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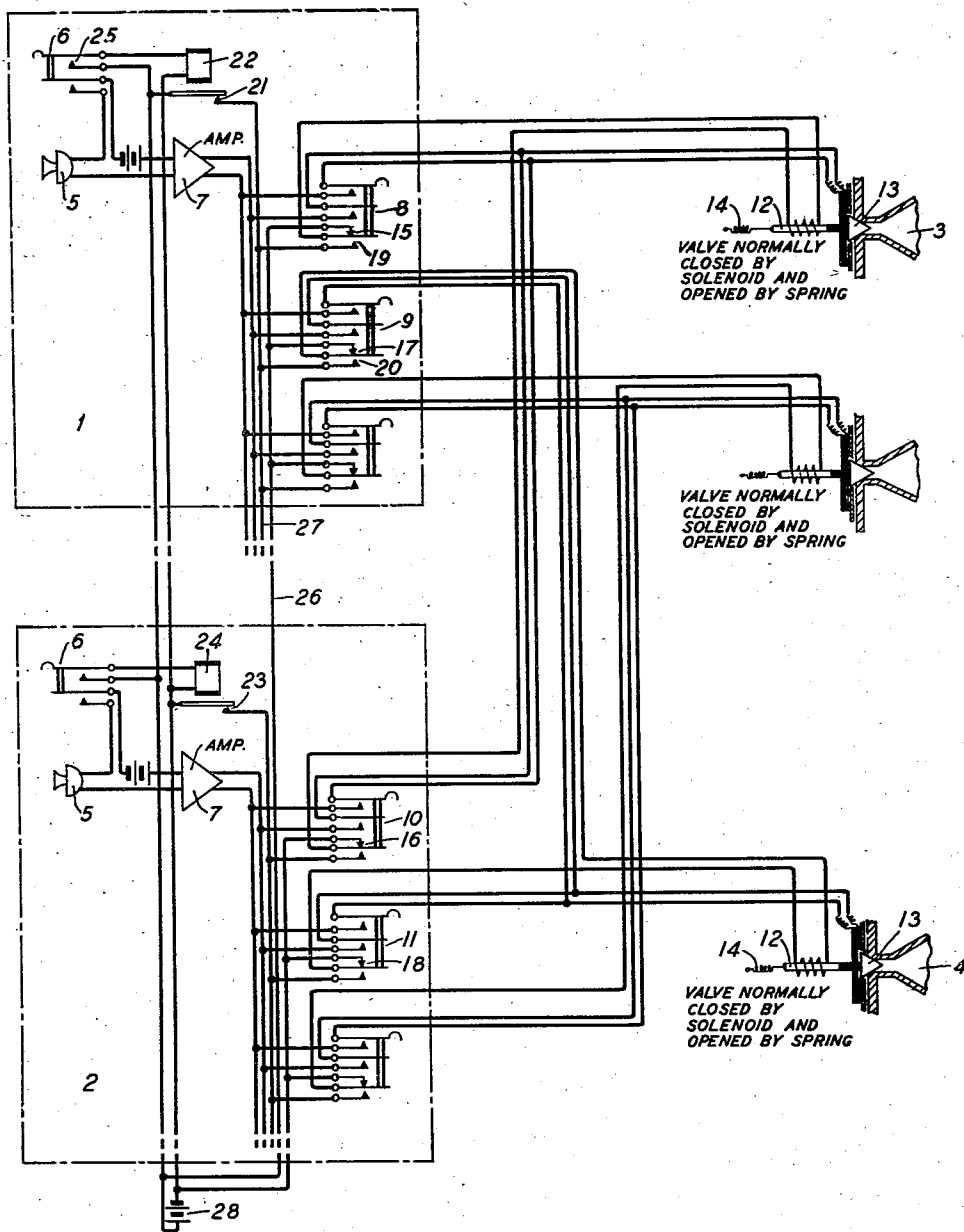
A. F. PRICE
SIGNALLING SYSTEM

