A. D. JONES.

SOUND TRANSMITTING APPARATUS.

APPLICATION FILED MAR. 2, 1914.

1,249,409.

Patented Dec. 11, 1917.

2 SHEETS—SHEET 1.

Fig. 2.

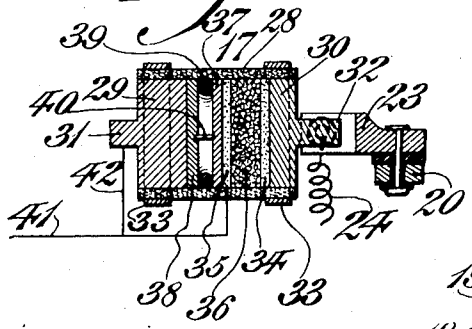


Fig. 1.

Fig. 3.

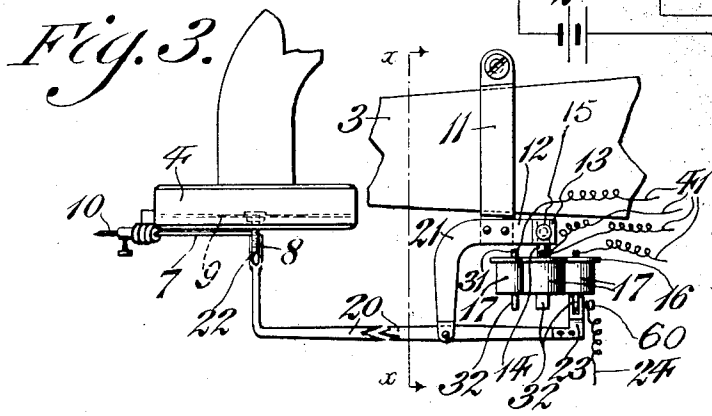


Fig. 4.

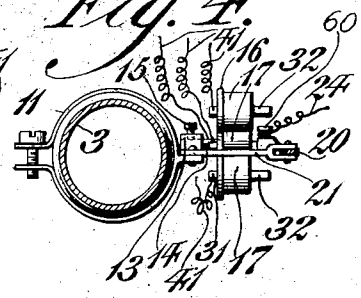


Fig. 5.



WITNESSES

L. Howville,

P. F. Nagle.

INVENTOR

Alva D. Jones

BY Wiederhelm & Landau

ATTORNEYS

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Fig. 7.

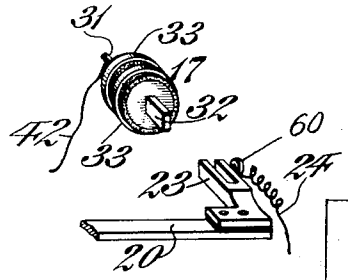


Fig. 6.

WITNESSES

L. Douville,

P. F. Nagle.

INVENTOR

Alva D. Jones.

BY Wedderburn & Faibanks

ATTORNEYS

UNITED STATES PATENT OFFICE.

ALVA D. JONES, OF PHILADELPHIA, PENNSYLVANIA, ASSIGNOR OF FORTY ONE-HUNDREDTHS TO FRANK LYSTER, OF PHILADELPHIA, PENNSYLVANIA.

SOUND-TRANSMITTING APPARATUS.

1,249,409. Specification of Letters Patent. Patented Dec. 11, 1917.

Application filed March 2, 1914. Serial No. 821,877.

To all whom it may concern:

Be it known that I, ALVA D. JONES, a citizen of the United States, residing in the city and county of Philadelphia, State of Pennsylvania, have invented a new and useful Sound-Transmitting Apparatus, of which the following is a specification.

My invention consists of an apparatus adapted to be attached to and connected with a talking machine for transmitting sounds reproduced from a record by a sound-box in such machine to a distant receiver or sound-reproducing device.

It further consists of such apparatus in which the talking machine can emit the sounds at the same time they are distantly transmitted to another reproducing device.

It further consists of an improved variable resistance device or microphone for such apparatus.

It further consists of improved provisions for adapting the transmitting device to the varying tonal characteristics of the sounds reproduced from various records or other sources of sound.

It further consists of apparatus in which individual variable resistance devices or microphones are applied respectively to the individual sources of concerted sounds, such as to the individual instruments of a band or orchestra, each of such devices being adjusted to the tone-quality of its source or instrument, and the circuits from the several devices being connected to mains or trunks connected to a sound-recording device, recording the concerted current vibrations or undulations produced by the sound vibrations or undulations upon a blank similar to that in the ordinary sound-recording apparatus.

It further consists of other novel features of construction, all as will be hereinafter fully set forth.

The annexed drawings and the following description set forth in detail one mechanical form embodying the invention, such detailed construction being but one of various mechanical forms in which the principle of the invention may be used.

In said annexed drawings—

Figure 1 represents a perspective view of a portion of a talking machine equipped with my transmission apparatus, portions of the apparatus being illustrated diagrammatically.

