

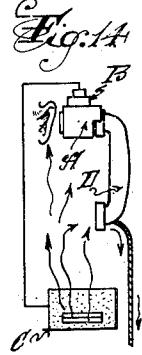
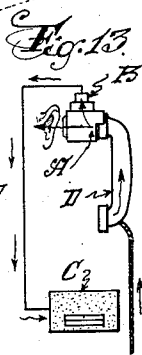
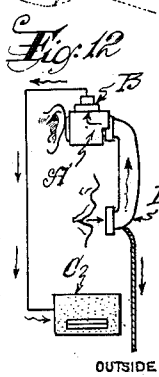
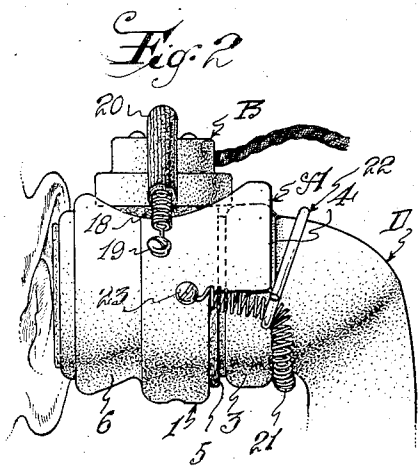
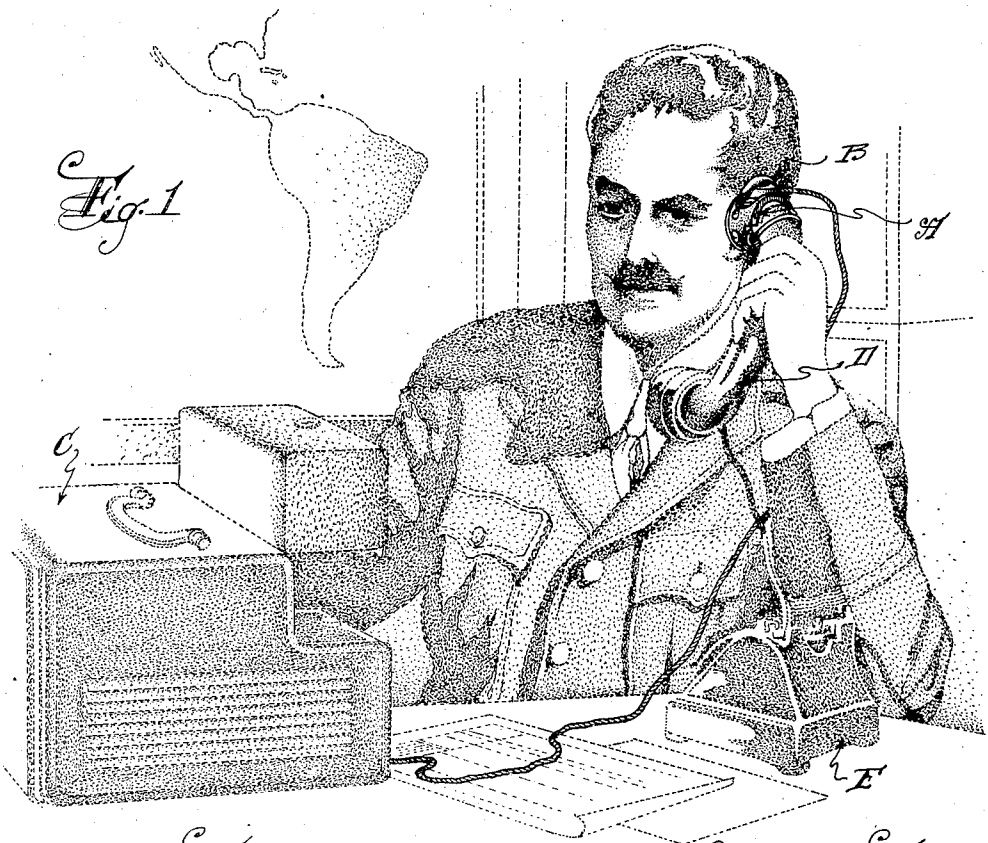
Aug. 23, 1949.

S. B. BERKELEY
ACOUSTICAL TELEPHONE CONNECTOR
FOR SOUND RECORDERS

2,479,806

Filed July 14, 1948

2 Sheets-Sheet 1



Inventor:
Scott B. Berkeley.
BY Dudley B. Howard
Attorney.

