July 13, 1937. M. GLASER 2,087,027

LOUDSPEAKER TELEPHONE SYSTEM

Filed April 15, 1935

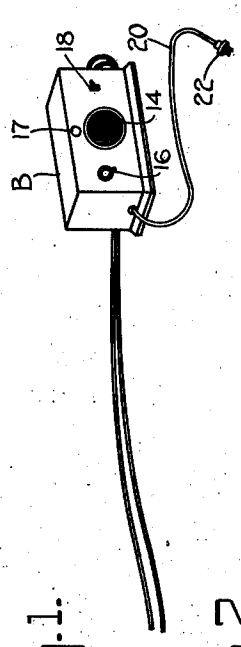


Fig. 1.

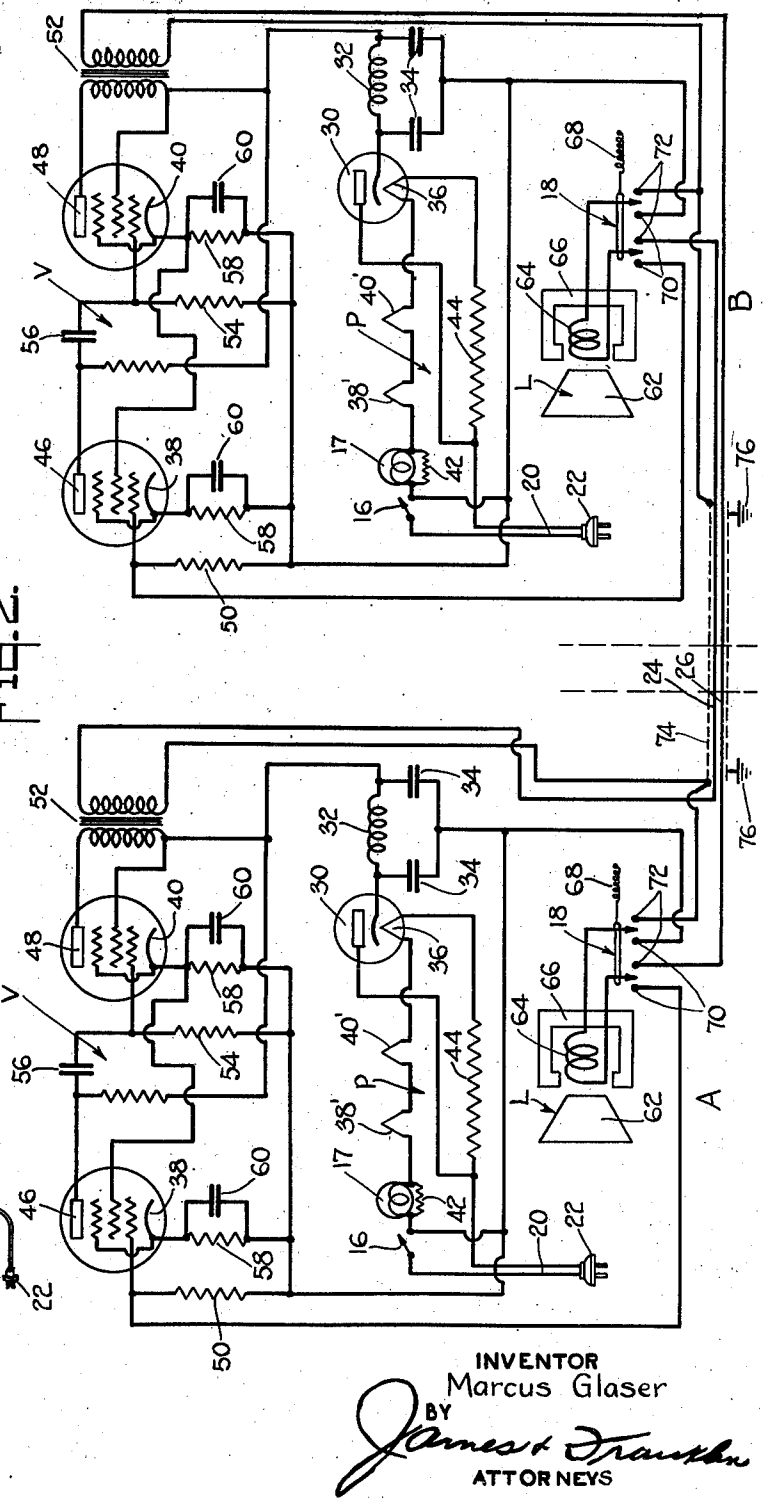


Fig. 2.

