

June 10, 1924.

1,497,194

J. NORDEN ET AL

RADIO ALARM SYSTEM

Filed April 13, 1922

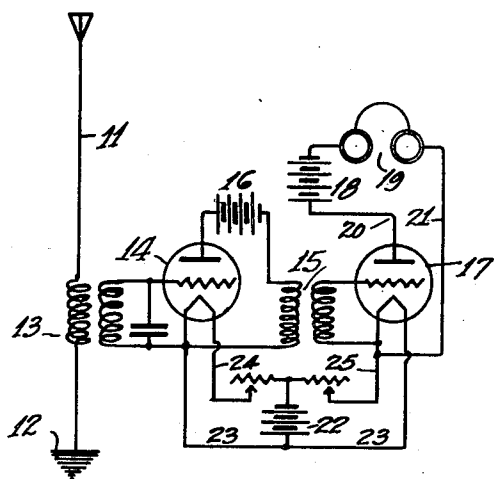


Fig. 1

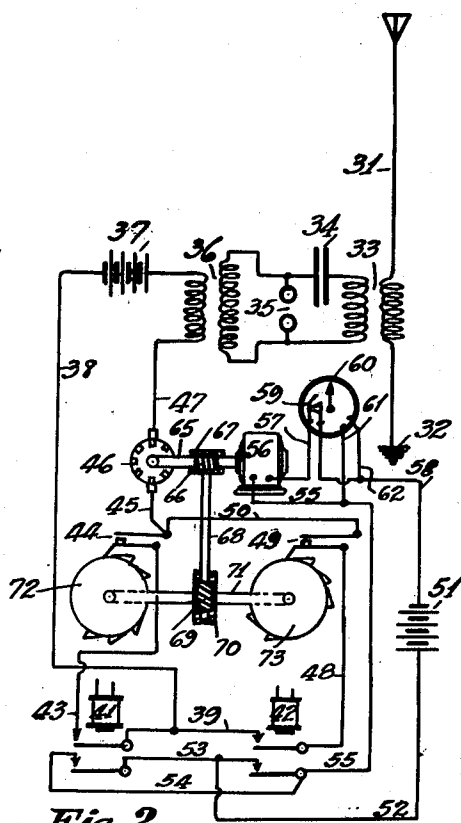


Fig. 2

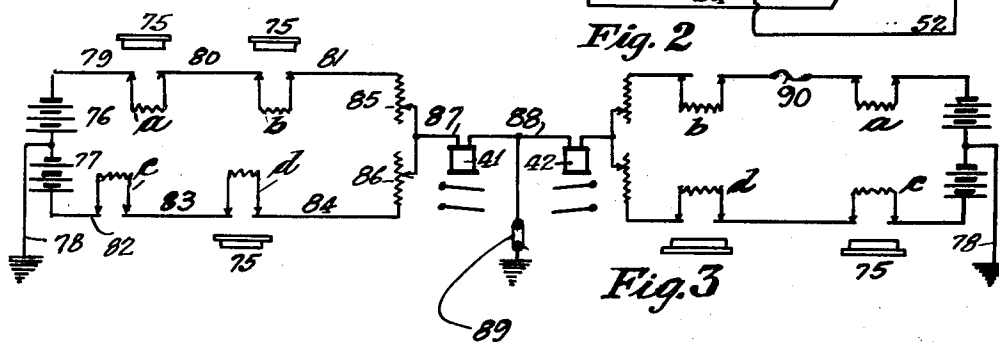


Fig. 3

INVENTORS
Jesse Norden
Anton F. Nalty
 BY their ATTORNEY
W. Loughridge

Patented June 10, 1924.

1,497,194

UNITED STATES PATENT OFFICE.

JESSE NORDEN, OF NEW YORK, AND ANTON FETTING WALTZ, OF BROOKLYN,
NEW YORK.

RADIO ALARM SYSTEM.

Application filed April 13, 1922. Serial No. 552,180.

To all whom it may concern:

Be it known that we, JESSE NORDEN and ANTON FETTING WALTZ, citizens of the United States, and residents, respectively, of New York city and Brooklyn, State of New York, have invented certain new and useful Improvements in Radio Alarm Systems, of which the following is a specification.

This invention relates to alarm systems operated by radio and has for an object to provide systems of this kind which may be installed in unitary transmitting stations, signaling to a central receiving station by an automatic arrangement when a fire occurs, a burglary is committed or other unusual conditions arise. A further object of this invention is to provide an apparatus of this kind which will signal a central station in a positive and distinctive manner, that can readily be distinguished from radio signals for other purposes. These and other objects of this invention will be understood from the following specification and the accompanying drawings in which Fig. 1 shows a wiring diagram for a central receiving station. Fig. 2 shows a transmitting station and Fig. 3 shows an arrangement that may be used in buildings protected by this alarm system, that automatically brings the transmitting apparatus into operation when an unusual condition arises.