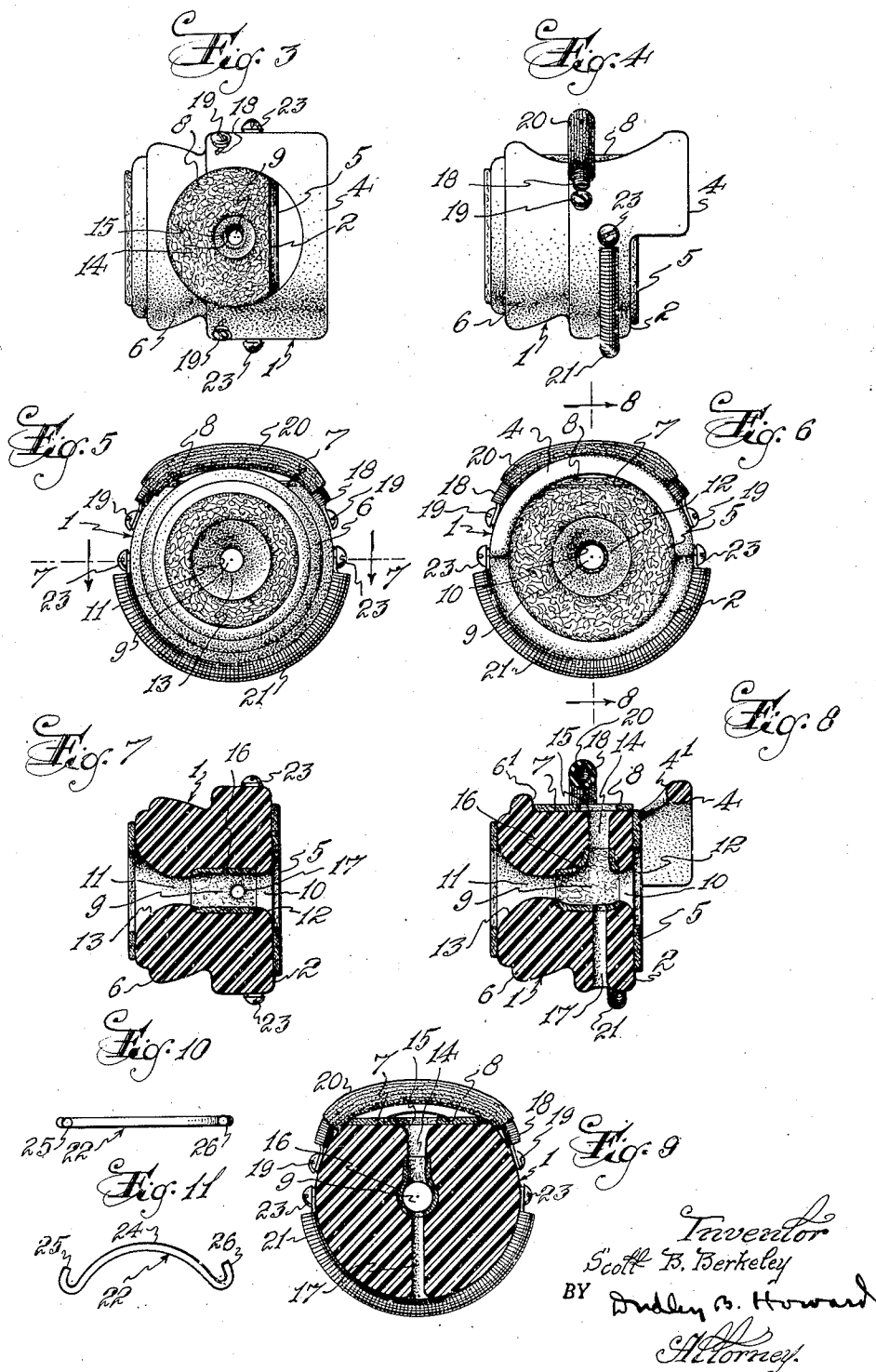
Aug. 23, 1949.

S. B. BERKELEY
ACOUSTICAL TELEPHONE CONNECTOR
FOR SOUND RECORDERS

2,479,806

Filed July 14, 1948

2 Sheets-Sheet 2



UNITED STATES PATENT OFFICE

2,479,806

ACOUSTICAL TELEPHONE CONNECTOR FOR
SOUND RECORDERS

Scott B. Berkeley, Goldsboro, N. C.

