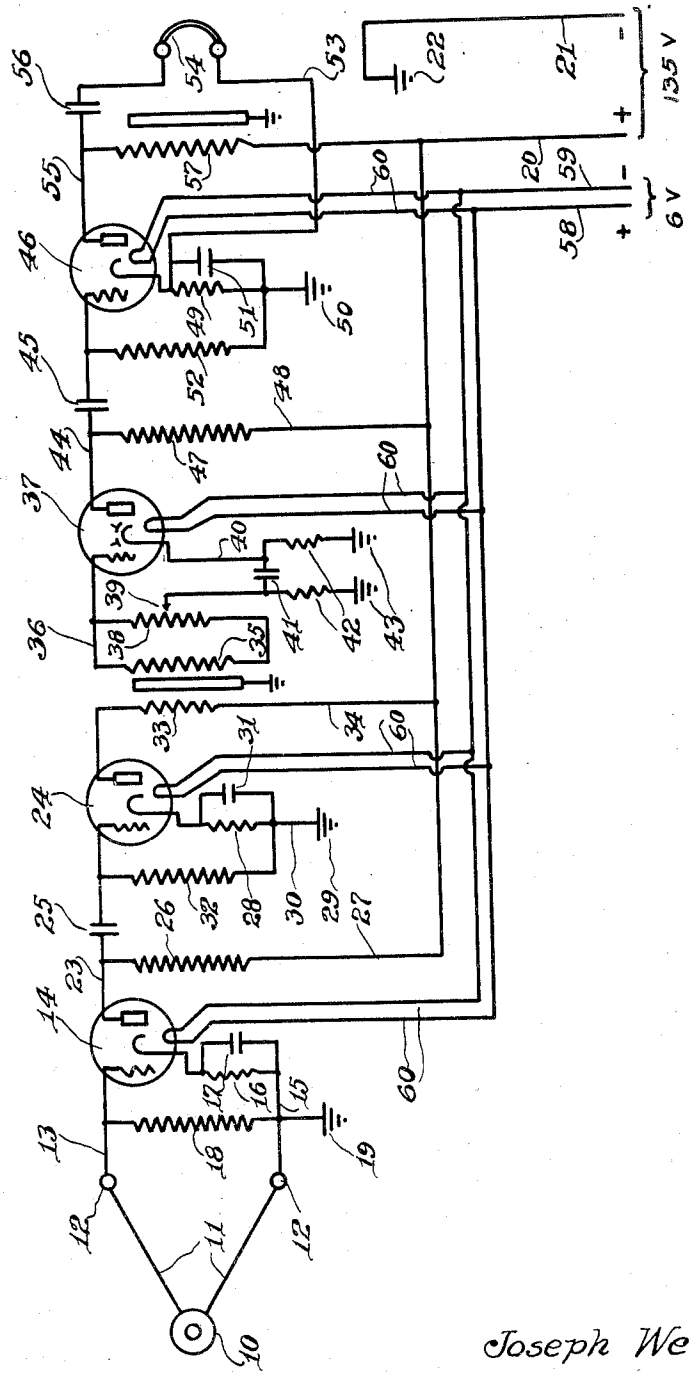
Oct. 9, 1934. J. WEINSTEIN 1,976,707

AMPLIFYING STETHOSCOPE

Filed Nov. 7, 1933



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Patented Oct. 9, 1934 1,976,707

UNITED STATES PATENT OFFICE

1,976,707

AMPLIFYING STETHOSCOPE

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Application November 7, 1933, Serial No. 697,088

1 Claim. (Cl. 179—171)

This invention relates to stethoscopes and has special reference to an amplifying stethoscope.

In the ordinary form of stethoscope, difficulty is often experienced in detecting slight sounds or differences in sounds and it frequently happens that these faint sounds or slight differences are of high importance in enabling a correct diagnosis of a patient's condition. Such difficulties would be readily overcome if the sounds produced were amplified.

It is, therefore, an important object of the invention to provide novel means for amplifying such sounds, the means being in the form of a microphonic stethoscope connected to the in-put side of an amplifying circuit with which it is thus combined, the amplifying circuit being of the general character of such amplifying circuits as are used in radio receiving sets.

A second important object of the invention is to provide a novel form of amplifying circuit especially adapted for use in connection with a microphonic stethoscope.

A third important object of the present invention is to provide a device of this character operable by battery current so that the device may be utilized at any desired place whether or not such place is provided with light or power from a central station.

With the above and other objects in view, the invention consists in general of certain novel details of construction and combinations of parts hereinafter fully described, illustrated in the accompanying drawing and specifically claimed.

In the accompanying drawing like characters of reference indicate like parts throughout and the figure represents a wiring diagram disclosing the arrangement of the microphonic stethoscope and its amplifying circuits.

