

April 8, 1958

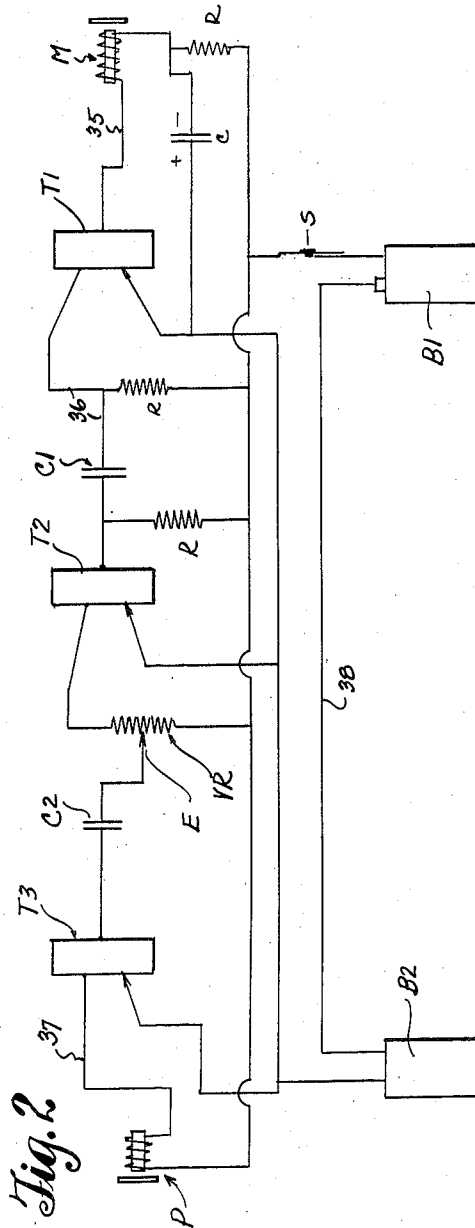
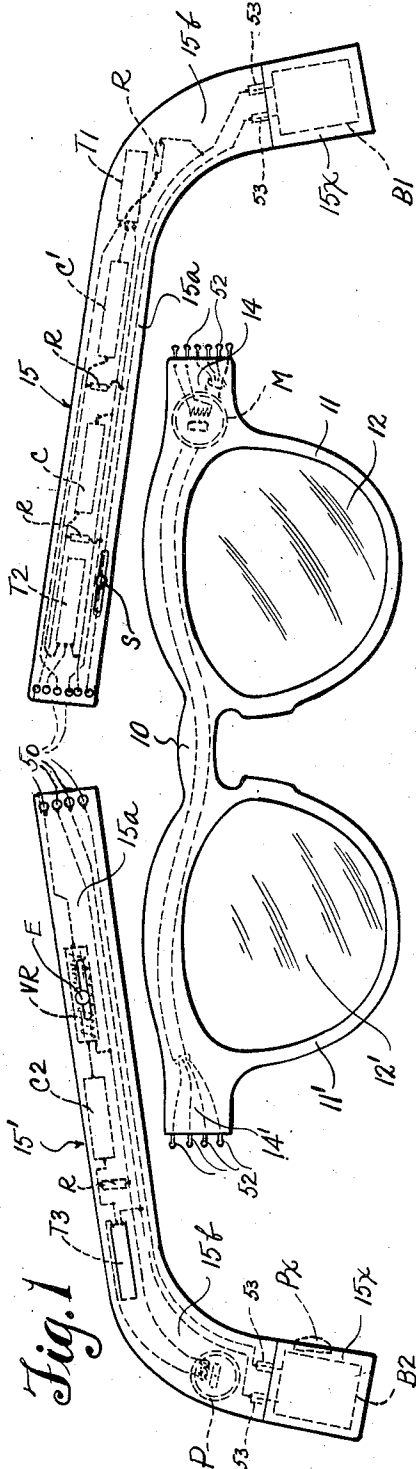
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2,830,132

