March 18, 1924. 1,487,309

W. T. BOOTH

AIRPLANE SIGNALING APPARATUS

Filed April 25, 1919 2 Sheets-Sheet 1

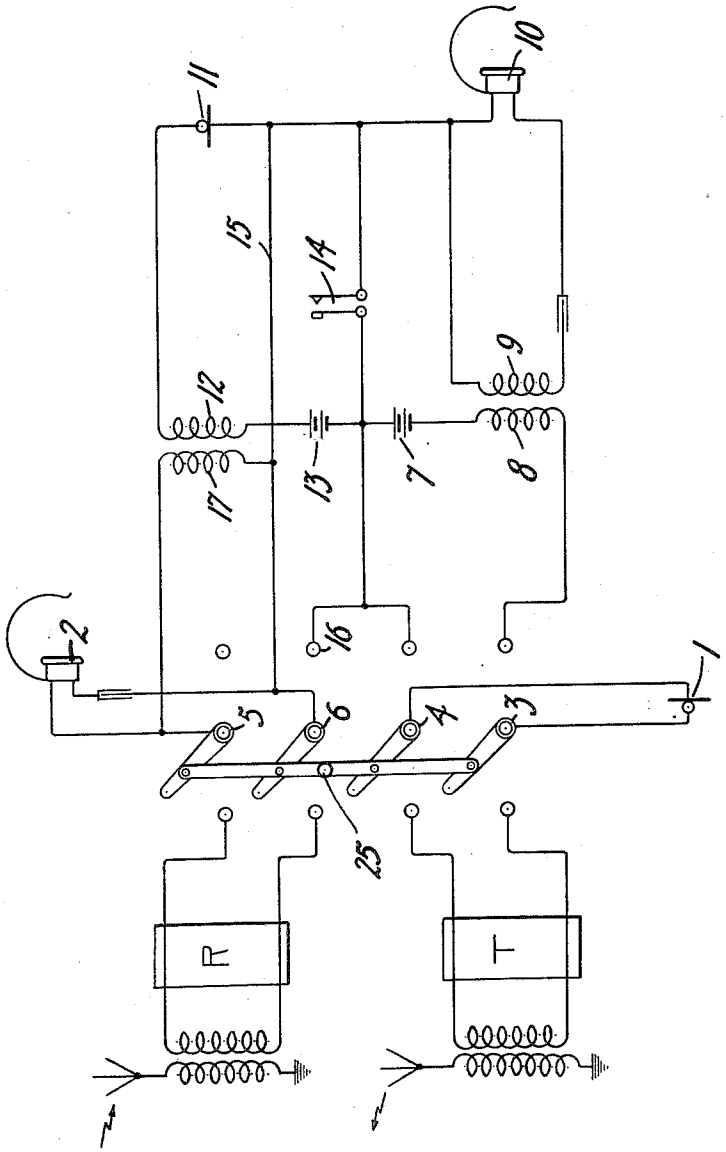


Fig. 1.