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Patented July 13, 1937 2,087,027

UNITED STATES PATENT OFFICE

2,087,027

LOUDSPEAKER TELEPHONE SYSTEM

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Application April 15, 1935, Serial No. 16,344

17 Claims. (Cl. 179—1)

This invention relates tc communication systems and more particularly to a loud speaker telephone system.

Regular telephone systems and also special inter-office telephone systems are well known, but there is need for an inexpensive communication system readily adapted for use in small plants, as between the office and a shop or stock room or tool room, etc. The primary and general object of my invention is to fulfil this need and to provide a small, compact, inexpensive, portable communication system which may be readily installed by the purchaser without the use of expert electricians, and which will provide loud speaking two-way communication.

In accordance with a further object of my invention, the system is energized from an ordinary wall outlet of standard power line or lighting systems. Still another object of my invention is to minimize power consumption and to prolong the life of the vacuum tubes used in the system by keeping the system normally in a dead or de-energized state. Each of the stations may be provided with a local power unit and power switch controlling the energization of the same so that the system may be energized by that station which is calling another. Still another object of my invention is to make the system freely and interchangeably energizable from either alternating or direct current power lines.

To the accomplishment of the foregoing and other objects which will hereinafter appear, my invention consists in the elements of the loud speaker telephone system and their relation one to the other as hereinafter are more particularly described in the specification and sought to be defined in the claims. The specification is accompanied by a drawing in which

Fig. 1 illustrates one general arrangement which the system may take; and

Fig. 2 is a wiring diagram for a system comprising two stations.

Referring now to the drawing, and more particularly to Fig. 1, the system is there illustrated as comprising two stations marked A and B respectively. The stations are alike and more than two may be used. As here illustrated, each station resembles a miniature radio receiver and comprises a small, compact cabinet 12 having a sound opening or window 14 in the front wall thereof, behind which is located a loud speaker of small dimension. At any convenient location on the cabinet, I provide a power switch 16, a pilot light 17, and a talk button 18. A power line connection 20 leads from cabinet 12 and is provided with a conventional male plug 22 for insertion in any conveniently available wall outlet. The stations A and B are interconnected by conductors 24 and 26, these conductors being inexpensive and selected to satisfactorily handle the audio frequency energy needed to operate the loud speakers. It will be understood that the purchaser need merely buy the complete stations A and B; place the same in desired location; string a suitable two-wire lead (in this case the conductors 24 and 26) between the stations; and plug in the power line connections; whereupon the system is ready for operation.

The details of the system may be described with reference to Fig. 2. Each station comprises three main parts, a power pack P, a vacuum tube amplifier V and a loud speaker L.

The power pack or rectifier unit P comprises a rectifier tube 30 and an appropriate filter including inductance 32 and condensers 34. The filament 36 of the rectifier tube is connected in series with the filaments 38' and 40' which heat the cathodes 38 and 40 of the amplifier tubes of amplifier V. Pilot light 17 may also be connected in series but is by-passed by an appropriate shunt 42. The filament current is limited by a suitable limiting resistor 44. The rectifier tube 30 together with filter 32, 34 produce a steady potential to be applied to the anodes or plates 46, 48 of the amplifier tubes and the arrangement is such that if the power pack is connected to a D. C. line, with the plug inserted in proper polarity, the same result is attained, the rectifier tube passing the steady current. This feature is of great convenience in the sale and use of the apparatus because some purchasers may have A. C. lines and others D. C. lines.

The amplifier V as here illustrated is a two-stage resistance coupled audio frequency amplifier. While tubes with multiple grids are shown, this is not essential. The impedance of input resistor 50 is matched to the impedance of output transformer 52 and these in turn are matched to the impedance of loud speaker L. The first and second tubes are coupled by a resistor 54 and the anode potential on plate 46 is blocked from the grid or control electrode of the second tube by a condenser 56. The tubes are biased by suitable biasing resistors 58 which in turn are shunted by condensers 60. The amplifier probably needs no further description and in fact, may be conventional except for the desirable precaution of matching the input and output impedances with the loud speaker.

