Feb. 25, 1930. E. G. HOCH ET AL 1,748,225

INPUT AND OUTPUT AMPLIFYING UNIT

Filed Nov. 16, 1925 3 Sheets-Sheet 1

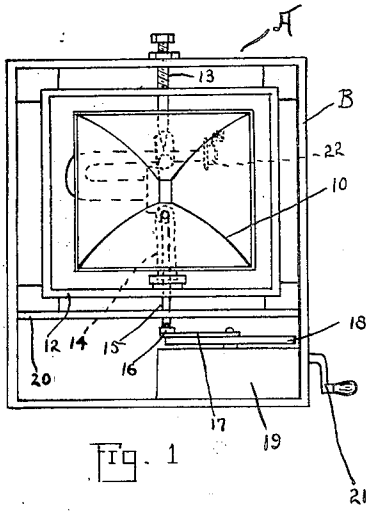


Fig. 1

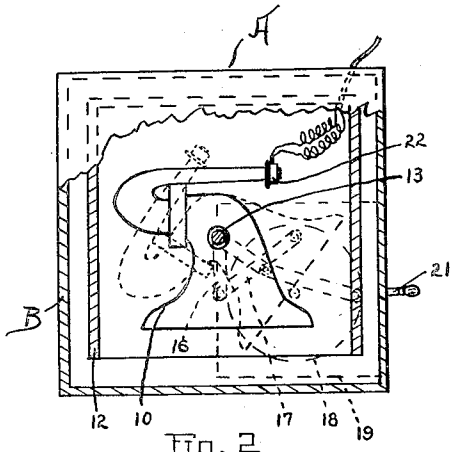


Fig. 2

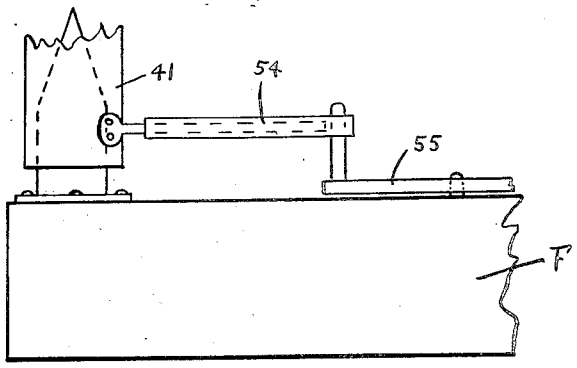


Fig. 8

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INPUT AND OUTPUT AMPLIFYING UNIT

