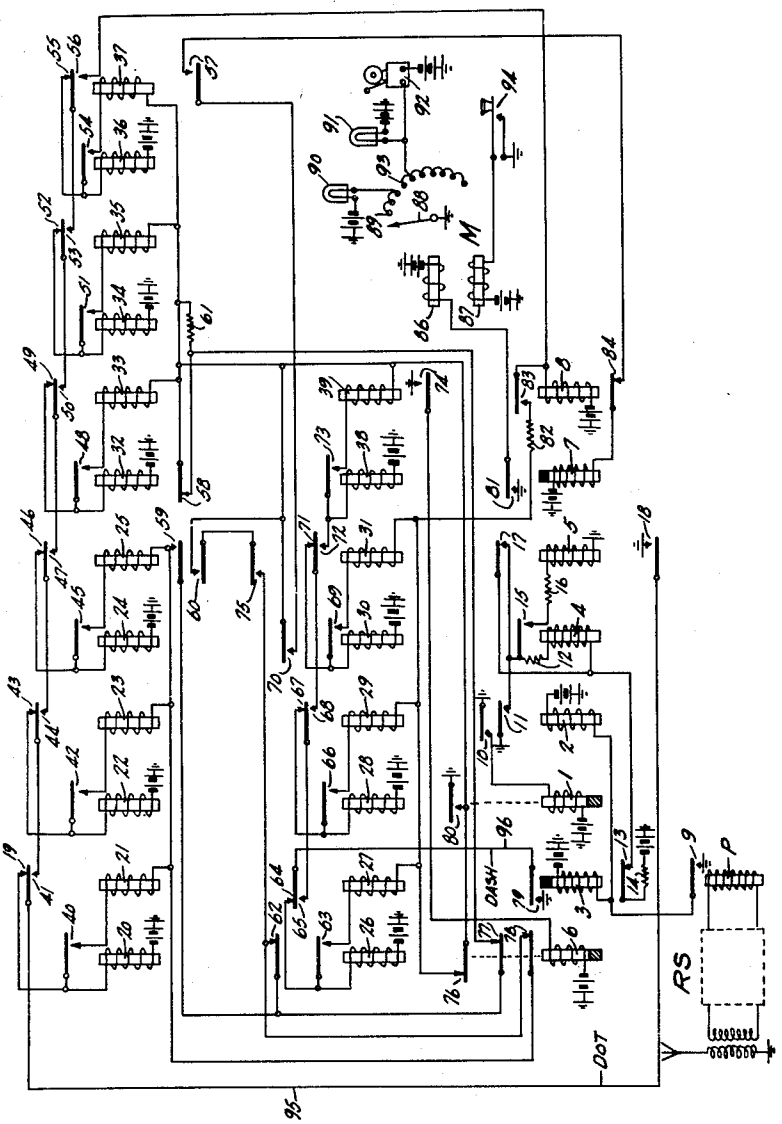
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SELECTIVE CODE RECEIVER

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SELECTIVE CODE RECEIVER

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4 Claims. (Cl. 177—353)

The present application is a division of my prior application, Serial No. 363,875, filed May 17, 1929, Patent No. 1,968,078, dated July 31, 1934. The particular feature of the selective code receiver which is being divided out and claimed in this application relates to a system of control relays which discriminate between the dots and dashes of a received signal.

A complete understanding of the invention may best be had from the following detailed explanation when read in connection with the accompanying drawing, comprising one figure only, which shows by means of the usual schematic diagram the complete circuit of the SOS receiver. The wireless receiving set has been indicated at RS and not shown in detail, as these receivers are well known in the art. The receiver is arranged to be used with any of these sets having a plate circuit suitable for operating the plate relay P. This plate relay may be adjusted to operate with the particular set to be used. The minor switch M is the standard ten-point minor switch well known in automatic telephony.

As is well known in the art, a complete SOS signal is transmitted as one letter, and the operation of the receiver depends upon the correct transmission of the signal in accordance with this practice. A distinct pause such as is used to separate the letters of a word in telegraphy will allow the receiver to release. However, the dashes of the signal may be made as long as desired by the operator transmitting the signal without interfering with the operation of the receiver in any way.