2,217,769

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4 Sheets-Sheet 1

FIG. 1



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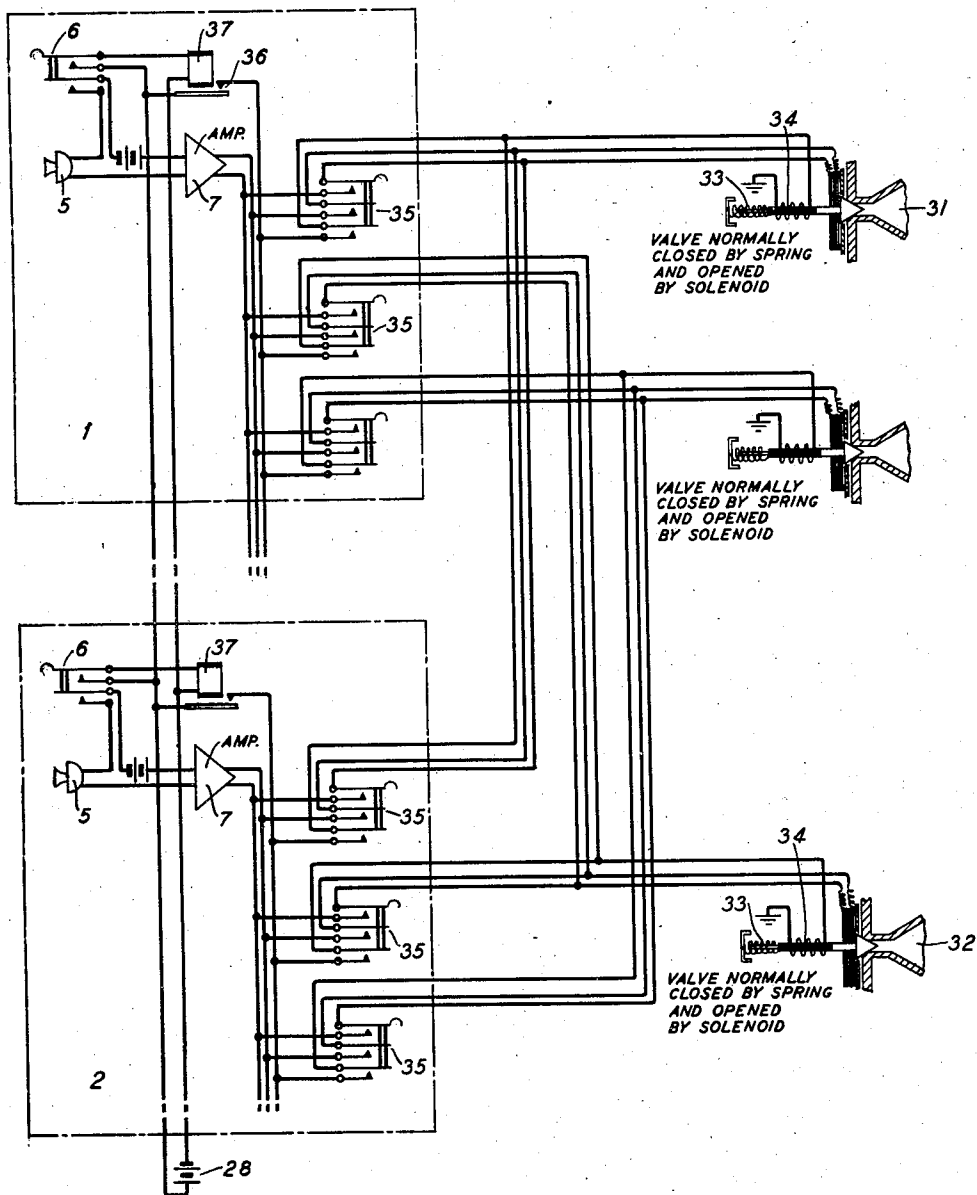
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FIG. 2



