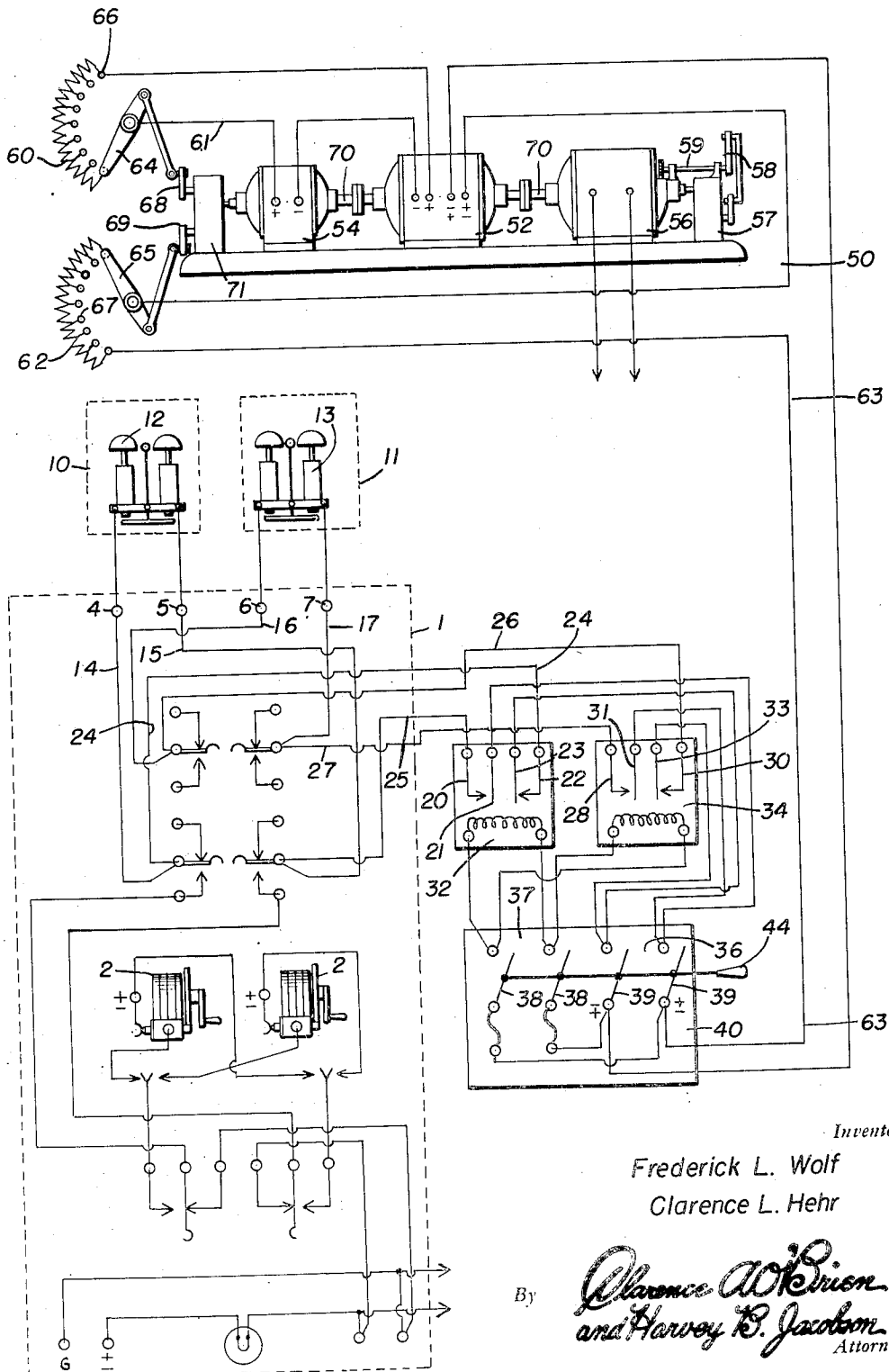


March 29, 1949.

F. L. WOLF ET AL
BROADCAST SYSTEM FOR PRODUCING SIMULTANEOUS ALARM
SIGNALS IN A PLURALITY OF TELEPHONE STATIONS
Filed Feb. 17, 1947

2,465,826



Inventor

Frederick L. Wolf

Clarence L. Hehr

By

Clarence A. O'Brien
and Harvey B. Jacobson
Attorneys

UNITED STATES PATENT OFFICE

2,465,826

BROADCAST SYSTEM FOR PRODUCING
SIMULTANEOUS ALARM SIGNALS IN A
PLURALITY OF TELEPHONE STATIONSFrederick L. Wolf, Inglewood, and Clarence L.
Hehr, Los Angeles, Calif.