The loud speaker L is preferably of the magnetic type comprising a light-weight cone or diaphragm 62 moved by a movable or voice coil 64 lying in the field of a powerful permanent field magnet 66. It is of course possible to use dynamic speakers but in such case the dynamic speakers are preferably of the type having substantial residual magnetism in the field core so that the speaker will be operated reasonably well even when the field coil is not energized. This makes it possible for the listening station to hear the calling station, after which the power switch at the called station may be closed, thereby energizing the dynamic speaker field coil along with the remaining apparatus at the called station.

The talk switch 18 is essentially a double-pole, double-throw switch which is preferably normally biased to the listening position. This is schematically indicated by tensioned spring 68. The voice coil 64 is connected to the poles of talk switch 18. One set of contacts, the left-hand set marked 70, as viewed in the drawing, is connected to the input impedance 50 of the amplifier. The other set of contacts, the right-hand set marked 72, is connected to the output transformer of the remote station. It will thus be manifest that in the normal or listening position, loud speaker L is adapted to be energized from the amplifier of the remote station. When the talk button is depressed, however, the loud speaker is connected to the local amplifier and speech directed against the speaker diaphragm causes the same to act as a microphone, and the resulting audio frequency energy is amplified by the local amplifier and transmitted to the remote station.

In elemental form, the stations A and B would be connected by four conductors, two leading from the output transformer 52 of station A to the right-hand or listening contacts 72 of station B, and the other two leading from the output transformer 52 of station B to the right-hand or listening contact 72 of station A. It is possible, however, to simplify the wiring by using three conductors or two conductors and a ground connection as a third conductor, and it is the latter arrangement which is illustrated in Fig. 2 of the drawing. The operation is, however, exactly the same as is the case when using four independent conductors.

In order to protect the conductors against outside interference as from power lines, motors, etc., I prefer to use a two-wire lead which is shielded throughout its length by an appropriate shield 74. The grounded conductors at each station may be and preferably are connected to shield 74 and this of course may be grounded at any convenient point along its length or at both ends as indicated at 76.

It will be understood that more than one station may be connected at either end of a single connecting line or lead, these stations being arranged in parallel. For example, station A may be at the office and stations B, C and D may be connected in parallel and located in a shop, the stock room and tool room. A call initiated at station A will be heard simultaneously at stations B, C and D, but only the called station need answer and thereafter communication will take place between station A and the called station. Any one of stations B, C and D may call station A. Similarly, a number of stations may be connected in parallel with station A and in such case any station at either end of the line may call any other station at the other end of the line. This degree of flexibility it should be understood is obtained without the use of any kind of switchboard or central operator or the like, and while using only a single main conductor system.

It is believed that the mode of constructing and using as well as the many advantages of my improved loud speaker telephone communication system will be apparent from the foregoing detailed description. The system may be made, sold and installed at minimum cost, yet provides two-way loud speaking communication which is of great convenience in stores, plants, shops, and the like. The apparatus may be installed by the purchaser and is merely plugged into a wall outlet as simply as is the case with a miniature radio set. The system possesses the important advantage of being de-energized or inoperative unless and until wanted, which not only minimizes current consumption but also wastage of vacuum tubes. The apparatus is interchangeably usable with A. C. or D. C. power lines.

It will be apparent that while I have shown and described my invention in the preferred form, many changes and modifications may be made in the apparatus disclosed without departing from the spirit of the invention defined in the following claims.

I claim:

1. A telephone system comprising a plurality of stations, each station having the following elements, a source of electrical energy, an audio frequency amplifier energizable from said source, a speaker, a power switch for controlling the energization of the station from the source, a talk switch, and conductors so interconnecting the speaker, the talk switch, the amplifier input of the station and the amplifier output of another station of the system that the speaker may be switched to either the amplifier input of the station or the amplifier output of said other station.

2. A telephone system comprising a plurality of stations, each station including the following elements, a power pack designed to be energized from an ordinary power line outlet, an audio frequency amplifier energized from said power pack, a speaker, a power switch for controlling the energization of the station from the power line, a talk switch, and conductors so interconnecting the speaker, the talk switch, the amplifier input of the station and the amplifier output of another station of the system that the speaker may be switched to either the amplifier input of the station or the amplifier output of said other station.