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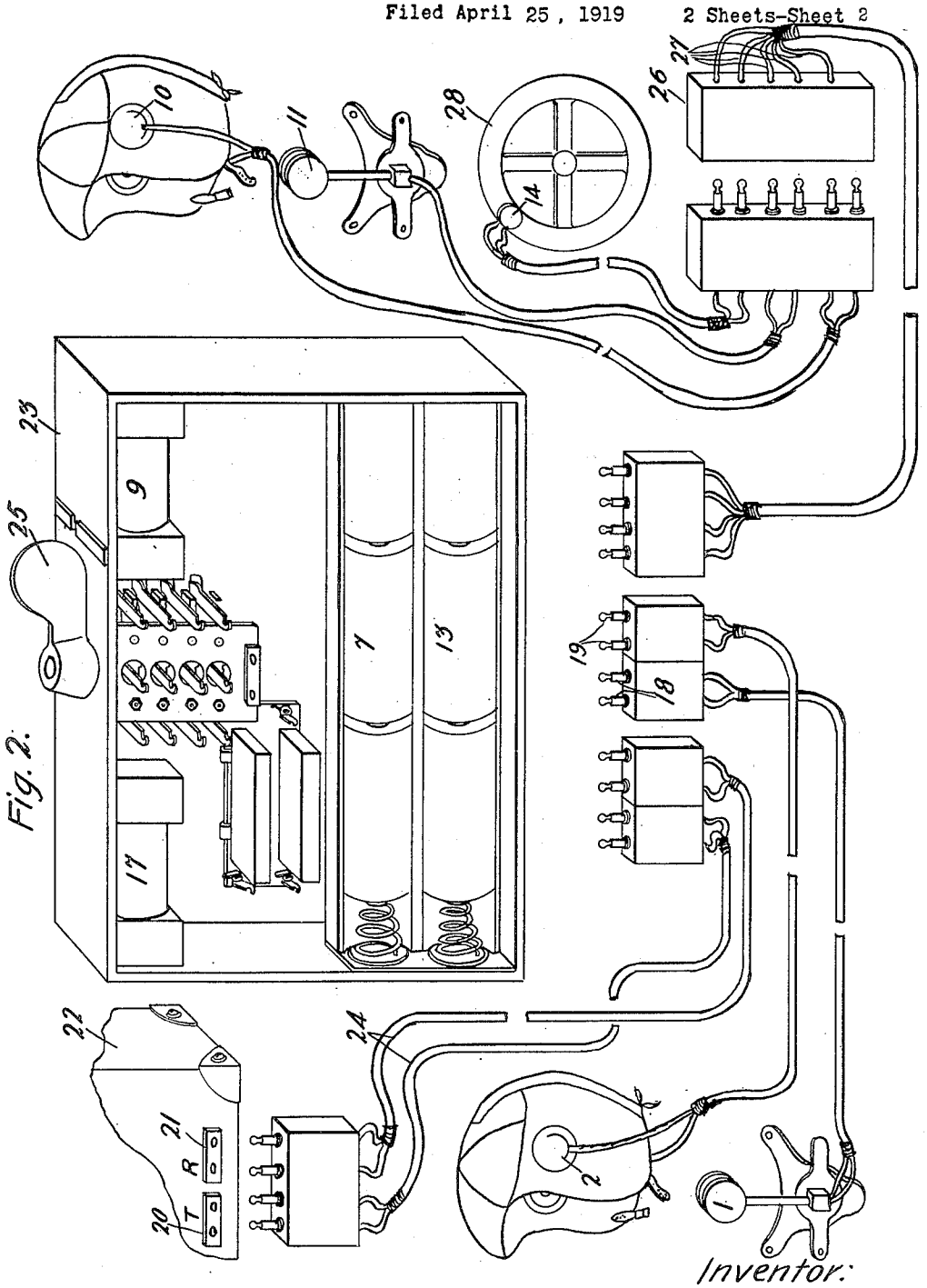


Fig. 2.

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Patented Mar. 18, 1924. 1,487,309

UNITED STATES PATENT OFFICE.

WILLIAM T. BOOTH, OF EAST ORANGE, NEW JERSEY, ASSIGNOR TO WESTERN ELECTRIC COMPANY, INCORPORATED, OF NEW YORK, N. Y., A CORPORATION OF NEW YORK.

AIRPLANE SIGNALING APPARATUS.

Application filed April 25, 1919. Serial No. 292,655.

To all whom it may concern:

Be it known that I, WILLIAM T. BOOTH, a citizen of the United States, residing at East Orange, in the county of Essex and State of New Jersey, have invented certain new and useful Improvements in Airplane Signaling Apparatus, of which the following is a full, clear, concise, and exact description.

This invention relates to airplane signaling apparatus and more particularly to combined interphone and radio telephone sets for permitting an occupant of an airplane to communicate during flight with the other occupants of the plane or with a distant signaling station.

An object of the invention is to provide a circuit arrangement whereby the same headset may be used for either radio or interphone signaling.

Another object of the invention is to provide an airplane with combined radio and interphone signaling apparatus whereby interphone communication may be carried on without production of radio signals.

A further object of the invention is to provide means whereby when an aviator is engaged in radio communication, another aviator of the same crew may signal to him without the transmission of corresponding radio signals.

A still further object of the invention is to provide receiver head circuits of an impedance suitable for either interphone or radio communication.

An additional object of the invention is to provide a compact unitary signaling set which may be simply inserted between the radio and talking sets of an airplane to equip an ordinary airplane radio set for interphone operation without further change or adjustment.

According to this invention an airplane having signaling sets for two or more occupants is supplied with suitable radio transmitting and receiving apparatus. Interphone circuits are provided for two-way wire communication between the aviators equipped with the signaling sets. A switch under the control of one of the aviators, for example, the observer, is arranged to connect the observer's signaling or headset to the interphone circuits or to the radio apparatus as desired. When this switch is in the radio position the observer's talking circuit is disconnected from the interphone circuits, but his receiver is associated with them so that the pilot may instantly call him if the need arises. The interphone set, including the circuit apparatus, talking battery and the switching arrangement, is all incorporated in a compact unitary structure equipped with jacks to receive the standard connecting plugs of the headsets and to permit similar connection to the radio apparatus.

Other objects of the invention will appear from the following detailed description taken in connection with the accompanying drawing in which Fig. 1 illustrates diagrammatically the circuit arrangement of an airplane radio and interphone signaling sytsem, and Fig. 2 shows a perspective of the interphone apparatus, the signaling sets and their connections to the radio apparatus.