Application February 17, 1947, Serial No. 729,122

14 Claims. (Cl. 179—5)

1

This invention relates to electric signalling and more specifically to broadcast signals to be transmitted over telephone lines and it has for its main object to provide a signalling system of this type by means of which a characteristic signal clearly distinguishable from normal ringing signals may be given simultaneously to a large number of sub stations having the customary telephonic equipment which are connected with a private exchange or with any other kind of central exchange upon operation of a single switch. This system may be used for instance as a fire alarm system in hotels or apartment houses in which each room is equipped with a telephone sub station connected to a private exchange, or as an emergency call signal for personnel within an organization such as a hospital or the like provided with telephone stations or for other purposes in which a characteristic signal to be associated with certain well defined circumstances, individuals or activities is to be broadcast simultaneously to a large number of stations with the usual standard equipment.

A further object of the invention consists in providing simple means for producing a characteristic signal current which may operate the call bells of the standard telephone and which will operate the same in the desired distinctive and characteristic manner.

A further object of the invention consists in providing an emergency signal system adapted to operate all the call bells of all the subscriber stations associated with an exchange simultaneously which system will be completely cut off from the normal equipment when not in use and which consists merely of parts not in use during normal operation which may be switched in and brought into operative contact with all the subscriber stations simultaneously by a simple manipulation such as the throwing of a switch.

A further object of the invention consists in providing a special high powered ringing generator equipped with means for changing the frequency and/or the current intensity and/or the voltage of the ringing current automatically and permanently during operation in order to produce characteristic signal variations.

Further objects and characteristic features of the invention will be gathered from the following detailed specification.

The invention will be more readily understood by referring to the following specification and to the accompanying drawings describing and illustrating an embodiment thereof. It is however to be understood that the system as described

2

and illustrated is to be regarded as an example by means of which the general principles to be applied according to the invention may be explained. The example shown and described is therefore not to be regarded as the sole embodiment of the invention or as limitative.

Modifications based on the principles herein-after explained but differing from those actually described will be obvious to the expert skilled in the art and such modifications are therefore not necessarily departures from the essence of the invention.

In the accompanying drawing the figure is a diagram of connections illustrating the application of the invention in the case of a so-called private exchange, adapted to extend telephonic connections to a relatively large number of sub-stations.

The switchboard 1 of the said private exchange as indicated by dotted lines may be of any desired type, the type shown with hand operated ringing generators 2, being merely selected to arbitrarily illustrate one type of switchboard such as may be used. This type of switchboard being in common use need not be described. The switchboard is provided with the required number of pairs of subscriber's contacts 4, 5, 6, 7 . . . to which the subscriber's stations 10, 11, indicated diagrammatically by the bells 12, 13 are connected.

Each conductor 14, 15; 16, 17 leading from the subscriber's private contact to the key or plug connector in the operator's set is connected by means of a further conductor 24, 25; 26, 27 to one of the contacts 20, 22, 23, 30 of a set of polarized alarm or emergency relays 32, 34. These alarm or emergency relays are also provided with further (movable) contacts 21, 23, 31, 33 each of which cooperates with one of the contacts 20, 22, 28, 30.

These further contacts are all connected with a set of contacts 35 on an alarm or emergency switch 40. The said switch also contains a further set of contacts 37 to which all the polarized alarm or emergency relay windings 41, 42 are connected.

The emergency switch 40 is hand operated, and is provided with switch arms 39, 39 operated by the handle 44, and connects the relays and relay contacts respectively with the alarm generator 50. This alarm generator has to be substituted for the normal ringing generator when an alarm or emergency call is to be transmitted in order to provide a signal of a specific and distinctive character, and in order to be able to

provide a large number of subscriber stations with ringing current. The usual switchboards would not be able to furnish the required current as their ringing generators are merely able to provide current for one call or for a very limited number of calls at a time. Assuming that one hundred subscribers are connected with the switchboard, and further assuming that the normal ringing current is 2 ampere, 20 ampere will be required to ring all the bells simultaneously. If the normal switchboard equipment is used it is therefore essential to provide a special generator for alarm purposes, especially as the average hotel or apartment house has more than one hundred rooms equipped with telephones.

The distinctiveness of the specific signal to be given may be obtained by several methods which may be used singly or in any combination.

The first method consists in using ringing currents, the frequency of which varies rhythmically or in any other preselected manner.

The second method consists in producing a periodic fluctuation of the voltage used and the third method consists in varying the current intensity of the generator output.