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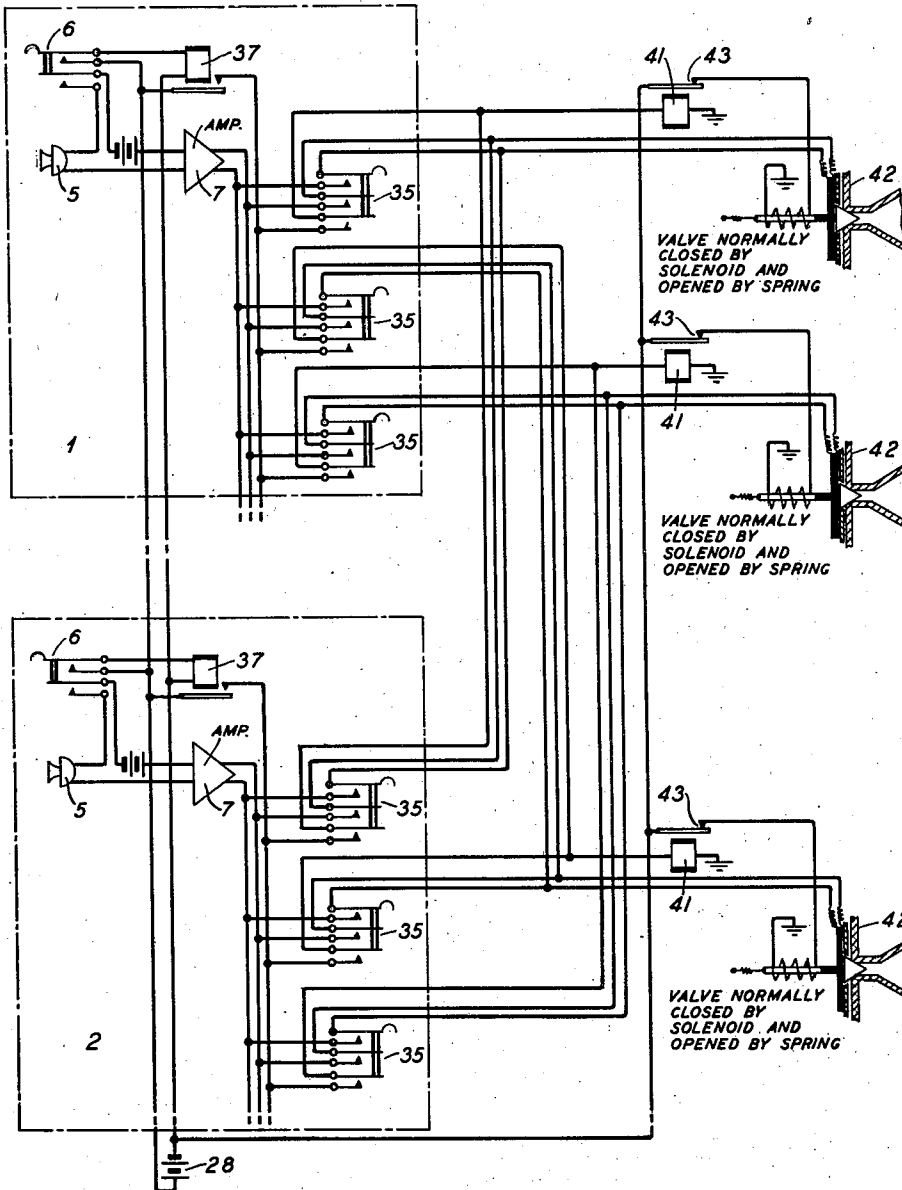
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SIGNALING SYSTEM