3. A loud speaker telephone system comprising a plurality of stations, each station including the following elements, a power pack designed to be energized from an ordinary power line outlet, an audio frequency amplifier energized from said power pack, a loud speaker, a power switch for controlling the energization of the station from the power line, a talk button, and conductors so interconnecting the loud speaker, the talk button, the amplifier input of the station and the amplifier output of another station of the system that the loud speaker may be switched to either the amplifier input of the station or the amplifier output of said other station.

4. A telephone system comprising a plurality of stations, each station having the following elements, a source of energy, an audio frequency amplifier adapted to be energized from said source, a speaker, a power switch for controlling the energization of the station from the source,

a talk button, and conductors so interconnecting the speaker, the talk button, the amplifier input of the station, and the amplifier output of another station of the system that the speaker may be switched to either the amplifier input of the station or the amplifier output of said other station, and means normally biasing the talk button to the listening position with the speaker connected to the amplifier output of said other station.

5. A telephone system comprising a plurality of stations, each station including the following elements, a power pack designed to be energized from an ordinary power supply line, an audio frequency amplifier energized from said power pack, a speaker, a power switch for controlling the energization of the station from the power line, a talk switch, and conductors so interconnecting the speaker, the talk switch, the amplifier input of the station and the amplifier output of another station of the system that the speaker may be switched to either the amplifier input of the station or the amplifier output of said other station, and means normally biasing the talk switch to the listening position with the speaker connected to the amplifier output of said other station.

6. A telephone system comprising a plurality of stations, each station having the following elements, a source of energy, an audio frequency amplifier adapted to be energized from said source, a speaker, the input impedance and output impedance of said amplifier being matched to the impedance of said speaker, a power switch for controlling the energization of the station from the source, a talk button, and conductors so interconnecting the speaker, the talk button, the amplifier input of the station, and the amplifier output of another station of the system that the speaker may be switched to either the amplifier input of the station or the amplifier output of said other station.

7. A loud speaker telephone system comprising a plurality of stations, each station including the following elements, a power pack designed to be energized from an ordinary power supply line, an audio frequency amplifier energized from said power pack, a loud speaker, the input impedance and output impedance of said amplifier being matched to the impedance of said speaker, a power switch for controlling the energization of the station from the power line, a talk button, and conductors so interconnecting the loud speaker, the talk button, the amplifier input of the station and the amplifier output of another station of the system that the loud speaker may be switched to either the amplifier input of the station or the amplifier output of said other station.

8. A loud speaker telephone system comprising a plurality of stations, each station including the following elements, a power pack designed to be energized from either an alternating current or direct current power supply line, an audio frequency amplifier energized from said power pack, a loud speaker, a power switch for controlling the energization of the station from the power line, a talk button, and conductors so interconnecting the loud speaker, the talk button, the amplifier input of the station and the amplifier output of another station of the system that the loud speaker may be switched to either the amplifier input of the station or the amplifier output of said other station.

9. A loud speaker telephone system comprising a plurality of stations, each station including the following elements, a power pack designed to be energized from either an alternating current or direct current power supply line, an audio frequency amplifier energized from said power pack, a loud speaker, the input impedance and output impedance of said amplifier being matched to the impedance of said speaker, a power switch for controlling the energization of the station from the power line, a talk button, and conductors so interconnecting the loud speaker, the talk button, the amplifier input of the station and the amplifier output of another station of the system that the loud speaker may be switched to either the amplifier input of the station or the amplifier output of said other station, and means normally biasing the talk button to the listening position with the loud speaker connected to the amplifier output of said other station.

10. A unitary station intended for use in a telephone system comprising a plurality of such unitary stations connected together, said station comprising a single compact casing having means adapted to be plugged into a source of electrical energy, an audio frequency amplifier in said casing adapted to be energized from said source, a speaker in said casing, a power switch for controlling the energization of the station from the source, a talk switch, input terminals adapted to be connected to another station, and conductors so interconnecting the speaker, the talk switch, the amplifier input of the station, and the aforesaid terminals that the speaker may be switched to either the amplifier input of the station or said terminals, and means normally biasing the talk switch to connect the speaker to said terminals.