Application July 14, 1948, Serial No. 38,683

6 Claims. (Cl. 179—182)

1

The invention relates in general to sound recording apparatus and has particular reference to the recording of telephone conversation.

Heretofore, some very satisfactory instruments have been produced for recording telephone conversation, but they involve wire-tapping and consequently are in the nature of permanent installations which do not meet the needs of persons who have occasion in the pursuance of their regular occupational activities to make a record of conversation when using telephones which are not equipped with any such permanent installations. Such persons frequently do their work while traveling and usually must resort to the use of the ordinary telephone instruments found in hotel rooms, public booths and in most offices. There are on the market several types of portable sound recording and reproducing sets which can be carried by hand quite easily, but, until the advent of my present invention, it has been impractical to connect any instrument of that kind to the telephones which had to be used for the purpose of transmission of voice vibrations from the latter to the former.

More specifically, my invention relates to means whereby a temporary voice transmission connection may be effected between a portable sound recorder and any of the telephones usually available without performing any wire-tapping or other modification of the normal electrical circuits.

It is my primary object to embody the inventive idea in a simple, compact connector device which may be carried along with a portable sound recorder so as to be instantly available when needed to effect a temporary voice transmission union with a telephone.

Another object is to make use of purely acoustical principles in the construction of my connector device in such a manner that voice transmission may be accomplished without the aid of electrical means other than those inherent in the instruments which are to be interconnected. The term "acoustical" as used herein relates to transmission of sound through air and solid media without the aid of electrical energy.

A still further object is to provide an acoustical connector of this character which is adapted to be attached to the transmitting microphone of a sound recording set and to a telephone receiver in interposed relation thereto and which includes quickly operable attaching means whose engagement with the two parts just mentioned involves no more than yieldable clamping contact with the exterior surfaces thereof.

2

Further objects and advantages of my invention will appear from the following description when read in connection with the accompanying drawings, in which:

5 Fig. 1 is a perspective view showing the connector in use in an office with a handset type of telephone;

10 Fig. 2 is a fragmentary side elevation of the connector on a larger scale applied to the hand-piece of the telephone while held in position of use;

Fig. 3 is a plan view of the connector alone with the microphone attaching means removed;

15 Fig. 4 is a side elevation with both attaching means in place and in relaxed condition;

Fig. 5 is a front elevation of the device as shown in Fig. 4;

Fig. 6 is a rear elevation;

20 Fig. 7 is a horizontal section on line 7—7 of Fig. 5;

Fig. 8 is a vertical section on line 8—8 of Fig. 6;

Fig. 9 is a transverse vertical section;

Fig. 10 is a detail plan view of the wire backing member of the telephone attaching means;

25 Fig. 11 is a side elevation of the same;

Fig. 12 is a diagrammatic view of the sound recorder, connector and telephone showing the recording of an outgoing conversation;

30 Fig. 13 is a similar view of the recording of an incoming call; and

Fig. 14 is a similar view of the playback of recorded conversation.

Referring now to the drawings in detail, Fig. 1 illustrates the manner of use of an acoustical connector A in its present state of development, wherein it connects the transmitter microphone B of a portable sound recording and reproducing set C to the receiver end of the handset D of a telephone instrument which has the cradle-type base E. All of the items of equipment disclosed in this figure represent modern types. The sound recorder is the portable model of a well-known electronic type and the telephone is the kind commonly used in offices, homes and hotel rooms. It is to be understood, however, that I do not propose to restrict the use of my acoustical connector to cooperation with any particular types or models of sound recording apparatus or telephones. In its present form, it is equally well adapted for use with the old types of sound recorders, such as the dictaphone, which do not employ the principles of electronics. Likewise, it can be applied readily to the receivers of the older upright telephone instruments, such as the 55 deskstand and wall types. When new types of

sound recorders and telephones are produced in the future, any slight modification which has to be made for purposes of adaptation should fall within the scope of my invention. In this connection, for the sake of brevity, the term "recorder" will be used hereinafter in the specification and claims to designate any type of sound recorder, or sound recording and reproducing apparatus, with which my connector may be employed by attaching it to the transmitting microphone or equivalent element. Similarly, the term "telephone receiver" is to be understood to mean the earpiece of any type of telephone regardless of whether the earpiece be integral with the transmitter mouthpiece or separate.