Filed Nov. 16, 1925 3 Sheets-Sheet 2

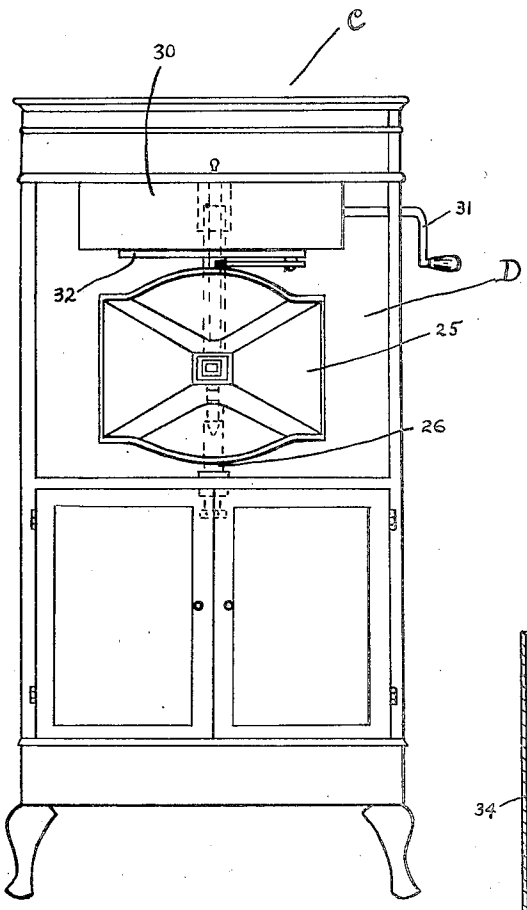


Fig. 3

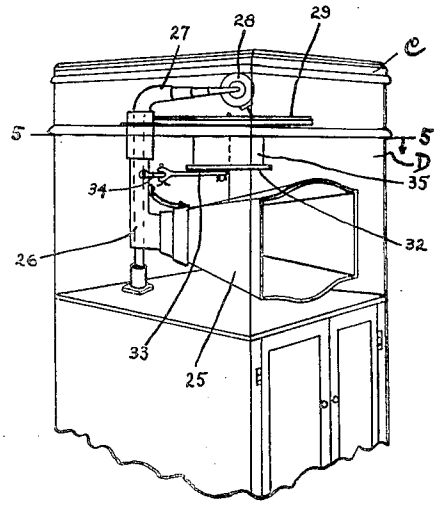


Fig. 4

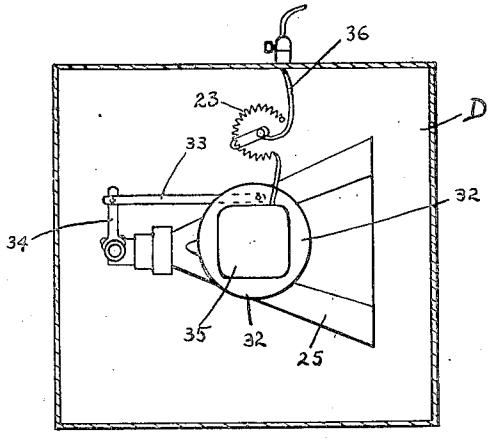


Fig. 5

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INPUT AND OUTPUT AMPLIFYING UNIT

Filed Nov. 16, 1925 3 Sheets-Sheet 3

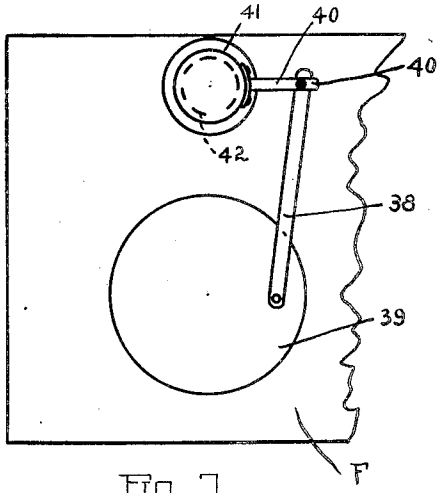


Fig. 7

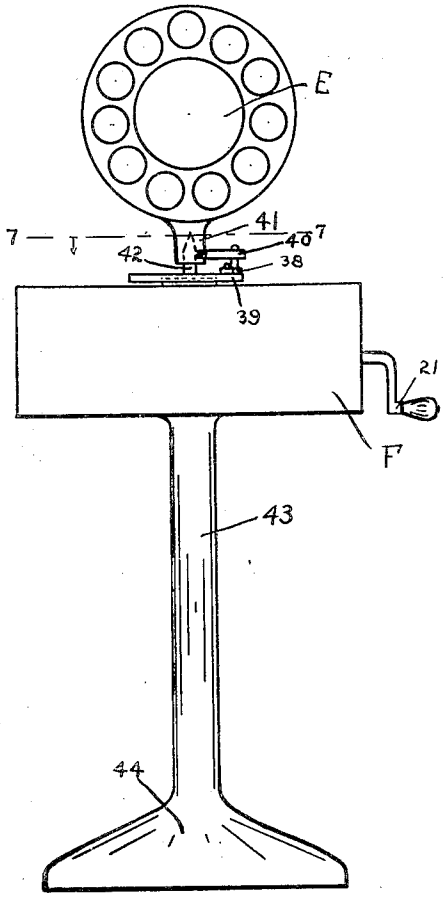


Fig. 6

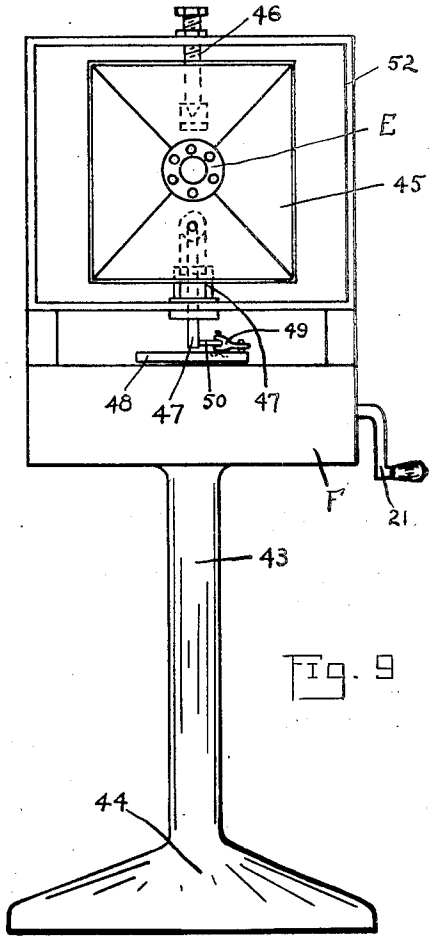


Fig. 9

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UNITED STATES PATENT OFFICE

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INPUT AND OUTPUT AMPLIFYING UNIT

Application filed November 16, 1925. Serial No. 69,277.