Fig. 2 represents a section of the variable resistance device or microphone.

Fig. 3 represents a plan view of a portion of the tone-arm and of the sound-box of a talking machine, showing the resistance device and its connection to the diaphragm.

Fig. 4 represents a section on the line *x—x* in Fig. 3.

Fig. 5 represents a perspective view of the support of the plurality of resistance devices employed.

Fig. 6 represents a diagrammatic view of the apparatus for individually conveying the individual sound-created current vibrations or undulations from the individual sources of sound to be concertedly recorded.

Fig. 7 represents a perspective detail view of one of the variable resistance devices and the end of the lever connected thereto.

Similar numerals of reference indicate corresponding parts in the figures.

Referring to the drawings, the reference numeral 1 indicates the casing of a talking machine of any preferred construction, having a rotatable turn-table, 2, and a movably supported tone-arm, 3, carrying a sound-box, 4, and communicating in any usual or desired manner with a horn, 5, or other sound-amplifier. The record, 6, of the usual disk-form rests upon the turn-table. A stylus-arm, 7, is supported upon the sound-box and connected at one end to a post or bolt, 8, secured through the center of the diaphragm, 9, of the sound-box, and the outer end of said stylus-arm carries the removable and changeable stylus, 10. All of these parts can be of any desired or suitable construction employed in the various types of talking machines.

A clamp, 11, is secured upon the tone-arm and has a bracket, 12, in a bearing, 13, of which a stud, 14, is rotatable and adjusted by a set-screw, 15, said stud projecting centrally from a spider-frame, 16. A number of variable resistance devices or microphones, 17, which will hereinafter be described in detail, are secured upon the branches of said spider-frame, and each of said devices has one terminal electrically connected by a conductor, 41, to one of a series of contacts, 18, of a switch device, the movable member, 19, of which can be moved to engage each of said contacts. A lever, 20 is fulcrumed upon a bracket, 21, projecting from the clamp upon the tone-arm, and has

an insulated clamp, 22, upon one bent end, clamping the end of the central post or bolt of the diaphragm of the sound-box, so that said lever will be vibrated in unison with the stylus-arm and diaphragm. The other arm of the lever has a bent end formed with a clamp, 23, which can engage a terminal of one of the resistance devices or microphones which is brought to register with the clamp by rotating and adjusting the spider-frame, and said clamp is insulated from the lever but in electric contact with the terminal of the resistance device and has a conductor, 24, of an electric circuit having a suitable source, 25, connected to it by a screw, 60. The other conductor, 26, of this circuit is electrically connected to the movable contact of the switch. A sound-producer, 27, the detail construction of which forms no part of the present invention is connected in the circuit to produce sound by the vibrations or undulations of the current in the circuit, and may be located at any distance from the talking machine.

The variable resistance device or microphone 17, four of which are illustrated, consists of a cylindrical jacket or casing, 28, of cloth or similar non-conducting yielding and inelastic material, and the ends of said casing are closed by two cylindrical heads, 29 and 30, of brass or similar electrically conducting material, having each a lug, 31 and 32, respectively, upon the outer side. Bands, 33, are preferably tightly drawn around the ends of the casing to secure it upon said heads. The lug 31 of the head 29 is rigidly secured in the branch of the spider, and the lug 32 of the head 30 can be engaged by the clamp 23 of the vibrating lever, so that said head can be vibrated from the vibrations of the lever. A disk, 34, of solid carbon and having its inner face smooth and highly polished, is secured in the casing to have the head 30 bear against its outer face. A similar disk, 35, also of solid carbon and having the face opposed to the former disk highly polished, is secured in the casing and at a distance from said other disk to form a space in which is a filling, 36, of granular conducting material, such as carbon, metal or other material, the conductivity of which is varied by rest or disturbance of the granules, such filling or granular body forming a variable resistance or microphone body. A disk, 37, of tungsten or magnetized steel is secured in the casing to bear against the carbon-disk, and a disk, 38, of soft iron is secured in the casing and bears against the rigid head 29, and an annular gasket, 39, is interposed between the edges of said disks and is formed from rubber or similar material to form a yielding and resilient spacer between the disks. A wire, 40, of steel or iron electrically connects the disks. The granular filling or body of the several variable resistance or microphone devices is of different consistency, having granules of greater or less size, so that the resistances of said devices will be different and each device adapted to the character of the sounds or tones to be transmitted.

The conductor 41 of each device is connected to the inner carbon-disk, and a shunt-wire, 42, connects said conductor and the rigid head of the device, to form a shunt-circuit through said head and the magnetic disks 37 and 38.

