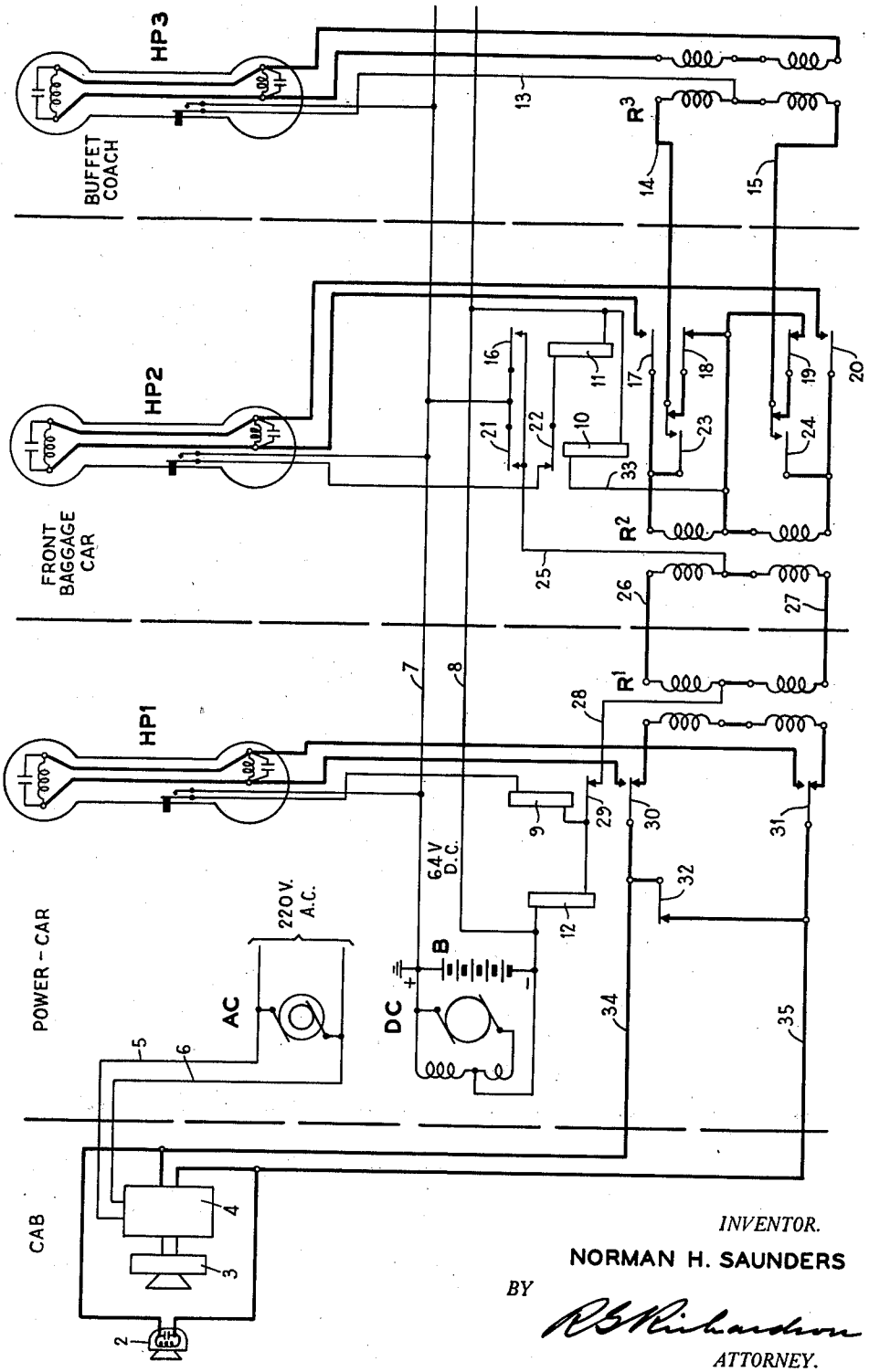
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TELEPHONE SYSTEM

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TELEPHONE SYSTEM

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The present invention relates in general to telephone systems, and more in particular to train telephone systems, and the object of the invention is to produce a new and improved system of this character which is well adapted for use on modern high speed stream lined passenger trains.

The invention will be described hereinafter with reference to the accompanying drawing, which shows diagrammatically the circuits and equipment required.