The complete operation of the receiver upon the receipt of an SOS signal of three dots, three dashes, and three dots will first be explained. The first dot of the signal is received by the receiving apparatus RS, which in turn momentarily operates plate relay P. At its make contact 9, relay P closes an obvious circuit for relays 2 and 3 in multiple. Relay 3 is slow to operate and is adjusted to respond to the dash impulses of the signal but will not respond to the dot impulses. Relay 2 operates and at contact 10 closes an obvious circuit for relay 1 which is made slow to release and is adjusted to remain operated during the complete signal, provided the entire signal is received as a single letter. Relay 2 also closes a circuit from ground, contact 11, resistance 12, winding of relay 4, back contact 13 of relay 3, resistance 14, to battery. Relay 4 operates but is quickly released due to the opening of contact 11 of relay 2 which is deenergized at the end of the dot impulse by the release of the plate relay P. Before relay 4 releases, however, it closes a circuit from battery, resistance 14, back contact 13 of relay 3, winding of relay 4, resistance 12, contact 15, resistance 16, winding of relay 5, to ground. Relay 5 operates in this circuit after relay 2 releases to remove at its armature 11 the shunt around relay 5 and at contact 17 short circuits the winding of relay 4.

The operation of relay 5 also closes a circuit from ground, make contact 18 of relay 5, conductor 95, back contact 19 of relay 21 of dot group #1, winding of relay 20, to battery. Relay 20 operates and at contact 40 closes a circuit from battery, winding of relay 20, contact 40, winding of relay 21, back contact 78 of relay 6, back contact 62 of relay 26, back contact 77 of relay 6, back contact 58 of relay 32, make contact 80 of relay 1, to ground. When relay 5 releases due to the opening of contact 15, ground shunt is removed from the winding of relay 21, allowing it to operate in series with relay 20 in the above-traced circuit. At contact 41 the impulsing lead 95 is extended to relay 22 of dot group #2.

When the second dot of the SOS signal is received by the receiving set RS, relay P is again momentarily energized and in turn causes the momentary energization of relays 2, 4, and 5 in the above-described manner. The closing of contacts 18 of relay 5 completes a circuit from ground, contact 18, impulse lead 95, contact 41 of relay 21, contact 43 of relay 23, winding of relay 22, to battery. Relay 22 operates and at contacts 42 closes a circuit from battery, winding of relay 22, contact 42, winding of relay 23, to ground at contact 80 of relay 1 over the same path as heretofore traced for the operation of relay 21. Upon the release of relay 5, relay 23 operates and at contacts 44 extends the impulsing lead 95 to relay 24 of dot group #3.

The third dot of the SOS signal is received in the same manner as described for the first and second dots. In this case relays 24 and 25 of dot group #3 are operated. At its contact 47 relay 25 transfers the impulsing lead 95 to relay 32 of dot group #4. At contact 59 it closes a locking circuit for the relays of the first three dot groups independent of contact 62 of relay 26. This locking circuit extends from ground, contact 80 of relay 1, back contact 58 of relay 32, back contact 77 of relay 6, contact 59 of relay 25, to the windings of relays 25, 23, and 21 in multiple. The first three dots of the SOS signal have now been received and registered.

When the first dash of the signal is next received, relay P again operates and in this case

remains operated a sufficient length of time to operate relay 3 in multiple with relay B. At its back contact 13, relay 3 opens the circuit of relays 4 and 5 to prevent the operation of these relays and the registering of another dot at this time. At contact 79 relay 3 closes a circuit from ground, contact 79, conductor 96, back contact 64 of relay 27, winding of relay 26, to battery. Relay 26 operates and at contact 63 closes a circuit from battery, winding of relay 26, contact 63, winding of relay 27, back contact 76 of relay 6, contact 80 of relay 1, to ground. At the end of the dash impulse, relay 3 releases due to the opening of contact 9 of relay P and at contact 79 removes the ground shunt from relay 27, allowing it to operate in series with relay 26 in the above-traced circuit. At contact 65 relay 27 extends the impulsing lead 96 to relay 28 of dash group #2. The second dash of the signal operates relays 28 and 29 of dash group #2 in the same manner as described above for the operation of relays 26 and 27. Relay 29, at its contact 68, extends the impulsing lead 96 to relay 30 of dash group #3.