The specific details of construction of the connector and attaching means are disclosed in Figs. 2 to 11 inclusive, of which Fig. 2 illustrates the mode of attachment to the recorder microphone and to the telephone receiver. The numeral 1 designates the body of the connector, which is shown as being substantially cylindrical in form for convenience of manufacture and to match the usual rounded contours of telephone receivers. It is to be understood, however, that changes in form to meet future requirements may be made without departing from the scope of my invention. This body may be made of any suitable material, such as wood, hard rubber, or the plastic composition indicated in the drawings. For reasons which will appear presently, it is believed that a synthetic resin is preferable. Furthermore, it is desirable that the material selected shall be suited to the conduction of sound vibrations through its mass. The reason for this requirement also will be made known later herein.

At the rear end of the body, which is thus designated because it is opposite to the end which will face the ear of the user, I have provided a flat perpendicular abutment face 2 of circular configuration to abut the face annulus 3 of a telephone receiver in the manner shown particularly in Fig. 2. An arcuate flange 4 is provided on the rear end of the body surrounding the upper half of abutment face 2. This flange serves to guide the telephone receiver into contact with abutment face 2 and insures rigidity of the abutting relation. Such a construction is considered to be preferable to a completely annular socket-defining wall because of the greater ease of application and separation which it affords. In order to eliminate excessive vibration of the body in use, wherein it becomes an acoustical medium capable of communicating sound waves or other vibrations from the telephone receiver to the recorder microphone, a facing of some soft material such as felt is applied to abutment face 2 as indicated by the numeral 5. For a subsequently explained purpose, this facing is annular in shape.

At the front end of body 1, an alternate earpiece 6 corresponding in form to the usual face annulus of a telephone receiver is provided for direct application to the user's ear when telephone conversation is being recorded through the medium of my acoustical appliance.

A circular depression has been formed in the top of body 1 to provide a seat or platform 7 upon which the recorder microphone may rest when applied to the connector. In order to prevent communication of excessive vibration to the microphone from the connector body, an annular facing 8 of felt or the like has been applied to seat 7. It will be noted that, in the process of forming the depressed platform, flange 4 has been penetrated, whereby the latter cooperates with

the wall at the front of the depression to guide the recorder microphone into its seat and to insure rigidity of this coupling also.

The acoustical system of the connector will now be described. Its heart is the sound chamber 9 which is located centrally in body 1. For acoustical reasons, this chamber is preferably of the circular cross-section shown. It is connected by axially aligned channels 10 and 11 respectively with outwardly flared orifices 12 and 13 formed in abutment face 2 and alternate earpiece 6. A perpendicular channel 14 leads upwardly from the sound chamber to the flared orifice 15 provided in microphone platform 7. It should now be apparent that the facings 5 and 8 are annular in shape in order to clear the orifices 12 and 15 respectively for air conduction of sound waves therethrough.

In order to avoid excessive resonance of the sound chamber walls, they have been lined with felt or the like as at 16. This lining should be countersunk as shown so that its exposed surface is flush with the sound channel walls to eliminate shoulders which would be apt to set up undesirable reverberations. Application of the lining 16 may be facilitated by making the connector body in two halves (not shown) which may be united readily by heat treatment after the lining is in place if synthetic resin, or some substance with like qualities, be used in the composition of the body. However, I do not intend to be limited to any particular method of manufacture.

As further means for eliminating insofar as possible objectionable reverberation of sound waves in the chamber, such as would result in "hollow-sounding" reproduction of recorded conversation, I have provided a vertical channel 17 which leads downwardly from the sound chamber to a flared orifice in the under surface of body 1. This channel and the orifice constitute a vent to the atmosphere. Although the desired result has been obtained by disposing the vent as shown in alignment with sound channel 14, it is conceivable that some other disposition may be found to serve the purpose equally well or better.

The internal acoustics of the connector seems to be as follows: Sound waves or vibrations from an outside source which impinge upon the air in orifice 12 will be afforded air conduction with minimum distortion through sound channel 10 to sound chamber 9, which constitutes a focus of radiation into the other channels. Channel 14 conducts vibrations upward to the orifice in the microphone seat, whereas channel 11 transmits vibrations to orifice 13 in the alternate earpiece. Also, as has already been mentioned, atmospheric vent 17, which is diametrically opposed to the microphone channel across the focus of radiation, serves to eliminate reverberations axial to channel 14. An additional sound channel is constituted by the solid mass of the connector body. The potential utility of this channel will be discussed at a more appropriate point later on.