This invention consists more specifically in a receiving station constructed according to standard practice and preferably, though not necessarily, provided with an audible detector where an operator can receive the signals from the transmitting stations. Transmitting stations are provided for one or more buildings within a radius of the receiving station; each transmitting station is arranged to transmit signals of a particular characteristic so that the operation of one transmitter can readily be distinguished from another and thereby the particular location of the transmitter can easily be detected. Another feature of the present invention consists in transmitting signals for alarm purposes which are entirely different in character from signals used for commercial and telegraphic purposes and which an operator can distinguish from these signals without confusion. This is secured in part by a tone wheel which gives a particular tone or note to the signals as received and also by the fact that the signals consist

of prolonged impulses and prolonged spaces, exceeding in time any signals used for telegraph or other purposes. The invention is arranged to be brought automatically into operation when the wiring of a closed circuit in the building is interrupted and these signals are repeated for a period of time when they are automatically discontinued and the receiving station is in position to receive signals from another transmitting station. In practice it is intended that the receiving station be located in fire stations or police stations or in direct communication therewith so that in case of a fire or burglary, relief can be dispatched to the point where the alarm originates.

Referring to the drawings, in Fig. 1, 11 represents an antenna, 12 is the ground connection for the antenna having the transformer coil 13 which energizes the grid of detector tube 14. This establishes the circuit through transformer 15 from battery 16, according to the well-known arrangement in radio receiving apparatus. The transformer 15 connects to the grid of the amplifying tube 17 and varies the circuit from wire 20, battery 18, telephones 19 and wire 21. The detector 14 has a filament connected between wires 23 and 24 through a variable resistance to battery 22 and the amplifying tube 17 has a heated filament connected between wires 23 and 25 through a variable resistance with battery 22, the entire combination amplifying the radio signals received on the antenna, so that they are distinctly audible to an operator using the head telephones 19.

The transmitting apparatus consists of the antenna 31 connecting to ground 32 through the transformer 33. This transformer is energized from the transmitting apparatus hereafter to be described and operated by the circuit established from battery 37 through wire 38, wire 39, the contact finger of relay 41 energized, wire 43, stepping contact 44, wire 45, tone wheel 46 and wire 47 to one winding of transformer 36. The tone wheel 46 interrupts this circuit with a high frequency and energizes the circuit including the spark gap 35, condenser 34 and one winding of the transformer 33 which in turn energizes the antenna 31 and thereby transmits the radio signals. It will be noted that signals may also be transmitted through the circuit from wire 39, contact finger of relay 42 energized, wire 48, stepping contact 49,

wire 50 and wire 45 through the tone wheel 46 as previously described.

The transmitting apparatus as shown is operated by the electric motor 56 driving shaft 65 directly connected to the tone wheel 46 which drives this wheel at a high speed and thereby interrupts the circuit at a frequency of a distinctive tone which can be easily distinguished in the telephone. On shaft 65 is mounted the worm 66, engaging worm wheel 67 on shaft 68. The end of shaft 68 is provided with worm 69 engaging worm wheel 70 on shaft 71. This double worm reduction drives the shaft 71 by motor 56 at a slow speed. Mounted on shaft 71 are the stepping wheels 72 and 73 arranged to transmit signals of different characteristics as desired. Wheel 72, it will be noted, as it rotates, closes the stepping contact 42 each time this contact engages a tooth and wheel 73 operates the stepping contact 49 in a similar manner. The teeth in wheel 72, it will be noted, include two teeth, then a space, followed by three teeth and then a longer space, producing a combination two-three, that is, two signals, space, followed by three signals and a longer space, for each revolution of the wheel and the wheel 73 is provided with three teeth, a long space, followed by two teeth and another long space, thus transmitting three signals, space, followed by two signals and another space for each revolution of the wheel. These combinations can, of course, be developed indefinitely to distinguish different stations and by driving the shaft 71 at a low speed, the time which the transmitter consumes in sending a single signal is several times greater than any signal transmitted by the ordinary telegraph code, also the spaces are correspondingly lengthened. It is, of course, apparent that the receiving station will be responsive to ordinary telegraphic signals sent out from commercial stations but by adapting the arrangement here shown and transmitted comparatively long signals and long spaces as well as giving these signals a definite tone or character, they can easily be distinguished by the operator at the receiving station from other signals, transmitting at the same time, without confusion and without difficulty.