Our invention relates to input and output amplifying means, such as a reception by a microphone or other means including the input, while the output may be in the form of a loud speaker, transmitting means in the form of a phonograph horn, or transmitting means of any other suitable nature used to output sound.

A feature of our invention resides in an amplifying unit used in connection with radio broadcasting, radio transmitting, such as loud speakers and the like, or any other suitable means where it is desired to input and output sound associated with amplification of any suitable nature. Our invention includes means for changing the direction of sound from a fixed position to an oscillating means whereby the sound waves are put in motion and continued in motion in a manner to unify the sound in the atmosphere, rather than directing it out of a loud speaker or phonograph horn in a single direction as has been done heretofore.

Our invention provides means for receiving or transmitting sound waves in a manner so as to overcome the harsh and undesirable acoustical sounds which are present in ordinary fixed rigid input and output means in radio and phonographic instruments, by providing an oscillating or swinging amplifying unit for output or for input receiving units which has the property of improving the rhythm, overcoming resonating reactions and diffusing the tones which practically eliminates the harshness in the present well known construction of mechanical sound reproducing means. With our invention sound is received and reproduced in a manner so as to so nearly equal the direct reproduction of the same from the source of the sound, as to practically deceive the ordinary observer who, in so far as we know, would practically feel assured that the sound was being reproduced from its origin, not by a mechanical means but by the very sound making instruments or the person singing or speaking. Heretofore, in so far as we know, reproducers and receivers have had a tiresome and mechanical effect, the acoustical reproducers being harsh, mechanical and fixed from a point so as to be even annoying if one stands directly in front of a reproducing and amplifying loud speaker or phonograph horn, while in our invention this is practically entirely overcome and the amplification is increased, together with sound reflections which may be obtained in the carrying out of our invention in a manner so as to set up sympathetic vibrations and reactions, and restore the beauty, color and quality of tone that would be otherwise lost in mechanical reproducing and receiving units.

A feature of our invention resides in means adapted to oscillate or swing the amplifying unit in timed relation in accordance with the music or reproducing of the sound, so that the oscillation of the unit causes the sound to be directed out into the atmosphere in a manner so that it would be very difficult to ascertain whether or not it was coming directly from the source of the sound reproduction.

Our invention includes oscillating the amplifying unit within a cabinet of any suitable nature which has the property of resonation of sound, thereby securing additional advantages of sound reflection which permits the vibrations to be directed out at continually differing and changing position in a manner so as to overcome horn or loud speaker vibrations and reactions, and permitting the sound to be brought out even, true and without setting up a counter series of vibrations in the reproducing instrument which is true of a fixed reproducer, loud speaker, phonograph reproducer and horn, or other instruments used to broadcast sound into the atmosphere from a mechanical sound reproducing means. In our amplifying unit the constant changing position of the unit does not permit the building up of a series of tone vibrations in any one direction, but rather diffuses the same so as to prevent any flat, harsh or undesirable unharmonious vibrations or sounds to be linked with the reproduction receiving and output of our amplifying unit. We have found that our amplifying unit for input and output of sound has the property of so clearly receiving and reproducing the sound as to be most desirable either for phonographic use or for radio reception and transmitting,

and to be, in so far as we know, far superior to anything for reproducing sound as is employed in phonographs, loud speakers or other radio equipment.

While we have set forth some features and objects of our invention, we desire to more clearly and fully bring these, together with other features of our invention, forth, in the following specification and claims.

In the drawings forming part of the specification:

Figure 1 is a diagrammatic front view of a radio loud speaker carrying out our invention.

Figure 2 is a diagrammatic plan view partly illustrated in cross section, of the loud speaker illustrated in Figure 1.

Figure 3 is a front view of a phonograph constructed to carry out our invention.