When the third dash of the signal is received, relays P and 3 operate as heretofore described. Relay 3 now closes a circuit from ground, contact 79, conductor 96, contact 65 of relay 27, contact 68 of relay 29, back contact 71 of relay 31, winding of relay 30, to battery. Relay 30 operates and at contact 70 prepares a circuit for relay 7 as will be described later. At contact 69 a circuit is closed from battery, winding of relay 30, contact 69, winding of relay 31, back contact 76 of relay 6, contact 80 of relay 1, to ground. When ground is removed from the impulsing lead 96 due to the release of relay 3 at the end of the dash impulse, relay 31 operates in series with relay 30 in the above-traced circuit. At contact 72 the impulsing lead 96 is extended to relay 38 of dash group #4. The function of relays 38 and 39 of dash group #4 will be explained later. At contact 75 relay 31 closes a locking circuit for the relays of the first three dot groups independent of contact 58 of relay 32 of dot group #4. This locking circuit extends from ground, contact 80 of relay 1, contact 60 of relay 25, contact 75 of relay 31, contact 78 of relay 6, to the windings of relays 21, 23, and 25 in multiple. The first three dots and the three dashes of the SOS signal have now been received and registered.

When the fourth dot of the SOS signal is next received, relay P operates and in turn operates relays 2, 4, and 5 in the manner already described for the first three dots. The operation of relay 5 closes a circuit from ground, contact 18, impulse lead 95, contact 41, contact 44, contact 47, back contact 49 of relay 33, winding of relay 32, to battery. Relay 32 operates and at contact 48 closes a circuit from battery, winding of relay 32, contact 48, winding of relay 33, contact 80 of relay 1, to ground. The opening of contacts 58 at this time is without effect as a substitute locking circuit for the relays of the first three dot groups has been closed at contacts 60 and 75. When ground is removed from impulse lead 95 at the end of the dot impulse, relay 33 operates in series with relay 32 in the above-traced circuit. At contact 50 the impulse lead 95 is extended to relay 34 of dot group #5. When the next dot of the signal is received, relays 34 and 35 of dot group #5 are operated in the same manner as relays 32 and 33 of dot group #4. The operation of relay 35 extends the impulsing lead 95 to relay 36 of dot group #6.

When the last dot of the SOS signal is received, relays P, 2, 4, and 5 operate in the same manner as heretofore described. The operation of relay 5 closes a circuit from ground, contact 18, impulse lead 95, contact 41 of relay 21, contact 44 of relay 23, contact 47 of relay 25, contact 50 of relay 33, contact 53 of relay 35, back contact 55 of relay 37, winding of relay 36, to battery. Relay 36 operates and closes a circuit from battery, winding of relay 36, contact 54, winding of relay 37, contact 80 of relay 1, to ground. When ground is removed from the impulse lead 95 due to the deenergization of relay 5 at the end of the dot impulse, relay 37 operates in series with relay 36 in the above-traced circuit. At contact 57 it closes a circuit from ground, contact 80 of relay 1, contact 70 of relay 30, contact 57 of relay 37, contact 84 of relay 8, winding of relay 7, to battery. Relay 7 operates and at contact 81 closes an obvious circuit for the stepping magnet 86 of the minor switch M. Magnet 86 operates and moves wiper 88 to the first bank contact 89. This closes a circuit from ground, wiper 88, bank contact 89, alarm lamp 90, to battery, lighting the lamp to indicate that an SOS signal has been received. The pause following the transmission of the complete SOS signal allows relay 1 to release and open its contact 80, thereby removing ground from the holding leads, and allowing all the relays of the receiver to restore to normal.

It will be appreciated that there is a remote possibility of impulses due to static being received in combination with telegraph signals in the proper sequence and number to operate the chain of the registering relays. In view of this possibility, the first three bank contacts of the minor switch M are connected only to a lamp 90. Thus the first three signals received will bring in only a visual alarm. The remaining bank contacts, 4 to 10, inclusive, are wired to a lamp 91 and also to a bell 92. Allowance is thereby made for a maximum of three possible false alarms during the time that the operator is off duty. Should an SOS call be received during this period, the minor switch M will be stepped past the fourth bank contact due to the continuous repetition of the signal. Thus an audible alarm will be sounded calling the operator to duty. The minor switch may be released by the operator at any time by depressing the non-locking release key 94, thereby closing an obvious circuit for the release magnet 87.