In the embodiment of the invention as herein disclosed there is provided a combined stethoscopic sound receiver and microphone or microphonic stethoscope 10 having its terminal conductors 11 connected to the in-put terminals 12 of an amplifying circuit. A wire 13 leads from one terminal 12 to the grid of a tube 14. The remaining terminal 12 is connected by a wire 15 through a resistance 16 to the cathode of this tube. A condenser 17 is arranged between this remaining terminal and the cathode in parallel to the resistance 16. Across the wires 13 and 15 is bridged a high resistance 18 and the junction of this high resistance is grounded at 19.

The amplifier is provided with power supply lines 20 and 21 preferably receiving current from a battery having a potential of 135 volts. The negative line 21 is preferably grounded at 22. A wire 23 connects the plate of the tube 14 to the grid of a second tube 24 through a condenser 25 and the wire 23 is connected to the positive line or lead 20 through a resistance 26 by a wire 27, the connection being made between the tube 14 and the condenser 25. The cathode of tube 24 is grounded, through a resistance 28 to the ground 29 by a wire 30. A condenser 31 is arranged in shunt around the resistance 28 in this ground connection. A resistance 32 has one terminal connected to the wire 23 between the condenser 25 and tube 24 and has its other terminal grounded at 29. The tube 24 has its plate connected, through the primary winding 33 of a transformer, by a wire 34 to the wire 27 and thus to the positive lead 20.

The secondary winding 35 of the transformer has one terminal connected by a wire 36 with the grid of a tube 37 and its other terminal is connected to the wire 36 through a resistance coil 38 over which moves a movable contact 39 connected by a wire 40, through a condenser 41, to the cathode of tube 37. At each side of the condenser 41 the wire 40 is grounded through a resistance 42 to a ground 43. A wire 44 connects, through a condenser 45, the plate to tube 37 to the grid of a fourth tube 46 and the wire 44 is connected, through a resistance 47, to the wire 27 by a wire 48. The cathode of the tube 46 is grounded, through a resistance 49, to a ground 50 and a condenser 51 is arranged in shunt around the resistance 49 between this cathode and ground. The wire 44 is grounded, between the condenser 45 and tube 46, through a resistance 52 to the ground 50. A wire 53 connects the cathode of tube 46 directly to one out-put terminal 54 of the amplifier. The plate of tube 46 is connected by a wire 55, through a condenser 56 to the remaining out-put terminal 54 and a choke coil 57 has one terminal connected to the wire 55 between the tube 46 and condenser 56 and has its other terminal connected to the line or lead 20.

Receiving power from a suitable battery, say of six volts, are the supply lines 58 and 59 which are connected by branch wires 60 to the heater elements of the several tubes so that these heaters or filaments are connected in multiple to the current supply source.

In use, the microphonic stethoscope is applied to a portion of the anatomy over the organ to be auscultated, one or more sets of telephone ear pieces having been connected to the out-put terminals. Then the sound impulses emanating

from the organ are translated into electrical impulses through the action of the microphone, amplified by the amplifier, and received through the ear pieces as amplified sounds. Obviously a loud speaker device may be connected to the out-put terminals if desired and, when arranged in this manner, the apparatus may be used for clinical demonstrations.

There has thus been provided a simple and efficient device of the kind described and for the purpose specified.

It is obvious that changes may be made in the arrangement of the parts without departing from the spirit of the invention. It is not, therefore, desired to confine the invention to the exact arrangement here shown, but it is desired to include all such as come within the scope of the appended claim.

What is claimed, is:—

An amplifying instrument for microphonic stethoscope comprising in-put terminals, a series of electronic vacuum tubes each having a grid, a plate, a cathode and heater element, conductive connections between the in-put terminals and the grid and cathode of the first tube, the connection to the cathode having a resistance and a condenser in multiple therein, a high resistance bridge between said connections, a connection from the plate of the first tube to the grid of the second tube including a condenser, a transformer having primary and secondary windings and having one terminal of the primary winding connected to the plate of the second tube and one terminal of the secondary winding connected directly to the grid of the third tube and the remaining terminal of the transformer being connected through a through a resistance winding to the grid of the third tube, a movable contact traversing said resistance winding and connected through a condenser to the cathode of the third tube, ground connections each including a resistance and connected to the last mentioned cathode connection on opposite sides of the condenser, a connection from the plate of the third tube to the grid of the fourth tube and including a condenser, a pair of out-put terminals, a connection between the plate of the last tube and one of the out-put terminals, a connection between the cathode of the last tube and the remaining out-put terminal, the cathodes of the second and fourth tubes being each grounded through a resistance and condenser arranged in multiple, the grids of the second and fourth tubes being grounded through a resistance, a current supply line having the terminal of the transformer primary and the plates of the first, third and fourth tubes connected thereto in multiple, the connections to the plates having resistances interposed therein whereof the resistance for the plate of the fourth tube constitutes a choke coil, and means to heat said heater elements.

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