The variation of the ringing current which, as a rule, has a frequency of sixteen cycles per second in ordinary telephone systems is best obtained by imparting to it a frequency variation between 0 and 16, or between 0 and any frequency higher than 16. This variation must be performed automatically and permanently. Means for obtaining such automatic variations of the above mentioned three factors are indicated in the diagram.

It is however to be understood that the three variations need not be employed simultaneously in all cases and that a variation of a single factor or any combination of factors may be selected, the selection depending mainly on the purpose of the signal, or the fact whether merely one or a plurality of different signals is required and on local requirements.

The ringing generator arrangement 50 consists of an alternator 52, an exciter 54 and a driving motor 56 which in the present example is illustrated as an electromotor, deriving its power supply either from the mains or, for greater safety, from a special storage battery. The power may of course be supplied by means of an engine of some kind such as an internal combustion engine. This motor may be provided with any suitable means for varying permanently and automatically its speed. Means of this type are known.

With an electric motor such a variation may for instance be obtained by a variable resistance in the field winding, whose movable arm is driven by the motor itself. In the diagram another method is indicated which consists in rocking the commutator of the machine with respect to the brushes or in rocking the brushes with respect to the commutator by means of a gearing 57 driving a crank 58 which rocks a shaft 59 operating the commutator or a ring connected with the brushes.

The variation of the speed with which the alternator is driven and which is obtained in the manner described results in a ringing current with a variable number of cycles, which is characterized by a crescendo and decrescendo of the ringing tone which cannot be mistaken for any other signal.

The variation of the voltage of the ringing current is best obtained by increasing and decreasing a resistance 60 in the exciter circuit 61 while the variation of the current intensity is produced by

a variable resistance 62 in the output circuit 63 of the alternator.

The variation of the resistance 60, 62 is diagrammatically indicated by means of two swinging arms 64, 65 respectively sweeping over a series of contacts 66, 67 and each driven by a crank 68, 69, respectively, mounted on shafts which are driven by gears contained in the box 71 from the main shaft 70. This showing is purely diagrammatic and symbolical and the variations of the resistance may be obtained in many other ways, such as for instance by means of a rotating arm driven directly from the shaft 70. The increase and decrease of the voltage and of the current intensity both affect the intensity of the sound produced so that a crescendo and decrescendo of the intensity of the sound produced will vary. Different dosages of these variations will produce characteristic signals and if necessary a plurality of characteristic signals.

The normal operation of the switchboard need not be described. The operation in the case of an alarm or emergency call consists merely in throwing the switch into the alarm position in which the generator 50 will be connected with all the polarized alarm relays 32, 34 and also with all the movable alarm relay contacts 21, 22, 28, 30. The current from the alternator operates the polarized alarm relays 32, 34, whereby the relay contacts close their circuits connecting the output circuit 63 of the alternator with all the conductors 24, 25; 26, 27 . . . and 14, 15; 16, 17 . . . leading to the subscriber's contacts and to the bells 12, 13 of the subscriber stations 10, 11. The characteristic alarm or emergency signals are therefore heard everywhere in every room of the building.

Subscribers who have engaged in a telephone conversation will hear the characteristic ringing current signals in the receivers.

It is to be emphasized that the details of the construction as will be clear from the foregoing, do in no way affect the system which forms the essence of the invention.

We claim:

1. An emergency signal system for a telephone system, comprising a central exchange, a switchboard, subscriber's stations, subscriber's lines and private subscriber contacts on said switchboard, associated with each subscriber line, ringing means in said subscriber stations and a ringing generator for calling the subscriber station producing the conventional A. C. ringing current, a polarized alarm relay for each subscriber station, pairs of cooperating alarm relay contacts controlled by said alarm relays, one contact of each pair being connected with one of the private subscriber contacts, an additional high powered alarm generator for producing ringing currents, connected with the second contact of each pair of cooperating relay contacts, an energizing circuit for said polarized alarm relays connected with and supplied with current from said high powered alarm ringing generator and a manual multi-contact emergency switch controlling the connections of the relay circuits and of the relay contacts with the additional high powered alarm generator.

2. An emergency signal system for a telephone system, comprising a central exchange, a switchboard, subscriber's stations, subscriber's lines and private subscriber contacts on said switchboard, associated with each subscriber line, ringing means in said subscriber stations and a ringing generator for calling the subscriber station pro-

5

ducing the conventional A. C. ringing current, a polarized alarm relay for each subscriber station, pairs of cooperating alarm relay contacts controlled by said alarm relays, one contact of each pair being connected with one of the private subscriber contacts, an additional high powered alarm generator for producing ringing currents means for changing the frequency of the ringing current, an output circuit for said alarm generator connected with the second contact of each pair of cooperating relay contacts, an energizing circuit for each of said polarized alarm relays, connected with and supplied with current from the output circuit of said alarm generator, and a manual multi-contact emergency switch controlling the connections of the relay circuits and of the relay contacts with the additional high powered alarm generator.