HEARING AID AND SPECTACLES COMBINATION

Filed March 16, 1953

2 Sheets-Sheet 1



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2 Sheets-Sheet 2

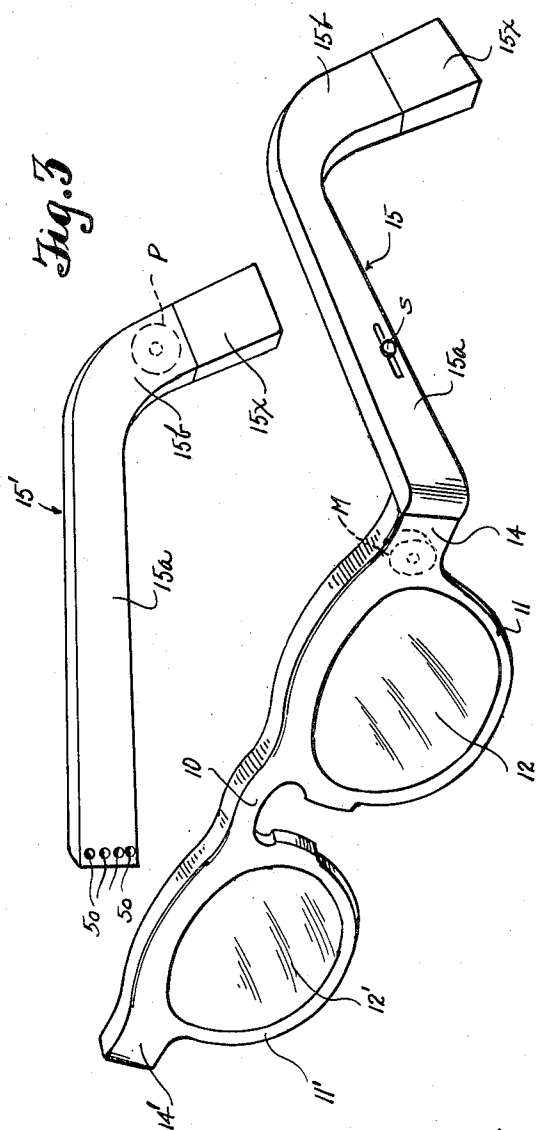


Fig. 3

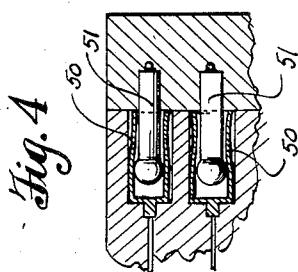


Fig. 4

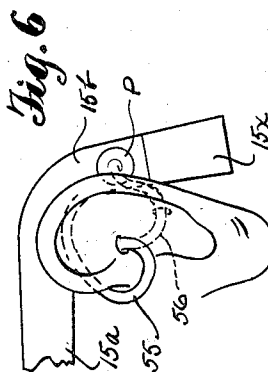


Fig. 6

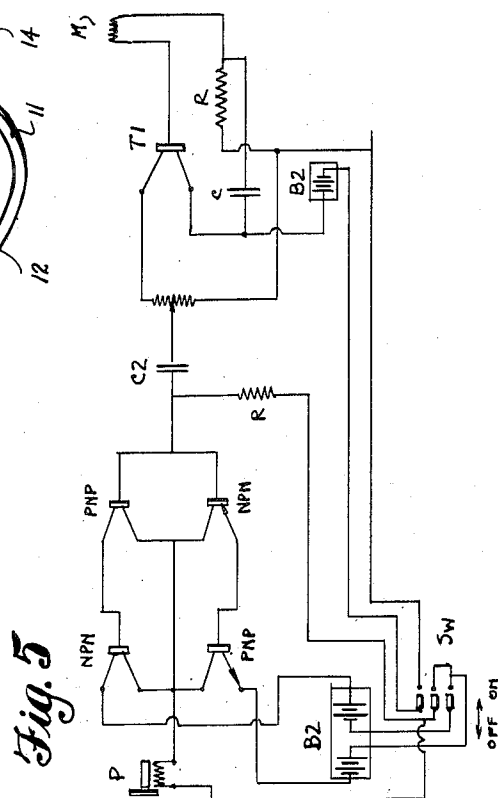


Fig. 5

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HEARING AID AND SPECTACLES COMBINATION

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3 Claims. (Cl. 179—107)

This invention relates to what are generally known as "hearing aids." More particularly, it pertains to the combining of hearing aid equipment with the frame of a pair of spectacles, or a support which is of the character of and adapted to be worn as, and to simulate a pair of spectacles; it being the principal object of this invention to provide a combination of hearing aid equipment and spectacles that are so associated that neither of the parts of the combination interferes with the normal use of the other, and the frame of the spectacles, as worn in the normal manner, provides for a practical, and very advantageous positioning of the hearing aid equipment particularly in reference to the microphone for receiving sound and the ear phone whereby the sound received is transmitted to the ear of the person wearing the equipment.

More specifically stated, it is the principal object of the present invention to provide hearing air equipment that is contained in its entirety in a supporting frame structure which may be the frame for a pair of spectacles, or a frame that simulates and is adapted to be worn as the frame for a pair of spectacles.