The manner in which the relay chain is automatically released should the received signal deviate at any point from the prescribed SOS signal of three dots, three dashes, and three dots will now be explained. It will first be assumed that the entire SOS signal is not transmitted as one letter, but that a pause occurs at some point between the impulses of the signal. In this case the pause will allow relay 1 to release, opening contact 80 and thereby removing ground from the locking circuits of the relay chain. This allows all relays to release and the receiver to restore to normal.

It will now be assumed that a dash is received before the first three dots of the signal have been registered. In this case the dash impulse operates relays 26 and 27 in the manner already described. The operation of relay 26 opens contact 62, thereby removing the holding ground from those relays of the dot recording group which have already been operated. This allows the relays of the dot recording group to be released. The relays 26 and 27 are maintained operated

until the end of the signal when the usual pause will release relay 1 and restore the receiver to normal.

If four successive dots should be received before the first dash of the signal is received, the fourth dot will operate relays 32 and 33 in a manner already described. The operation of relay 32 opens contact 58, which removes the holding ground from the relays of the first three dot groups, allowing them to release. In this case relays 32 and 33 are maintained operated until the end of the signal when the usual pause will allow relay 1 to release, thereby restoring the receiver to normal. The next possibility to be considered is that of a fourth dash being received after the first three dots and the three dashes of the signal have been registered. The receipt of the fourth dash will operate relays P and 3 in the same manner as already described for the first three dashes. The operation of relay 3 closes a circuit from ground, contact 79, contact 65 of relay 27, contact 68 of relay 29, contact 72 of relay 31, winding of relay 38, to battery. Relay 38 operates in this circuit and at contact 73 closes a circuit from battery, winding of relay 35, contact 73, winding of relay 39, contact 80 of relay 1, to ground. When ground is removed from the impulse lead 96 at the end of the dash impulse, relay 39 operates in series with relay 38 in the above-traced circuit. At contact 74, an obvious circuit is closed for the slow-to-release relay 6. Relay 6 operates and at contact 76 removes holding ground from the relays of the first three dash groups. At contacts 77 and 78 relay 6 removes holding ground from the relays of the first three dot groups and all relays of the first three dot groups and the first three dash groups are thereby released. Relays 38 and 39 are maintained energized until the end of the signal when the usual pause allows relay 1 to release, thereby restoring the receiver to normal.

The only other possibility which might tend to bring in a false alarm is the receipt of a signal consisting of three dots, three dashes, and four dots. Upon the receipt of the sixth dot, contact 57 is closed, thereby closing a circut for relay 7 as already described. However, the receipt of the seventh dot places ground on the impulse lead 95 which extends through contact 41 of relay 21, contact 44 of relay 23, contact 47 of relay 25, contact 50 of relay 33, contact 53 of relay 35, contact 56 of relay 37, winding of relay 8, to battery. As relay 7 is made slow to operate, relay 8 is energized in this circuit and opens contact 84 before relay 7 has had time to energize. Relay 8 closes a locking circuit for itself extending from ground, contact 80 of relay 1, contact 76 of relay 6, resistance 82, contact 83 of relay 8, winding of relay 8, to battery. Relay 8 remains locked in this circuit until the receiver is restored to normal by the release of relay 1 at the end of the signal.

If the last three dots of the signal were followed by a dash, relays 38 and 39 would be operated as previously explained. Relay 39 at contact 74 closes the circuit for relay 6 which operates and at contacts 76 and 78 opens the holding circuits of the relay of the first three dot groups and the first three dash groups which thereupon release. Relay 30, in releasing, opens contact 70 thereby opening the circuit of relay 7 which has not had time to operate. The relays of the last three dot groups and of the fourth dash group remain locked up until relay 1 releases during the abnormal pause between signals.

