulse, and means for restoring the system to initial condition on the receipt of the $n+1$ impulse within a predetermined time after the termination of the n th impulse.

LOUIS L. CHAUVEAU.