The motor 56 is operated by either relays 41 or 42 which in turn are connected with the entrances to a building so as to respond to a forced entrance. The operating circuit can be traced from the battery 51 through wires 52 and 53, contact finger of relay 41 energized, wire 54, wire 55 to motor 56 and wire 57, circuit controller 59 and wire 58 to battery. The circuit controller 59 is connected to a timing device 60 which is operated in multiple circuit with motor 56 by wire 61 connecting to wire 55 and wire 62 connecting to wire 58. This device has a

mechanism not illustrated, which after a certain time interval moves around to open the circuit controller 59 and thereby stop the motor 56. This device may also operate an audible alarm. The object in providing a timing device is to limit the time in which an alarm may be sent from any particular station so that the receiving apparatus may be available to receive signals from other stations. For instance, if the transmitting apparatus is brought into use it will generally be found that five minutes' operation will be sufficient to indicate to the operator the station where the trouble originates. In this time if the stepping wheels make two revolutions per minute the operator would receive ten repetitions of the code which distinguishes a station. After this the signals would cease and the receiving station would become available for responding to other calls. In the wiring shown in Fig. 2, relay 42 operates the transmitting apparatus similar to relay 41 by contact finger which connects wires 53 and 55 as shown. Each of these relays, when energized, sets up the circuit for operating the motor and also sets up the transmitting circuit. For instance, relay 41 sets up the transmitting circuit operated by stepping wheel 72 and relay 42 sets up the transmitting circuit operated by stepping wheel 73; thus there is only one transmitting circuit in use at one time, although a number of transmitting circuits may be driven by the same motor mechanism.

A suggested arrangement for wiring a building for use in connection with our invention is shown in Fig. 3. This consists of a circuit wiring around a building having doors or windows as indicated at 75 with a means at each entrance for interrupting or changing the circuit so as to operate the transmitting relay 41. This circuit originates in batteries 76 and 77, the central point of which is connected to ground by wire 78. One side of this battery connects by wire 79, resistance *a*, wire 80, resistance *b*, wire 81 and resistance 85 to wire 87. The other side connects by wire 82, resistance *c*, wire 83, resistance *d*, wire 84 and resistance 86 to wire 87, this wire connecting to relay 41 and through wire 88 and switch 89 to ground as shown. It will be noted that a closed circuit is provided from batteries 76 and 77 which include the resistances *a*, *b*, *c*, *d*, 85 and 86. If the resistance on one side of this circuit connecting to wire 87 is equal to the resistance on the other side, there will be no current through relay 41, nor through the grounded circuit. Resistances 85 and 86 are made adjustable so that this balance may readily be obtained for normal conditions. If, however, a forced entrance is made through a window or door, so as to interrupt the circuit, then one leg of the closed circuit is interrupted and a cir-

cuit is immediately established through the other side and ground to relay 41, energizing this relay and operating the transmitting apparatus. If, however, instead of interrupting the circuit a person should attempt to bridge the wires which protect a door or window, this would eliminate the resistance in each leg, such as *a* or *b*, or *c* or *d*, thereby causing an unbalancing in the closed circuit and the unbalanced current would flow through the ground connection and relay 41, thereby energizing this relay to operate the transmitting apparatus. The same condition would also prevail if current from another battery were applied between any point of the closed circuit and ground. The switch 89 is provided so that the apparatus may be cut out of service when not required. An arrangement shown on the right of Fig. 3, operating relay 42, is exactly similar to that just described and may be applied to another building or to a separate floor in the same building. This circuit also shows a fusible link 90 which in case of fire, will disconnect one side of the circuit and thereby operate the alarm system. It is understood that in burglar alarm systems there are various methods whereby an alarm system is set in operation. The one here illustrated is a typical arrangement but we do not wish to limit our invention to this arrangement as it may be applied to an open circuit arrangement, to a plain closed circuit arrangement or to any other system in which a circuit is established to operate the transmitting apparatus through a forced entrance or similar condition.

In applying our invention we propose to conceal as far as possible, the transmitting antennæ so that the presence of the alarm system cannot readily be detected or inter-

ferred with. Also we may operate the transmitting mechanism either by an electric motor as shown, by a clock-working motor or by a run-down device, which after a certain interval, will run down and stop. By the use of our invention, a system of burglar and fire alarm can be provided at a comparatively small expense which is easily installed and which can be operated without interference from other radio apparatus in the same range.

Having thus described our invention, we claim:

1. In a system of the class described, the combination of a radio receiver and a radio transmitter, a plurality of stepping wheels for producing signals of different character driven by an electric motor associated with said transmitter, a relay for each stepping wheel controlling the circuit of said motor and the transmitting circuit from each wheel and remotely located means responsive to temperature changes for automatically controlling said relays.

2. In a system of the class described, the combination of a radio receiver and a radio transmitter, a plurality of stepping wheels for producing signals of different character driven by an electric motor associated with said transmitter, a relay for each stepping wheel controlling the circuit of said motor and the transmitting circuit from each wheel and a remotely located fusible link responsive to an increase in temperature controlling said relay.

Signed at New York, in the county of New York and State of New York, this eighth day of April, A. D. 1922.

JESSE NORDEN.
ANTON FETTING WALTZ.