Referring to the drawing, the circuit is divided into sections by dotted lines to indicate the location of the equipment with respect to the different parts of the train, such as the driver's cab, power car, etc. The purpose of the system is to afford a means of communication whereby the conductor and other authorized members of the train crew can call the driver in the cab for the purpose of transmitting orders, for information, etc.

The telephone equipment in the cab comprises a transmitter 2, which may be a so called sound power unit such as is disclosed in the application of Woodruff et al, S. N. 738,030, filed August 2, 1934, an amplifier 4, and a loud speaker 3. The amplifier and loud speaker may be of any efficient type, such for example, as those sold by the RCA Manufacturing Co. Inc.

The telephone equipment in the power car comprises two of the so called sound power units, preferably mounted together in the form of a hand telephone HP1, such as is disclosed in the pending application of Sengebusch, S. N. 738,186, filed August 3, 1934. One unit of the hand phone functions as a receiver and the other as a transmitter.

The first baggage coach and the buffet coach are similarly equipped with hand phones HP2 and HP3, respectively. The locations of these phones are of course only specified by way of example, as they will naturally be located at the most convenient points in the train.

In the power car there is a generator labeled AC, which may be the generator for supplying current to the motors of the air conditioning equipment throughout the train. This generator is conveniently used to supply power to the amplifier 4 over leads 5 and 6.

There may also be in the power car a generator labeled DC and a storage battery B, which supply current for the lighting system of the train over leads 7 and 8. These leads also are used to supply current for the relays of the telephone system.

In addition to the speaking apparatus already described the telephone system comprises a talking circuit extending through the train and shown in heavy lines in the drawing, three repeating coils R1, R2, and R3, included in the talking circuit, and four relays 9 to 12, inclusive, together with their connections as shown.

Suppose now that a call is to be made from the buffet coach to the cab. The calling party will pick up the hand phone HP3 and will depress the push button. This button has to be held depressed during conversation. With the push button actuated there is a circuit established for relay 10 which extends from the grounded pole of battery B by way of lead 7, actuated push button of HP3, conductor 13, left-hand windings of R3 in parallel, conductors 14 and 15 in parallel, contacts controlled by 23 and 24 in parallel, contacts 18 and 19 in parallel, conductor 33, and winding of relay 10 to lead 8, which connects to the negative pole of battery B. Upon energizing, relay 10 connects conductors 14 and 15 with the right-hand winding of R2 at 23 and 24, thus closing the talking circuit at this point. The operation of contacts 23 and 24 also changes the circuit of relay 10 by substituting a path through the right-hand windings of R2 in parallel for the path by way of contacts 18 and 19 in parallel. Thus the circuit of relay 10 is converted into a standard simplex circuit superimposed on the talking circuit including R3 and R2.

Relay 10 also opens the circuit of relay 11 at 22, to prevent the operation of relay 11 from hand phone HP2, and at 21 closes a simplex circuit for operating relay 12, the circuit extending from lead 7 by way of 21, 25, left-hand windings of R2 in parallel, 26 and 27 in parallel, right-hand windings of R1 in parallel, 28, 29, and winding of relay 12 to lead 8. Relay 12 operates over this circuit and at 32 removes a short from across talking conductors 34 and 35. Relay 9 cannot be operated from hand phone HP1 under these conditions because of the ground potential at 29.

The talking circuit is now established and the party in the buffet coach can call the driver in the cab by speaking into the transmitter of hand phone HP3. The voice currents are amplified by the amplifier 4 and actuate the loud speaker 3. The driver will respond by speaking into the transmitter 2, and conversation can then proceed as desired. The conversation cannot be interrupted because as explained already, the relays 9 and 11 cannot be energized from hand phones HP1 and HP2. When the conversation is over with, the party in the buffet coach will put down the hand phone HP3, releasing the push button. Relays 10 and 12

therefore deenergize and the circuits are returned to normal.

When a call is made from the baggage car the hand phone HP2 is used. Upon actuation of the push button in this hand phone a circuit is closed for relay 11, extending from lead 7 by way of the operated push button, contact 22, and winding of relay 11 to lead 8. Upon energizing relay 11 disconnects conductors 14 and 15 from relay 10 at 18 and 19, thus preventing operation of relay 10 from hand phone HP3, and at 17 and 20 connects the talking circuit coming from hand phone HP2 to the repeating coil R2. Relay 11 also closes at 16 the previously traced circuit for operating relay 12. Upon energizing, relay 12 removes the short from the talking conductors 34 and 35 at 32.