11. A unitary station intended for use in a telephone system comprising a plurality of such unitary stations connected together, said station comprising a single compact casing having means adapted to be plugged into a source of electrical energy, an audio frequency amplifier in said casing adapted to be energized from said source, a speaker in said casing, a power switch for controlling the energization of the station from the source, a talk switch, input terminals adapted to be connected to another station, and conductors so interconnecting the speaker, the talk switch, the amplifier input of the station, and the aforesaid terminals that the speaker may be switched to either the amplifier input of the station or said terminals, and means normally biasing the talk switch to connect the speaker to said terminals.

12. A unitary station intended for use in a telephone system comprising a plurality of such unitary stations connected together, said station comprising a single compact casing having means adapted to be plugged into a source of electrical energy, an audio frequency amplifier in said casing adapted to be energized from said source, a speaker in said casing, the input impedance and output impedance of said amplifier being matched to the impedance of said speaker, a power switch for controlling the energization of the station from the source, a talk switch, input terminals adapted to be connected to another station, and conductors so interconnecting the speaker, the talk switch, the amplifier input of the station, and the aforesaid terminals that the speaker may be switched to either the amplifier input of the station or said terminals.

13. A unitary station intended for use in a loud speaker telephone system comprising a plurality of such unitary stations connected together, said station comprising a single compact casing, a

power pack therein designed to be energized from an ordinary power supply line, an audio frequency amplifier in said casing energized from said power pack, a loud speaker in said casing, a power switch for controlling the energization of the station from the power line, a talk button, input terminals adapted to be connected to another station, and conductors so interconnecting the loud speaker, the talk button, the amplifier input of the station and the aforesaid terminals, that the loud speaker may be switched to either the amplifier input of the station or said terminals.

14. A unitary station intended for use in a loud speaker telephone system comprising a plurality of such unitary stations connected together, said station comprising a single compact casing, a power pack therein designed to be energized from an ordinary power supply line, an audio frequency amplifier in said casing energized from said power pack, a loud speaker in said casing, a power switch for controlling the energization of the station from the power line, a talk button, input terminals adapted to be connected to another station, and conductors so interconnecting the loud speaker, the talk button, the amplifier input of the station and the aforesaid terminals, that the loud speaker may be switched to either the amplifier input of the station or said terminals, and means normally biasing the talk button to connect the speaker to said terminals.

15. A unitary station intended for use in a loud speaker telephone system comprising a plurality of such unitary stations connected together, said station comprising a single compact casing, a power pack therein designed to be energized from an ordinary power supply line, an audio frequency amplifier in said casing energized from said power pack, a loud speaker in said casing, the input impedance and output impedance of said amplifier being matched to the impedance of said speaker, a power switch for controlling the energization of the station from the power line, a talk button, input terminals adapted to be connected to another station, and conductors so interconnecting the loud speaker, the talk button, the amplifier input of the station and the aforesaid terminals, that the loud speaker may be switched to either the amplifier input of the station or said terminals.

16. A unitary station intended for use in a loud speaker telephone system comprising a plurality of such unitary stations connected together, said station comprising a single compact casing, a power pack therein designed to be energized from either an alternating current or direct current power supply line, an audio frequency amplifier in said casing energized from said power pack, a loud speaker, a power switch for controlling the energization of the station from the power line, a talk button, input terminals adapted to be connected to another station, and conductors so interconnecting the loud speaker, the talk button, the amplifier input of the station and the aforesaid terminals, that the loud speaker may be switched to either the amplifier input of the station or said terminals.

17. A unitary station intended for use in a loud speaker telephone system comprising a plurality of such unitary stations connected together, said station comprising a single compact casing, a power pack therein designed to be energized from either an alternating current or direct current power supply line, an audio frequency amplifier in said casing energized from said power pack, a loud speaker, the input impedance and output impedance of said amplifier being matched to the impedance of said speaker, a power switch for controlling the energization of the station from the power line, a talk button, terminals adapted to be connected to another station, and conductors so interconnecting the loud speaker, the talk button, the amplifier input of the station and the aforesaid terminals, that the loud speaker may be switched to either the amplifier input of the station or said terminals, and means normally biasing the talk button to connect the speaker to said terminals.

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