Another object of the invention is to so incorporate all the necessary instruments and elements of the hearing aid equipment in the spectacle frame, that all exterior wires, cords and other accessories are eliminated.

It is a further object of the present invention to so combine the hearing aid equipment with the spectacles frame that placing the frame in a natural wearing position results in bringing the microphone to the most advantageous position for the user for the pick-up of sound; that is, for receiving the sound of the voice of a person faced by the person wearing the frame. Also, to provide that the application of the bows of the frame in normal wearing position back of the ears results in placing the receiver, or ear phone, in a most satisfactory position for transmittal of sound from the microphone to the ear of the wearer.

Yet another object of the invention is to so construct the supporting frame that its parts may be readily disconnected for repair or replacement of hearing aid parts if such should become necessary or desirable.

Furthermore, it is an object to provide such details of construction of parts that disconnection and also the connection of the circuit members leading between various instruments of the hearing aid equipment located in the various separable parts of the frame is automatically effected merely by the manual disconnection and connection of the frame members as provided for.

Still further objects and advantages of the present invention reside in the details of construction of various parts and in their mode of use, as will hereafter be fully described.

In accomplishing these and other objects of the invention, I have provided the improved details of construction, the preferred forms of which are illustrated in the accompanying drawings, wherein:

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Fig. 1 is a view of a frame for a pair of spectacles including its bows as equipped with the present hearing aid instruments and accessories; the bows here being shown disconnected from the spectacle rims and disposed in the plane of the joined rims merely for purpose of better illustration and to reduce the size of the view.

Fig. 2 is a wiring diagram for the hearing aid elements.

Fig. 3 is a perspective view showing one of the bows detached from the rim.

Fig. 4 is an enlarged sectional detail showing the manner of making circuit connections between parts contained in the bows and in the rims.

Fig. 5 is a wiring diagram and the showing of an alternative arrangement of parts.

Fig. 6 illustrates the application of the ear phone portion to the ear.

In Fig. 1, a frame for a pair of spectacles has been shown that is typical of present day "shell frames." This frame may be made in various designs, of plastic, or other suitable materials. The parts of the frame are of substantial dimensions in accordance with present day popular designs, thus making the combining of the hearing aid equipment therewith quite readily possible. The spectacle frame structure comprises the usual bridge portion 10 and the two oval frames 11—11', generally referred to as the rims; these parts being integrally formed as a single and substantially rigid piece. Fig. 1 shows the two rims as being equipped respectively with lenses 12—12'. However, the type, kind or prescription of the lenses, or even the use of lenses, is of no particular significance to the present invention. It may be that the wearer does not require lenses to aid or correct vision, and may have the frames fitted with optical glass only to disguise their use as a support for hearing aid equipment. The rims 11—11' are formed, at their outer ends, with laterally extending bosses, or projections, 14—14', to which the bows 15—15' are attached for the proper support of the frame when worn.

It is to be understood that the specific overall design or shape of the spectacle frame, as well as the details of construction of the various parts thereof, is of no particular significance so long as not inconsistent with the invention or the objects to be attained thereby. Nor are the materials of which the frame is made of any particular significance so long as practical for use.

Each of the parts 15—15', designated as the bows, comprises a relatively straight temple portion 15a that is equipped at one end for attachment to the corresponding rim, and at its other end terminates in a downwardly curved ear engaging portion 15b. Extension pieces 15x are here shown to be removably applied to the lower ends of the parts 15b, as best shown in Fig. 1; the manner of their attachment will presently be explained.

The present hearing aid equipment includes various parts that are now well known, and are presently being used in hearing aid equipment, and no claim to these parts, per se, is herein made. The hearing aid equipment employed embodies a microphone which may be of the dynamic type, or permanent magnet type or might be of other suitable type. It is herein designated in its entirety by reference character M, and it is contained within the lateral extension 14 of the rim 11. This sound pick-up instrument, is so disposed as to best receive sound from directly forward of the wearer of the frames. The necessary electrical system is energized by current that is supplied by two small one cell batteries, designated respectively by reference characters B1 and B2; these batteries being contained respectively in the extension pieces 15x as applied to the bows 15—15'. The receiver, or ear phone, is of the permanent magnet type or other suitable type and is designated by reference

character P. It is mounted on the ear engaging piece 15x of bow 15', and its position is such that when the ear engaged portion 15b of that bow is applied back of the ear of the user in the normal manner the transmittal side of the phone will be pressed against or near the mastoid bone just back of the ear where it will operate best for the transmittal of sound to the ear.