From the foregoing it will be seen that the only possible signal or combination of impulses which can operate the chain of registering relays to bring in an alarm is the SOS signal of three dots, three dashes, and three dots, transmitted as one letter. The possibility of this signal being duplicated by a combination of static and telegraph signals is very remote.

Although only a particular application of the invention has been described in the foregoing specification, it is apparent that the receiver could be arranged to respond only to some signal other than an SOS call without departing from the spirit of the invention.

Having described the invention, what is thought to be new and is desired to have protected by Letters Patent will be set forth in the appended claims.

What is claimed is:

1. An arrangement for discriminating between dot and dash signals comprising a dash relay operated only by dash signals, a second relay operated by both dot and dash signals, a third relay, a circuit for said third relay, said third relay operated by said second relay over said circuit responsive to a received signal, contacts on said third relay, a dot relay connected in series with said third relay through its contacts by the operation of the latter but shunted until said second relay releases at the termination of the received signal, said dot relay then operating in series with said third relay through its contacts, and means controlled by said dash relay for preventing the operation of said dot relay in case the received signal is a dash signal.

2. In combination, an incoming circuit over which dot and dash signals are received, an outgoing dot conductor and an outgoing dash conductor, a slow operating dash relay, a dot relay, a first relay connected in multiple with said dash relay to said incoming circuit, a second relay, said dash relay operative responsive to dash signals but not to dot signals, means responsive to the reception of a dash signal over said incoming circuit to fully energize said dash relay and said first relay, a set of contacts operated by said dash relay to close the circuit to said dash conductor, a second set of contacts on said dash relay, a set of contacts closed by said first relay to operate said second relay over a circuit via said second contacts on said dash relay before said second contacts are fully operated, contacts on said second relay operated thereby to prepare a circuit for said dot relay in series with said second relay, the contacts on said first relay shunting said dot relay to prevent the dot relay from operating and closing the dot conductor, said second dash relay contacts when fully operated by said dash relay opening the circuit to said second relay to deenergize the same, said dash relay and said first relay deenergizing after the end of the dash signal.

3. In combination, an incoming circuit over which dot and dash signals are received, an outgoing dot conductor and an outgoing dash conductor, a slow operating dash relay, a dot relay, a first relay connected in multiple with said dash relay to said incoming circuit, a second relay, said dash relay fully responsive to dash signals and not to dot signals, means responsive to the reception of a dot signal over said incoming circuit to energize said dash relay and to operate said first relay, a set of contacts on said dash relay for closing the circuit to said dash conductor, a second set of contacts on said dash relay, both of said sets of contacts operated only when said dash relay is

fully operated, contacts on said first relay operated thereby to close the circuit of said second relay via the second set of dash relay contacts, contacts operated by said second relay to prepare the circuit to said dot relay in series with said second relay, said dot relay being shunted by the first relay contacts, said first relay deenergizing at the end of the dot signal to open its contacts and remove the shunt circuit from the dot relay and operate the dot relay in series with said second relay and the second contact set of said dash relay, contacts on said dot relay operated thereby to close the circuit of said dot conductor, and a second set of contacts operated by said dot relay to shunt said second relay and deenergize the same and at its contacts open the circuit of the dot relay.

4. In combination, an incoming circuit over which dot and dash signals are received, an outgoing dot conductor and an outgoing dash conductor, a slow-to-operate dash relay, a dot relay, a first relay connected in multiple with said dash relay to said incoming conductor, said dash relay fully operating responsive to a dash signal but not to a dot signal, said first relay operated responsive to either a dot or a dash signal, contacts on said dash relay for closing the circuit to said dash conductor and contacts on said dot relay for closing the circuit of said dot conductor, a second relay, contacts operated by said first relay for operating said second relay, contacts operated by said second relay for closing the circuit of said dot relay in series with said second relay, said dot relay shunted by said first relay contacts in case the received signal is a dash and said dash relay is fully operated to prevent the closing of the dot conductor, a second set of contacts controlled by said dash relay for closing the circuit to and operating said dot relay in series with said second relay in case said received signal is a dot and before said dash relay fully operates, and other contacts operated by said dot relay for shunting said second relay to deenergize the same and in turn open the circuit of said dot relay.

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