Referring to Fig. 1, an observer's transmitter 1 and head receiver 2 having a condenser in series are connected respectively to switch points 3, 4 and 5, 6 of a four-pole double-throw control switch. The left contacts of the pairs of switch points 3, 4 and 5, 6 are respectively connected to the radio transmitting apparatus T and receiving apparatus R conventionally shown as associated with independent antennæ. As will be understood, any suitable form of radio signaling apparatus may be used and a single antenna with well-known balancing arrangements for preventing local interference with the receiving circuits may be employed. The radio receiving apparatus preferably includes a detector of the thermionic type and the output circuit of the detector, or of a thermionic amplifier to which it supplies energy, may be connected to the left contacts associated with the switch points 5, 6. In this case receiver 2 has preferably a resistance of the order of 15,000 to 20,000 ohms in order to introduce an impedance of the most effective value in the ouput circuit of the thermionic device.

Connected to the right contacts of switch points 3 and 4 are the battery 7 and primary repeater coil winding 8 of the observer's talking circuit. The secondary winding 9 of this repeating coil is connected through a condenser to a pilot's receiver 10 which is similar in electrical characteristics to re-

ceiver 2. A pilot's transmitter 11 is in circuit with primary winding 12 of a repeating coil and talking battery 13, this circuit being completed either through cut-in key 14, which is normally open, or by way of conductor 15, switch point 6 and upper right contact 16 of the control switch. Associated with primary winding 12 is a secondary winding 17 connected directly to switch points 5 and 6.

In operation, if the observer desires to receive radio signals, he throws the control switch to the left or radio position directly connecting his transmitter 1 and receiver 2 to the radio transmitting and receiving apparatus respectively. This operation completes circuits for two-way radio communication with a distant station. Sufficient side tone to enable the observer to regulate his speech is received in the observer's receiver in consequence of the radio energy induced in or forced upon the radio receiving circuits on account of their proximity to the radiating antenna. It is, however, possible to so adjust the relations of the transmitting and receiving apparatus as to limit this side tone to a very small value, or to substantially eliminate it even in the case where a single antenna is used for both radio transmission and reception.

During the radio conversation the talking circuit through the pilot's transmitter 11 is open. If, however, the pilot desires to call the observer's attention he closes cut-in key 14 and upon speaking into transmitter 11, he causes speech currents to be repeated by repeater 12, 17, to receiver 2. If the observer desires to respond to the pilot he throws the control switch to the right, disconnecting the radio apparatus and simultaneously completing interphone talking circuits for himself and the pilot. The two aviators can now converse with cut-in key 14 in its normal open position.

Referring to Fig. 2, the observer's transmitter 1 and receiver 2 are shown connected to cords terminating in plugs 18 and 19 which may be connected directly to jacks 20 and 21 of radio set 22 if no interphone operation is desired. The interphone apparatus, according to the present invention, is a unitary set 23 having jacks (not shown) to which plugs 18 and 19 may be connected. Cords 24 serve to connect the radio set 22 with the interphone set 23. A handle 25 of the control switch is conveniently located with respect to the observer.

The pilot's receiver 10 and transmitter 11 may be connected to the proper terminals of the interphone set by cords similar to cords 24. Where the pilot and observer are at some distance from each other in the airplane and it is desired to use interchangeable headsets, a local jack block 26 may serve for connection with the cords of the pilot's set and may be connected to the interphone set by extension cord 27. The pilot's cut-in key 14 is preferably located on the rim of the airplane control wheel 28.

The interphone circuits as illustrated are normally anti-sidetone. This enables the highest electrical transmission efficiency to be secured. If it is desired to place the radio communication in charge of the pilot, this may be done by moving cut-in key 14 to the observer's position and placing the control switch 25 of interphone set 23 within reach of the pilot, the plug and jack connections of the observer and pilot being interchanged. Obviously, there may be as many additional sets as desired bridged across the observer's set. While this apparatus is of particular applicability to airplane operation, it is also suitable for signaling purposes in other relations.

What is claimed is:

1. An airplane signaling apparatus including a radio transmitter and a radio receiver, an aviator's signaling set connected to said transmitter and said receiver, a second aviator's signaling set, means independent of said radio transmitter for connecting said second signaling set to said first named signaling set whereby the operator of said second set may call the operator of said first set at will.

2. An airplane communication set comprising radio receiving and transmitting apparatus, an observer's signaling set, a pilot's signaling set, and unitary means electrically interposed between said apparatus and said sets for permitting the operator of one of said sets to carry on two-way radio communication with a distant station or two-way interphone communication with the operator of said other set.

In witness whereof, I hereunto subscribe my name this 24th day of April A. D., 1919.

WILLIAM T. BOOTH.