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FIG. 3



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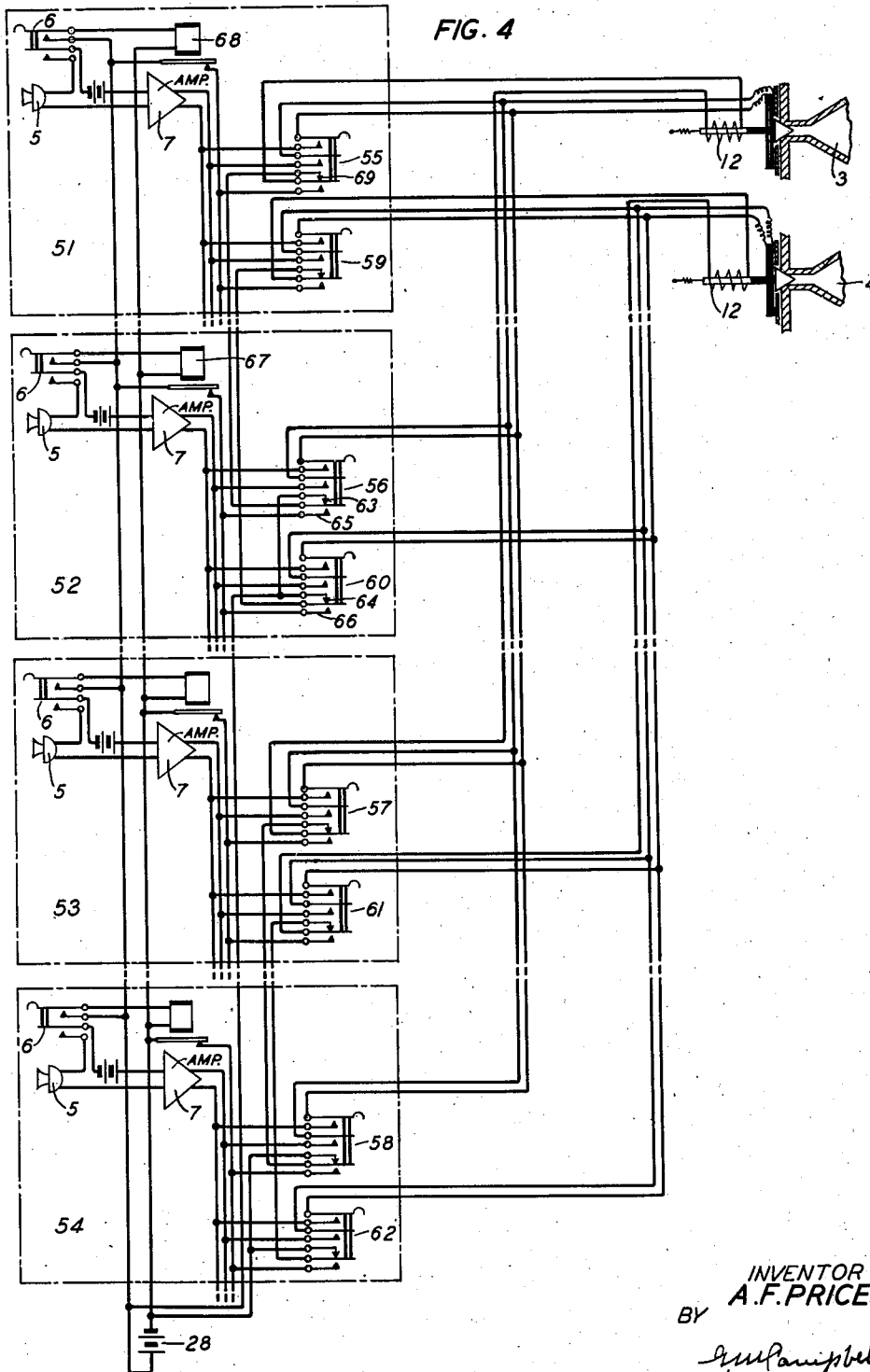
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UNITED STATES PATENT OFFICE

2,217,769

SIGNALING SYSTEM

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6 Claims. (Cl. 178—184)

This invention relates to signaling systems and particularly to those in which any desired number of the signal receiving devices may be connected to any one of several signal transmitting circuits.