3. An emergency signal system for a telephone system, comprising a central exchange, a switchboard, subscriber stations, subscriber's lines, and private subscriber contacts on said switchboard, associated with each subscriber line, ringing means in said subscriber stations and a ringing generator for calling the subscriber station producing the conventional A. C. ringing current, a polarized alarm relay for each subscriber station, pairs of cooperating alarm relay contacts controlled by said alarm relays, one contact of each pair being connected with one of the private subscriber contacts, an additional high powered alarm generator for producing ringing currents, means for changing the current intensity of the output of the said generator, an output circuit connected with said generator and further connected with the second contact of the pair of cooperating relay contacts, an energizing circuit for said relays connected with said additional high powered alarm generator, and a switch controlling the connections of the relay circuits and of the relay contacts with the high powered alarm generator.

4. An emergency signal system for a telephone system, comprising a central exchange, a switchboard, subscriber stations, subscriber's lines, and private subscriber contacts on said switchboard, associated with each subscriber line, ringing means in said subscriber stations and a ringing generator for calling the subscriber station producing the conventional A. C. ringing current, a polarized alarm relay for each subscriber station, pairs of cooperating alarm relay contacts controlled by said alarm relays, one contact of each pair being connected with one of the private subscriber contacts, an additional high powered alarm generator for producing ringing currents, means for changing the voltage of the said ringing currents, connected with the second contact of each pair of cooperating relay contacts, an energizing circuit for said relays connected with said additional high powered alarm generator and a switch controlling the connections of the relay circuits and of the relay contacts with the additional high powered alarm generator.

5. An emergency signal system for a telephone system consisting of a central telephone exchange, provided with subscriber contacts, ringing generators, a number of telephone lines connected with the subscriber contacts and subscriber stations, each provided with a ringing means responsive to the current produced by the ringing generators, said system comprising an additional high powered alarm generator for producing ringing currents differing from the currents produced by the first named ringing generators

6

and adapted to operate the ringing means in the subscriber stations, and means for connecting said high powered alarm generator for ringing currents simultaneously with a predetermined number of subscriber contacts in the central exchange.

6. An emergency signal system for a telephone system consisting of a central telephone exchange, provided with subscriber contacts, ringing generators, a number of telephone lines connected with the subscriber contacts and subscriber stations, each provided with a ringing means responsive to the current produced by the ringing generators, said system comprising an additional high powered alarm generator for producing ringing currents, differing from the currents produced by the first named ringing generators and adapted to operate the ringing means in the subscriber stations, an emergency switch provided with a plurality of contacts, and means controlled by said switch for connecting said high powered generator simultaneously with a predetermined number of subscriber contacts in the central exchange.

7. An emergency signal system for a telephone system consisting of a central telephone exchange, provided with subscriber contacts, ringing generators, a number of telephone lines connected with the subscriber contacts and subscriber stations, each provided with a ringing means responsive to the current produced by the ringing generators, said system comprising an additional high powered alarm generator for producing ringing currents, differing from the currents produced by the first named ringing generators and adapted to operate the ringing means in the subscriber stations, an emergency switch provided with a plurality of switch contacts and alarm relays controlled by the said switch for connecting said high powered alarm generator simultaneously with a predetermined number of subscriber contacts in the central exchange.

8. An emergency signal system for a telephone system consisting of a central telephone exchange, provided with subscriber contacts, ringing generators, a number of telephone lines connected with the subscriber contacts and subscriber stations, each provided with a ringing means responsive to the current produced by the ringing generators, said system comprising an additional high powered alarm generator for producing ringing currents differing from the currents produced by the first named ringing generators and adapted to operate the ringing means in the subscriber stations, an emergency switch provided with a plurality of contacts, a polarized alarm relay for each subscriber station, an energizing circuit for each of said relays, controlled by said emergency switch and connected with the high powered alarm generator for energizing said relay with the ringing currents, said relays being provided with contacts for connecting the said additional high powered alarm generator simultaneously with a predetermined number of subscriber contacts.