Figure 4 is a perspective view diagrammatically illustrating our invention applied to a phonograph, a portion of which is broken away and illustrating an electric motor adapted to operate the same.

Figure 5 is a section on the line 5—5 of Figure 4.

Figure 6 is a diagrammatic side elevation of a microphone operated by our means of input in our invention.

Figure 7 is a section on the line 7—7 of Figure 6.

Figure 8 is a detail of a portion of our invention.

Figure 9 illustrates another form of microphone equipped with our invention and adapted to be operated in a manner to carry out our means of receiving, or input of sound.

In the drawings the loud speaker A is provided with the amplifying horn 10 which is mounted within the cabinet B in a manner so as to be contained within an inner compartment 12 which is spaced away from the outer walls of the casing of the cabinet B so as to form a resonating compartment in which the loud speaker amplifying horn 10 is positioned.

The loud speaker amplifying horn 10 is pivotally connected by means of the adjustable screw member 13 which pivotally engages on one side of the horn 10 and which is pivotally supported by the standard 14 on the under side of the horn 10. An operating shaft 15 extends through the standard 14 and is connected by the link 16 to the operating arm 17. The arm 17 is pivotally connected to the disk 18 of the motor 19 which is positioned beneath the compartment 12 and is separated therefrom by the wall 20.

The motor 19 is of any suitable construction of a well known mechanical type adapted to be wound by the crank 21 and being provided with a suitable spring motor such as is used in phonographs or the like, and not illustrated in detail in the drawings.

When the motor 19 is operated it is adapted to operate the lever arm 17 which operates the connecting link 16, which in turn operates the shaft 15 to move or oscillate the horn 10 as is indicated in dotted outline in Figure 2. When the motor 19 is operating, the loud speaker amplifying horn 10 is oscillated from one side to the other within the compartment 12 which diffuses the sound amplified by the horn 10 and puts the sound waves into motion in a manner so as to diffuse the same into the outer atmosphere without directing the tones in a straight line out of the open end of the loud speaker horn. The motor is provided with the ordinary well known speed regulating means, such as the rheostat 23 in Figure 5, so that the speed of the motor can be varied in its operation, and this permits the oscillation of the loud speaker horn 10 in accordance with the music which is being broadcasted and amplified through the horn 10.

The pivotal connection through the adjustable screw member 13 and the standard 14 of the horn 10 permits the free oscillation and movement of the horn 10 in a manner so that instead of the music or sound being amplified out of the horn 10 in a harsh, rigid manner, the vibrations set up in the horn by the resonating of the sound waves coming from the transmitter 22 of the loud speaker horn 10 are absorbed and diffused by the motion and free mounting of the horn 10, and instead of the music or sound being amplified out of the horn in a manner which would detract from the rhythm and harmony of the original sound received by the reproducer 22, we have found that our reciprocating amplifying horn 10 broadcasts the sound practically as it is received in the same harmonic manner without distortion and distributing the same into the atmosphere in a manner so as to overcome the heretofore mechanical sound and distortion which is ordinarily produced in the ordinary loud speakers. The sound coming from our oscillating amplifying horn 10 seems to just float in the air with its original melody and harmony.

In Figure 3 we have illustrated a phonograph C having a loud speaker or amplifying horn 25 which is adapted to be operated in a manner to oscillate the same which we accomplish by the pivoted supporting standard 26 positioned in the back portion of the horn compartment D, so that the horn can be oscillated back and forth in the same manner as the horn 10 is oscillated within the compartment 12.

In the phonograph C the standard 26 is to form a tubular sound receiving member so as to connect the amplifying horn 25 with the tone arm 27 from the reproducer 28. The reproducer engages with the record 29 of the phonograph C, as illustrated in Figure 4, and is adapted to operate in the ordinary well known manner.

The phonograph C is equipped with the

ordinary spring motor 30 which is operated by the crank 31 excepting that we provide a disk 32 on the inner side of the motor 35 which is connected by the arm 33 with the link 34 and the link 34 is connected to the pivoted standard 26 in a manner so as to oscillate the horn 25 when the motor 30 is in operation. In this manner the same motor, such as 30, which operates to operate the record in the phonograph C simultaneously operates and oscillates the horn 25 back and forth within the horn compartment D of the phonograph C. In Figures 4 and 5 we have illustrated an electric motor 35 which may be of any ordinary well known construction and is only illustrated diagrammatically in the drawings, connected by the electric cord 36 to any suitable source of electrical energy. The motors 30 and 35 are only illustrated diagrammatically and both of these motors operate to simultaneously operate the record 29 of the phonograph C and the oscillation of the horn 25.