In certain applications of systems of this type, the loud-speakers are sometimes subjected to such abnormally high air pressures that it is desirable to protect the vibratory diaphragms of the loud-speakers when they are not in use by a valve which normally closes the opening through which the sound energy is radiated. One such valve is disclosed in Patent 2,098,291 to Hopkins, November 9, 1937. When the blast valve is closed the loud-speaker is, of course, inoperative and hence the valve is designed to be either opened or closed by energizing a solenoid, depending on whether protection of the loud-speaker or operativeness of the system in emergencies is the primary consideration. If, for example, a solenoid holds the valve closed against the tension of a spring, the valve will open automatically when the power fails leaving the loud-speaker unprotected but in operative condition. The object of this invention is a control circuit which will quickly condition for operation any selected number of the receiving devices in such a system and which will keep all of the devices protected when they are not actually in use.

According to the invention, the blast valves of all the loud-speakers of the system are controlled from any transmitting station over solenoid energizing circuits which include contacts on the corresponding loud-speaker selecting switch at each station. As each loud-speaker is selected for operation at any station, the control circuit for its solenoid is extended to the contacts of a relay common to all the selecting switches at that station. When the transmitter is energized for announcing purposes this relay is operated and the blast valves of all the selected loud-speakers are opened to condition the loud-speakers for operation. With a circuit of this type the blast valves are controlled by means of a single relay at each station regardless of the number of loud-speakers in the system.

In the drawings:

Fig. 1 shows a two-station system according to the invention in which the solenoids are energized when the valves are closed;

Fig. 2 shows a modification of Fig. 1 in which the solenoids are energized to open the valves of the loud-speakers;

Fig. 3 shows a system similar to Fig. 2 but adapted to open the valves by deenergizing the solenoids as in Fig. 1; and

Fig. 4 shows how the circuit of Fig. 1 may be extended to a system involving any number of transmitting stations.

Referring now to Fig. 1, the system shown comprises two transmitting stations 1 and 2 and a plurality of loud-speakers such as 3 and 4. Each transmitting station is provided with a transmitter 5, a transmitter switch 6, an amplifier 7 and a plurality of loud-speaker selecting keys, such as 8, 9 at station 1 and 10, 11 at station 2, for selectively connecting the loud-speakers to the amplifier.

The loud-speakers are provided with protecting valves of the type shown in the Hopkins patent referred to above which consist essentially of a solenoid 12 which, when energized, moves the plug 13 against the tension of the spring 14 into the throat of the loud-speaker horn as shown. With all of the selecting keys in the non-selected position as shown, the solenoid 12 of loud-speaker 3, for example, is energized over a circuit extending from one terminal of the power supply 28 through contact 15 of switch 8 at station 1 to one side of the solenoid and from the other end of the solenoid winding through contact 16 of switch 10 at station 2 to the other terminal of the power supply. The solenoid of loud-speaker 4 is also energized over a similar circuit including contact 17 on the switch 9 and contact 18 on switch 11.

When the switches 8 and 9 are operated to connect the loud-speakers 3 and 4 to the amplifier 7, contacts 15 and 17 are opened but contacts 16 and 18 are closed, thereby completing holding circuits for the solenoids through the contact 21 of relay 22. Similarly, if switches 10 and 11 are operated to connect the loud-speakers to the amplifier of station 2, contacts 16 and 18 are opened and the solenoids are then energized through contact 23 of relay 24.