9. An emergency signal system for a telephone system consisting of a central telephone exchange, provided with subscriber contacts, ringing generators, a number of telephone lines connected with the subscriber contacts and subscriber stations, each provided with a ringing means responsive to the current produced by the ringing generators, said system comprising an additional high powered alarm generator for producing ringing currents differing from the currents produced by the first named ringing gen-

erators, said generator being provided with means for varying the frequency of the ringing current and means for connecting said high powered alarm generator simultaneously with a predetermined number of subscriber contacts in the central exchange.

10. An emergency signal system for a telephone system consisting of a central telephone exchange, provided with subscriber contacts, ringing generators, a number of telephone lines connected with the subscriber contacts and subscriber stations, each provided with a ringing means responsive to the current produced by the ringing generators, said system comprising an additional high powered alarm generator for producing ringing currents differing from the currents produced by the first named ringing generators, said generator being provided with means for varying the voltage of the ringing current produced, said current being adapted to operate the ringing means in the subscriber stations, an emergency switch provided with a plurality of contacts, and means controlled by said switch for connecting said high powered alarm generator simultaneously with a predetermined number of subscriber contacts in the central exchange.

11. An emergency signal system for a telephone system consisting of a central telephone exchange, provided with subscriber contacts, ringing generators, a number of telephone lines connected with the subscriber contacts and subscriber stations, each provided with a ringing means responsive to the current produced by the ringing generators, said system comprising an additional high powered alarm generator for producing ringing currents differing from the currents produced by the first named ringing generators, said generator being provided with means for varying the current intensity of the ringing current produced, said current being adapted to operate the ringing means in the subscriber station, an emergency switch provided with a plurality of switch contacts, and means controlled by said switch for connecting said high powered alarm generator simultaneously with a predetermined number of subscriber contacts in the central exchange.

12. An emergency signal system for a telephone system, comprising a central exchange, a switchboard, subscriber stations, subscriber lines and private subscriber contacts on said switchboard associated with each subscriber line, ringing means in said subscriber stations and a ringing generator for calling the subscriber stations, producing the conventional A. C. ringing current, a polarized alarm relay for each subscriber station, pairs of cooperating alarm relay contacts controlled by said alarm relays, one contact of each pair being connected with one of the private subscriber contacts, an additional high powered alarm generator for producing ringing currents, a driving motor for the same, means for changing the rotational speed of the driving motor, an output circuit connected with the generator and further connected with the second contact of each pair of cooperating relay contacts, an energizing circuit for said relays, connected with said additional high powered alarm generator and a switch controlling the connections of the relay circuits and of the relay contacts with said additional high powered alarm generator.

13. An emergency signal system for a telephone system, comprising a central exchange, a switchboard, subscriber stations, subscriber lines and private subscriber contacts on said switchboard, associated with each subscriber line, ringing means in said subscriber stations and a ringing generator for calling the subscriber stations, producing the conventional A. C. ringing current, a polarized alarm relay for each subscriber station, pairs of cooperating alarm relay contacts controlled by said alarm relays, one contact of each pair being connected with one of the private subscriber contacts, an additional high powered generator for producing ringing currents, differing from the ringing current produced by the first named ringing generator, said additional generator being provided with a field winding, means for providing said field winding with current, means for periodically varying the current supplied to the field winding, an output circuit connected with said generator and further connected with the second contact of each pair of cooperating relay contacts, an energizing circuit for said relays connected with said high powered alarm generator, and a switch controlling the connections of the relay circuit and of the relay contacts with the high powered alarm generator.

14. An emergency signal system for a telephone system, comprising a central exchange, a switchboard, subscriber stations, subscriber lines and private subscriber contacts on said switchboard associated with each subscriber line, ringing means in said subscriber stations and a ringing generator for calling the subscriber stations, producing the conventional A. C. ringing current, a polarized alarm relay for each subscriber station, pairs of cooperating alarm relay contacts controlled by said alarm relays, one contact of each pair being connected with one of the private subscriber contacts, an additional high powered alarm generator for producing ringing currents, differing from the ringing currents produced by the first named ringing current generator, an output circuit connected with said generator, driving means for said generator, means operated by said driving means for periodically varying the current intensity of said output circuit, the said circuit being connected with the second contact of each pair of cooperating relay contacts, an energizing circuit for each of said polarized alarm relays, connected with said output circuit of the alarm generator, and a manual multi-contact emergency switch controlling the connections of the relay circuits and of the relay contacts with additional high powered alarm generators.

FREDERICK L. WOLF.
CLARENCE L. HEHR.

REFERENCES CITED

The following references are of record in the file of this patent:

UNITED STATES PATENTS		
Number	Name	Date
288,570	Hess	Nov. 13, 1883
2,298,489	Kiner	Oct. 13, 1947