Means being required to attach the connector body to the microphone of its companion recorder and to a telephone receiver, I have invented the two independent devices for that purpose illustrated in the drawings. The attaching device for the recorder microphone will be described first. Because the particular microphone which seems to be most suitable for use with a portable recorder is of the so-called "lapel" type, it has been practicable to use the coil-spring loop 18, which has its ends removably secured to body 1

5

at opposite sides of platform 7 by suitable means such as screws 19. The attaching loop must be expanded to permit insertion of the microphone into its seated position, whereupon, the spring tension may be released sufficiently to bring the loop into contact with the top surface of the microphone. The remaining tension will cause the latter to bear evenly and tightly against its seat. To prevent the transmission of vibration from body 1 to the casing of the microphone through the metallic mass of the spring loop, the loop has been encased in a short length of tubing of rubber or other soft, yielding material. One reason for having separate and independent attaching devices is that it may be found to be desirable to maintain the connector permanently attached to the recorder microphone for storage and transportation therewith inside the recorder case.

Designing means for attaching the connector interchangeably to the various types of telephone receivers was a more difficult problem. The device shown in the drawings was finally developed, however, and has proved to be very satisfactory. It comprises the coil-spring loop 21 and the cooperating backing member 22. The ends of the former are secured to opposite sides of connector body 1 by suitable means such as screws 23. Backing member 22 may conveniently be made of wire and in its chosen form has a bowed central portion 24 and reversely turned hooks 25 and 26 at its ends. In the use of the attaching device constituted by spring loop 21 and backing member 22, it has been found most practical to apply the loop first after the receiver annulus has been applied to abutment face 2 of the connector body. This may be accomplished by expanding the loop and bringing it to bear against and embrace one side of the neck of the receiver. While holding the loop in position, one end of the backing member is hooked to one side portion of the loop and the bowed portion is brought into embracing relation to the opposite side of the receiver neck, whereupon the other end of the backing member is hooked to the adjacent side portion of the loop. One manner of effecting this neck embracing engagement is shown in Fig. 1 and 2, but a satisfactorily secure connection may be obtained by reversing the positions of loop and backing member with relation to the sides of the receiver neck. The alternative arrangement is not illustrated because it represents just another of possibly numerous variations in the adaptation of this form of universal attaching means to present and future types of telephones. It should be evident that it is a very adaptable, form-fitting device which possesses the added advantage of being inconspicuous and out of the way when not being used in its normal capacity. Upon being detached from a telephone receiver, the spring loop automatically shrinks into snug conformity to the external periphery of the connector body as shown in Figs. 4 to 6. Before placing the connector in one's pocket or in the recorder case for transportation, the little backing member may be tucked between the spring loop and the connector body so that it will not become misplaced or lost. It will be noted that the similar retractile quality of the microphone-attaching loop causes it to hug the contiguous peripheral surface of the connector body when restored to inoperative position. The complete assembly of connector and attaching means is therefore very compact and capable of being stored or packaged in a very small container.

6

The operational use of the connector will now be described. The usual situation, wherein the possessor of the connector and a portable recorder of modern electronic type carries these articles with him wherever he goes in the course of business, will be imagined. Supposing, then, that he is in an office equipped with a handset type of telephone and either plans to initiate an outgoing telephone call or anticipates an incoming call which it is desired to record. All that has to be done in preparation is to rest the recorder on a desk or other support near the telephone, plug-in at a wall outlet, open the cover of the recorder case, insert a record into operative position, make certain adjustments of the recording mechanism, and then attach the connector to the recorder microphone (if not already permanently attached) and to the telephone receiver. When placing the call or answering, as the case may be, the equipment will be in the condition illustrated in Fig. 1. When ready to commence recording, the appropriate switch of the recorder is moved to "Talk" position, whereupon the voice of the local user will be transmitted both out onto the telephone line and in through the connector and microphone to the recorder as indicated by the arrows in Fig. 12. The course of the voice vibrations of the party at the other end of the line are indicated by the arrows in Fig. 13. If the conversation relates to an important sales transaction, a legal instrument, military order, or to any other communication of intelligence which requires a perfect meeting of the minds and clear, unmistakable understanding of each detail, it may be desirable to have the conversation played back immediately for the benefit of both parties. This can be done readily by flicking the switch from "Talk" to "Listen" positions and then holding the telephone transmitter close to the loudspeaker of the recorder. Voice transmission will be as indicated by the arrows in Fig. 14. Because of the speed with which my connector may be applied to either or both of the associated instruments, it is possible to make sudden, unexpected preparations for recording when it is realized at the instant a calling party identifies himself that the conversation should be recorded. The time required for these preparations is negligible, especially when the connector is maintained habitually coupled to the recorder microphone.