When the operator at station 1, for example, desires to make an announcement, he operates and holds his transmitter switch 6 which connects the transmitter 5 to the input of the amplifier 7 and at the same time completes a circuit through contact 25 for the relay 22. The operation of relay 22 opens at contact 21 the solenoid circuits of all the loud-speakers which have been selected at that station, thereby permitting their valves to open and condition the loud-speakers to reproduce the announcement. As soon as the transmitter switch is released contact 25 reopens, relay 22 releases and closes the solenoid circuits of the

selected loud-speakers, thereby again closing the valves. With this circuit, it will be clear that the loud-speakers not selected are always protected against excessive pressures and that selected loud-speakers are left unprotected only while a message is being transmitted.

While only three selecting keys have been shown at each station, it will be seen that additional keys may be provided for controlling any desired number of other loud-speakers by merely connecting the solenoid control contacts to the conductors 26 and 27, respectively.

If one loud-speaker is selected at both stations, its blast valve remains closed but either operator may release it by operating his transmitter switch. If a power failure occurs in the solenoid supply circuit the valves will, of course, open automatically to permit the operators to use the system without first manually opening the blast valves.

The system of Fig. 2 is similar to the system of Fig. 1 except that the loud-speakers 31 and 32 have blast valves which are normally held closed by springs 33, 33 but are opened when the solenoids 34, 34 are energized. In this case the loud-speaker selecting keys 35 are of the single-throw type which keep the solenoid circuits open in the non-selected position and connect them to contact 36 of relay 37 when in the selected position. Upon the operation of the transmitter switch 6 at either station, relay 37 closes contact 36 to complete all the solenoid circuits which have been prepared by the operation of the corresponding selecting keys.

In this system also, either or both stations may take control of any or all of the loud-speakers and if the power supply fails the loud-speakers are protected but the valves cannot be opened except by manual operation.

The system of Fig. 2 can be modified as shown in Fig. 3 by the addition of a relay 41 for each loud-speaker 42. The loud-speaker valves in this case are identical with those shown in Fig. 2 but the solenoids are energized through the back contacts 43 of the relays 41 which in turn are operated, in the case of selected loud-speakers, by means of relays 37 as in Fig. 2. This modified circuit will therefore function with single-throw selector switches and additional relays to give operating features similar to those of the system of Fig. 1. As in the case of Fig. 1, when the power fails the valves will open to condition the loud-speakers for operation.

The circuits described so far will control any number of loud-speakers having blast valves but they are directly applicable to systems with only two transmitting stations. The circuit of Fig. 4, however, is applicable to a system with any number of transmitting stations, each having any desired number of loud-speaker selecting switches.

Each of the stations 51 to 54 is provided with a transmitter 5, a transmitter switch 6, an amplifier 7, a plurality of loud-speaker selecting keys and a relay common to the keys as in Fig. 1. The loud-speakers 3 and 4 have blast valves which are held closed by normally energized solenoids 12 but it will be observed that with all the selecting keys for loud-speaker 3 in the non-selected position as shown, the solenoid circuit extends through contacts on all four keys 55 to 58 at the respective stations. Similarly, the circuit of the solenoid of loud-speaker 4 extends through contacts on the corresponding four keys 59 to 62 and, if desired, additional keys, not

shown, may be connected in the same manner to control any number of other loud-speakers. When the operator at station 52, for example, closes keys 56 and 60 to connect the loud-speakers 3 and 4 to his amplifier, the solenoid circuits are transferred from contacts 63 and 64 to contacts 65 and 66 on the keys 56 and 60 and are thereby placed under the control of relay 67 so that the operator may condition the loud-speakers for operation as in the systems previously described.

Similarly, when the operator at station 53 selects the loud-speakers by means of his keys 57 and 61 the solenoid circuits are placed under the control of station 53 and if both stations select the loud-speakers either operator may open the blast valves when an announcement is to be made.

However, when the operator of a station such as 51, which is electrically nearer the solenoids, selects a loud-speaker, he has priority over the more remote stations in the same conductor to the solenoid. For example, when key 55 at station 51 selects the loud-speaker 3 and transfers the solenoid circuit to the contacts of relay 68, station 52 can no longer control this loud-speaker, since the solenoid circuit to station 52 is open at contact 69 of key 55. Similarly, any loud-speakers selected at station 54 can no longer be controlled at station 53.