In practice, the disk having the record to be transmitted is placed upon the turn-table, and the spider carrying the resistance devices or microphones is adjusted to bring the appropriate device to have its terminal lug engaged by the clamp of the vibrating lever. When the stylus is brought into contact with the groove in the record and the turn-table is started, the vibrations of the stylus and diaphragm will be communicated to the lever, which will communicate such vibrations to the movable head of the variable resistance device or microphone connected to the lever. Said vibrations will exert more or less disturbance in the granular body in the resistance device, thus varying the resistance in the circuit of the producing device and transmitting the sound vibrations or undulations of the diaphragm of the sound-box by corresponding vibrations or undulations in the electric circuit to the distant sound-producing instrument or receiver.

The circuit in the variable resistance device or microphone passes through the movable head, the outer carbon-disk, the granular body and the inner carbon-disk, and a shunted circuit passes through the magnetic steel disk, the soft iron disk and the head. The variations of the intensity of the circuit will vary the magnetization of the steel and iron disks and the degree of their attraction.

The resistance in each device is different from that in the others by the employment of larger and smaller granules or of granules of material differing in conductivity, so that a variable resistance device or microphone of greater or less resistance under varying disturbances may be employed according to the tonal character of the instrument or sound-generator being reproduced.

In Fig. 6 of the drawings is illustrated an apparatus for recording sounds in which my variable resistance device or microphone is employed. Musical instruments and other tone or sound-producing sources have different tonal characteristics which act differently upon diaphragms or other recording and reproducing devices, and in recording the concerted sounds from such sources, the sounds from one source are liable, on account of their characteristic influence upon the recorder, to interfere with the sounds

from other sources and thus destroy or disturb the concerted effect.

For the purpose of preventing such result, each source of sound or a number of sources having the same tonal characteristics are arranged to emit the sounds to a transmitter, the circuit of which is connected to a specially adapted variable resistance device or microphone having granular fillings of special material and size, as above described, and such circuits are connected in multiple to trunk-conductors leading to a recording device which produces the thus concerted vibrations upon one record.

In said figure, three instruments are illustrated as examples, viz.—a horn, 43, a clarinet, 44, and a drum and cymbals, 45. A receiving sound-box, 46, is supported to receive the tones from each instrument, and has its diaphragm connected by a lever, 47, to a variable resistance device or microphone, 48, as in the hereinbefore described apparatus, such device being connected to the conductors, 49 and 50, of a circuit, having a source, 51, of electric current and connected to main-conductors, 52, the several branch-circuits being connected in multiple to such main-conductors. The main conductors are connected to a recording apparatus, 53, of any suitable or desired construction for transferring the current vibrations in the mains to a graver, 54, forming a record-groove in a blank, 55, supported upon a turn-table, 56, such as usually employed in recorders for talking machines.

Where several instruments have the same or substantially the same tonal characteristics, they may be grouped to one receiving sound-box and microphone.

By thus transmitting the electric current vibrations of sounds from each source or group of sources through a microphone adjusted to the tonal-characteristics of the same, and concerting such modified vibrations to one recording apparatus, an even record which will produce an evenly concerted sound or tone in a reproducer will be made, in which shrill or otherwise disturbing sounds will be eliminated.

By the employment of the variable resistance device or microphone in an electric circuit transmitting vibrations or undulations in an electric current created by and corresponding to sound vibrations or undulations, such vibrations or undulations may be transmitted any distance and may be enlarged and intensified at the reproducing terminus of such circuit.

Other modes of applying the principle of my invention may be employed for the mode herein explained. Change may therefore be made as regards the mechanism thus disclosed, provided the principles of construction set forth respectively in the following claims are employed.

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

1. In apparatus of the character stated, a variable resistance device or microphone, comprising a non-conducting casing, heads closing the opposite ends of said casing and formed from conducting material, carbon disks within said casing and one in contact with one of said heads, a body of granular conducting material between said disks, a permanent magnet and a soft-iron armature resiliently separated and electrically connected with each other and with a head and a carbon-disk, a sound transmitting device having a diaphragm, means for communicating the vibrations of said diaphragm to the head in contact with the outer carbon-plate, and an electric circuit having one conductor electrically connected to said last mentioned head and the other conductor electrically connected to the other head and to the inner carbon-plate.

2. In apparatus of the character stated, a sound transmitting device having a diaphragm, a lever fulcrumed to have the end of one arm connected to said diaphragm to vibrate with the same, a plurality of microphones movably mounted to each have its mechanically movable element mechanically connected to the other arm of said lever, an electric circuit having one conductor adapted to be electrically connected to any one of said microphones and the other conductor connected to the lever to form electrical connection with the microphone engaged by the same, and a sound-reproducing device in said circuit.

3. A device of the character stated, comprising a sound transmitting device having a diaphragm and a tone arm, a plurality of microphones mounted on said tone arm, an electric circuit connected with said microphones, a switch to place a predetermined microphone in circuit, means to mechanically connect a predetermined microphone with said diaphragm, and a sound reproducing device in said circuit.

ALVA D. JONES.

Witnesses:
WM. LECLUR,
C. D. MCVAY.