The additional sound channel through the solid mass of the connector body to which brief reference has been made will now be discussed and its useful possibilities pointed out. If, when the local party is talking, he will press the alternate earpiece tightly against his ear and also rock it slightly to bring its annulus to bear directly against his head, there will be transmission of his voice vibrations by bone-conduction from his vocal cords to the connector body and thence through its mass to the sound chamber for continued transmission by the air medium to the recorder microphone. This additional channel is a feature of considerable importance. Besides augmenting the volume and clarity of transmission of the local party's voice to the recorder when using a modern telephone having electrical conduction from transmitter to receiver, it may be used to advantage in unusual situations, such as when only an old-fashioned telephone lacking the electrical conduction just mentioned is available, or when the transmitter of a modern telephone being used is defective in respect to electrical transmission to its associated receiver. In such instances, the combined bone-

7

conduction and connector body-conduction channel will save the situation.

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

1. A portable telephone connector for sound recorders comprising a body adapted to be supported in contiguity to the user's ear in the position usually occupied by the earpiece of a telephone receiver, an earpiece provided on said body for direct ear contact and having an orifice therein, an abutment face formed exteriorly on said body to receive application of the earpiece of a telephone receiver and having an orifice therein, and a seat provided on said body to support a recorder microphone in close proximity to the body earpiece and abutment face and also having an orifice therein, said body being provided with an internal acoustical sound chamber communicating with the three said orifices whereby sound waves of articulate speech produced by the diaphragm of the telephone receiver at the orifice of the said abutment face will be transmitted through said sound chamber to the body earpiece and microphone seat by way of their respective orifices by air conduction and without utilizing or affecting electrical energy of the telephone circuit.

2. A telephone connector for sound recorders as defined in claim 1, which includes a flange projecting horizontally from the connector body contiguous to the peripheral margin of the abutment face in overhanging relation thereto for contact with the peripheral surface of the face annulus of a telephone receiver when applied to said abutment face.

3. A portable telephone connector for sound recorders comprising a body having an internal acoustical sound chamber and being adapted to be supported in contiguity to the user's ear in the position usually occupied by the earpiece of a telephone receiver, an earpiece provided on said body for direct ear contact and having an orifice therein, an abutment face formed exteriorly on said body to receive application of the earpiece of a telephone receiver and having an orifice therein, and a seat provided on said body to support a recorder microphone in close proximity to the body earpiece and abutment face and also having an orifice therein, said body be-

8

ing provided with internal acoustical sound channels radiating from said sound chamber and communicating with the orifices in the abutment face, body earpiece and microphone seat respectively, whereby sound waves of articulate speech produced by the diaphragm of the telephone receiver at the orifice of the said abutment face will be transmitted through the interior of said body to the body earpiece and microphone seat by air conduction and without utilizing or affecting electrical energy of the telephone circuit.

4. A telephone connector for sound recorders as defined in claim 3, wherein the connector body is provided with a reverberation eliminating channel leading from the sound chamber through said body to the atmosphere.

5. A telephone connector for sound recorders as defined in claim 3, wherein the connector body is provided with a reverberation eliminating channel leading from the sound chamber through said body to the atmosphere and being disposed opposite to the inner end of the sound channel which communicates with the orifice of the microphone seat and in alignment with the last mentioned sound channel.

6. A telephone connector for sound recorders as defined in claim 3, which includes a lining of soft material applied to the walls of the sound chamber in countersunk relation thereto so that the marginal edges of said lining are flush with the walls of the sound channels communicating with said chamber, whereby excessive resonance of the sound chamber walls is avoided.

SCOTT B. BERKELEY.

REFERENCES CITED

The following references are of record in the file of this patent:

UNITED STATES PATENTS

Number	Name	Date
847,691	Rector	Mar. 19, 1907
1,103,421	McGowen	July 7, 1914
1,548,028	Egerton	Aug. 4, 1925
1,654,633	Bisbee	Jan. 3, 1928
1,654,645	Green	Jan. 3, 1928
2,160,829	Cherry	June 6, 1939
2,165,546	Heller	July 11, 1939
2,278,828	Chiardio	Apr. 7, 1942