In this way, the more important stations can be given priority over those of less importance in controlling the loud-speakers. In these systems, each station is ordinarily supplied both with indicating means, such as signal lamps, which inform each operator of a selection made at any other station and with interstation communicating facilities so that any operator can request a station having priority of selection to give up control of any loud-speakers required for emergency announcements.

While the invention has been described with particular reference to the control of blast valve circuits, it may be used for various other purposes, such, for example, as the energization of the loud-speaker fields only when announcements are being made. In cases where the amplifiers are located at some distance from the selecting keys, it will be understood that the keys may be used to control relays the contacts of which are in the signal circuits. In a system of this latter kind, the circuits for the blast valves or for analogous purposes may be on either the keys or the corresponding relays. The telephone transmitters shown are, of course, merely illustrative and may be replaced by various other signal sources such, for example, as an oscillator and suitable code signaling means.

What is claimed is:

1. In an announcing system, a transmitter, a plurality of loud-speakers each having a vibratory diaphragm and a valve normally sealing the diaphragm against abnormal atmospheric pressures, switches for selectively connecting the loud-speakers to the transmitter and unitary switching means for effecting the opening of the valves of only the selected loud-speakers.

2. In an announcing system, a transmitter, a plurality of loud-speakers each having a vibratory diaphragm, a valve for sealing the diaphragm against abnormal atmospheric pressures and a solenoid for closing the valve, a two-position switch for each loud-speaker for selectively connecting the loud-speaker to the transmitter, a circuit including contacts on each switch for

energizing the solenoid of the corresponding loud-speaker in either position of the switch, a relay having a normally closed contact common to the solenoid circuit of all the loud-speakers connected to the transmitter, and a switch for energizing the transmitter and controlling the relay.

3. In an announcing system, a plurality of loud-speakers each having a vibratory diaphragm, a valve for sealing the diaphragm against abnormal atmospheric pressures and a solenoid for closing the valve, two transmitting stations each including a transmitter and a two-position switch for each loud-speaker for selectively connecting the loud-speaker to the transmitter, a circuit including contacts on the corresponding loud-speaker selecting switches at both stations for energizing each solenoid for both positions of said switches, a relay at each station having normally closed contacts common to the solenoid circuits of all loud-speakers connected to the transmitter, and a switch at each station for controlling the relay.

4. In a signaling system, a signal transmitter a plurality of normally inoperative signal receiving devices, a signal circuit including a switch at the transmitter for each device for selectively connecting it to the transmitter, means at each device for conditioning it for operation, an operating circuit for each conditioning means including contacts on the corresponding switch at the transmitter, and means common to all the switches in their selected positions for controlling all of the operating circuits.

5. In a signaling system, a plurality of transmitting stations each having a signal transmitter, a plurality of receiving devices, switching means at each station for each device for selectively connecting the device to and disconnecting it from the signal transmitter, a solenoid for each device for normally maintaining it in inoperative condition, a source of current, an energizing circuit for each solenoid comprising two conductors each normally extending between the solenoid and the source of current through the switching means at a plurality of stations for the corresponding receiving device, normally closed contacts at each station connecting the source of current directly to each switching means to maintain the solenoid energizing circuits of the receiving devices when connected to the transmitter, and means at each station for energizing the transmitter and opening the contacts.

6. In a signaling system, a plurality of transmitting stations, a signal transmitter at each station, a plurality of signal receiving devices, a solenoid for each device for normally maintaining it in inoperative condition, two-position switching means at each station for selectively connecting the transmitter to each device, energizing circuits for each solenoid including closed contacts in both positions of the corresponding switching means, and means at each station for simultaneously opening the solenoid circuits of all the receiving devices connected to the transmitter.

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