Conversation may now proceed between the party in the baggage car and the driver in the cab. Relays 9 and 10 cannot be energized so long as relays 12 and 11 remain energized and consequently no interference can occur from hand phones HP1 and HP3. Upon the release of the push button at hand phone HP2 the relays 11 and 12 fall back and the circuits are returned to normal.

If a call is made from the power car the hand phone HP1 is used. When the push button is actuated, relays 9 and 12 energize in series over an obvious circuit, the former relay operating to remove the short circuit from the talking circuit at 32. Relay 9, upon energizing, opens the previously described circuit of relay 12 at 29, so that the closure of this circuit by actuating the push button at HP2 or HP3 cannot shunt down relay 9. This relay also disconnects the talking conductors 34 and 35 from the repeating coil R1 and connects them instead to the hand phone HP1.

The talking circuit is now completed and conversation can take place so long as the push button at HP1 is held operated. No interruption can take place because the continued energization of relay 9 cannot be interfered with. When the push button at HP1 is released relays 9 and 12 deenergize and the circuits are returned to normal.

If a call should be made from some point such as the buffet coach, for instance, while the line is in use, the calling party will at once appreciate the condition due to the absence of the characteristic live sound of the line in his receiver and will call again after an interval.

The purpose of the normal short circuit of the line at 32 is to prevent the amplification and reproduction in the loud speaker 4 of ordinary noises in the cab at times when the line is not in use. The loud speaker has to be located where the driver can easily hear anything coming in over the line when he is called, and he would be subjected to some annoyance if the speaker were left in active condition at other times.

The invention having been described, that which is believed to be new and for which the protection of Letters Patent is desired will be pointed out in the appended claims.

What is claimed is:

1. A train telephone system comprising a transmitter, an amplifier and a loud speaker in the cab, telephones located at different points on the train, a line permanently connected to said apparatus in the cab and extending through the train, means associated with each one of said telephones for connecting it to said line at will, and a talking circuit including the connected telephone and said transmitter, amplifier, and loud speaker.

2. A train telephone system comprising a line extending through the train, telephone equipment at one point on the train permanently connected to said line, telephones at other points on the train, means for connecting any telephone to said line at will, and means for preventing more than one telephone from being connected to said line at the same time.

3. In a telephone system, a telephone line, a station on said line comprising a transmitter, an amplifier, and a loud speaker, other stations each comprising a hand phone, a push button in each hand phone, means responsive to the operation of any push button for placing the associated hand phone in talking connection with said first station over said line, and means for preventing the connection of any other hand phone to the line while the line is in use.

4. In a telephone system, a terminal station, a plurality of other stations, a line extending from the terminal station to all said other stations, said line being normally disconnected from said other stations, a normal shunt across said line, means for connecting any one of said other stations to the line, and means for automatically removing said shunt when the connection is made.

5. In a telephone system, a line, a transmitter connected to said line, a loud speaker connected to said line, a short circuit on said line to maintain said speaker inactive, means for connecting a telephone to said line, and means for automatically removing said short circuit when said telephone is connected.

6. In a train telephone system, a station in the cab, a line extending from said station to a second station on the train, an intermediate station normally disconnected from said line, and means at the intermediate station controlled over a simplex circuit superimposed on that portion of the line which extends from the intermediate station to the second station and responsive to a call from said second station for preventing the connection of the intermediate station to said line.

7. In a train telephone system, a station at one end of the train, a second station on the train, a line extending between said stations, an intermediate station at which the said line is normally open, and means at said intermediate station controlled over a simplex circuit superimposed on a portion of said line and responsive to a call from said second station for closing said line.

8. In a train telephone system, a station in the cab, a line extending from said station to other points on the train, means for normally disabling the line near the cab station, means controlled over a simplex circuit superimposed on a portion of said line for rendering said disabling means ineffective, and means at another station on said line for closing said simplex circuit.

9. In a train telephone system, a station in the cab, a line extending from said station to other points on the train, means for normally disabling the line near the cab station, means controlled over a simplex circuit superimposed on a portion of said line for rendering said disabling means ineffective, a second simplex circuit superimposed on another portion of said line, and means controlled over said second sim-

plex circuit for closing said first simplex circuit.

10. In a train telephone system, a station at one end of the train, stations at other points on the train, a line extending through the train over which connections are established between said first station and said other stations, simplex circuits superimposed on different sections of said line, and relays controlled over said circuits for preventing more than one of said other stations from being connected to said first station at any given time.

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