It is a feature of this invention that all the necessary and presently used instruments or elements of the hearing aid apparatus are embodied in, or are supported by and within the parts comprised in the spectacle frame structure, thereby eliminating the necessity for or the use of outside or visual cords, connections, and the like, that usually are required in making circuit connections between batteries, microphone and ear phone and which outside connectors are annoying to the user; are unsightly in use and cause noise by reason of their rubbing together or contacting the clothing.

The sound pick-up microphone, receiver or ear phone, the batteries and the required or desired transistors, resistors, switches, volume control and condensers are electrically connected for use as shown in Fig. 2 and are preferably located in the frame members in the relationship shown best in Fig. 1.

In the wiring diagram, the transistors are designated by reference characters T1, T2 and T3, respectively; the microphone is designated by reference character M; the ear phone by reference character P and the control switch by reference character S. Resistors are designated by characters R, condensers by reference character C and a variable resistance, for volume control, is designated by character VR. The switch S may be associated with the variable resistance.

Wiring connections are made as shown in Fig. 4, and in accordance with this diagram, sound picked up by the microphone M is fed to the base connection of transistor T1 through wire 35. The transistor T1 amplifies the current which is fed therefrom to the base connection of transistor T2 through a wire 36 in which a condenser C1 is interposed. From the transistor T2, current is fed to the base connection of transistor T3 through condenser C2. Output of the transistor T3 is carried to ear phone P through wire 37. Batteries B1 and B2 are connected in series by wire 38, and these batteries supply the necessary current to operate the transistors. Resistors R are applied in the circuit connections with transistors, as shown, to provide the necessary bias voltage to operate the transistors at the proper power curve.

The variable resistance VR has a movable contact element E that is adjustable from exteriorly of the supporting bow to change the resistance as required to increase or decrease sound volume.

As an alternative location, the ear phone might be so located in the bow as to press inwardly against the bone at the base of the ear. For accommodating this point of engagement, the ear phone might be located in the extension piece 15x. In Fig. 1, such a location is designated in dotted lines at PX.

Wherever circuit connections have to be broken in order to disconnect parts of the frame, separable plug-in connectors have been provided. For example, as seen in Fig. 4, metal sockets 50 are set in the bow pieces, and circuit wires are led thereto. The extension portions 14-14' are provided with metal plugs 52 adapted to be tightly received in the sockets, and circuit wires lead

to these plugs. Connections of this type are employed for mounting the bows on the rims and the same type of connections are used for removably mounting the extension pieces 15x on the ear engaging pieces of the bows, these being designated at 53 in Fig. 1.

Fig. 6 shows use of a sound conducting tube 55 leading from the ear phone about the top of the ear and then into the ear channel. Also, I have indicated in a dotted line showing at 56, the extending of the tube through the back wall of the ear for direct entry to the ear channel.

In Fig. 5, has been shown an alternative arrangement of parts and a wiring diagram therefor. This arrangement may be used to gain more amplification without the use of push-pull audio transformers. In this arrangement, sound is picked up in the microphone and fed to the base connector of transistor T1, then out to the volume control, through condenser C2 of dual transistors to the receiver. Battery B1 supplies current to operate transistor T1. The battery B2 supplies current to the parallel push-pull transistors.

With the hearing aid parts so arranged and embodied in the frame structure, the hearing aid equipment is brought into proper position for use merely by placing the spectacles in wearing position. The location of the ear phone can be adjusted to suit the wearer to some extent by bending the bow, and can be caused to press against the bone or base of the ear by proper curvature of the bow.

Combinations of this character may serve the dual purpose of aiding sight and hearing. In so far as the hearing aid is concerned, the equipment is inconspicuous, but most effective. The objectionable cords of most present day aids, between batteries and microphones are eliminated and a more practical disposition of the microphone and ear phone is made possible.

Having thus described my invention, what I claim as new therein, and desire to secure by Letters Patent is:

1. A hearing aid comprising a frame structure simulating and worn as a pair of spectacles; said frame comprising a front structure including a bridge and rims with bosses extending laterally from the rims, and a pair of bows attached to said bosses, and having ear engaging hook portions, a microphone mounted in one of said bosses, an ear phone contained within the ear engaging portion of one of the bows, extension members removably applied to the ends of the ear engaging hook portions of the bows and each containing an electric battery therein, circuit connections joining the microphone and ear phone with the batteries, the means incorporated in the circuit for volume control, and a switch for opening or closing the circuit.

2. A hearing aid as in claim 1 wherein a sound conducting tube extends from the phone and is adapted for entering the ear channel of the wearer.

3. A hearing aid as in claim 1 wherein said bosses and bows are equipped with snap on fittings for detachably mounting said bows, and circuit connections are made with the microphone through said snap on fitting.

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