Our phonograph operated in the manner described, reproduces sound in a most remarkable manner, clear and distinct without perceptible horn vibrations which tend to distort the harmony of the music or sound from the record, and practically simulating the sound as it is originated. The rhythm produced by our phonograph C is remarkable in its harmony and apparently is entirely free of the objectionable resonating sounds that are ordinarily present in mechanical reproducers.

The input of sound such as in the microphone for radio broadcasting is illustrated as attached to our invention by the microphone E which is mounted upon the motor cabinet F and is adapted to be operated by the motor F through the connecting arm 38 operated from the disk 39 and adapted to operate the arm 40, which is mounted on the depending standard 41 of the microphone E. The standard 41 is pivotally supported on the shaft 42 so that when the motor F is operating, the microphone E is oscillated back and forth in a manner so as to input the sound in a similar manner as the sound is output by the loud speaker A and the phonograph C. Such inputting of the sound with the microphone E oscillating, diffuses the reception and increases the efficiency of the receiving qualities of the microphone E.

The motor F is of an ordinary spring type such as is used in phonographs and is not illustrated in detail in the drawings.

The motor F is adapted to be supported on a suitable standard 43 from the base 44.

In Figure 9 we have illustrated the microphone E connected to a receiving horn 45 which is pivotally mounted at 46 and 47. The connection 46 providing an adjustable pivotal connection with the horn 45 and the connection 47 forming a supporting standard and shaft depending from the lower portion of the horn 45 and adapted to be connected with the operating disk 48 of the motor F. The operating disk 48 is connected by the arm 49 with the link 50 which operates the shaft 47 in a manner to move and oscillate the horn 45 within the cabinet 52. This form of input for radio reception and broadcasting provides a very desirable means for collecting the sound in the atmosphere and transmitting it in a clear, undistorted manner for radio broadcasting. This is an important feature of our invention as it permits the microphone E to operate much more efficiently and making it possible for the microphone to collect the sound in the atmosphere with more uniform reception and without harsh undesirable sounds coming from points directly in front of the microphone. In other words the reception or input through our microphone E, while the same is being oscillated, entirely overcomes fading of the sound of speakers talking before the microphone E or of some of the musical instruments playing before the same.

In Figure 8 the microphone standard is operated by the sliding connection 54 which is connected with the operating disk 55 and is adapted to move or oscillate the supporting standard 41 in a manner so as to oscillate the microphone F which is broken away in this view.

The heretofore mechanical harshness and undesirable distortions which have been secured in sound reproductions and input devices are entirely absent from our amplifying unit for output and our receiving unit for input. Music coming from our loud speaker A reproduces the melody in so far as we are able to determine, practically as it is received with its original harmony and tone, giving sweet, clear rhythm and floating the same out into the atmosphere in a manner so that the listener can stand in most any portion of the room wherein the music or sound is being amplified and not find the sound waves harsh or of a mechanical distorted nature, not being louder in one part than in another but unified so as to be practically equally distributed into the atmosphere.

In our output invention it is desirable to provide units where the input, such as a microphone or other sound receiving and recording instrument is used, is oscillated during the inputting operation and the output unit is adapted to be oscillated, which may consist of a loud speaker reproducing unit of a radio or an amplifying horn and reproducer of a phonograph. By using our means and method of inputting and outputting sound, we believe that we overcome undesirable distortions and discords together with other undesirable mechanical distortions or harshness of the receiving and reproducing instruments or units so that by

using our method and means of inputting and outputting sound we accomplish a very desirable means of providing a natural, or as near as possible, reproduction of the natural sound, either of a mechanical instrument or instruments such as orchestra and band music or individuals' singing or speaking, so that our use of our invention has developed, in so far as we know, a new and most satisfactory means of inputting and outputting sound.

In accordance with the patent statutes we have described the principles or operation of our amplifying unit for output and receiving for input of sound and while we have illustrated a particular formation of device and means for carrying out our invention, we desire to have it understood that these illustrations are only suggestive and that the invention can be carried out by other means and applied to uses other than those above set forth within the scope of the following claims:

We claim:

1. A radio loud speaker including, an amplifying member, a transmitter associated with said amplifying member and means for oscillating said amplifying member to continually change the direction of sound coming from said amplifying member during the operation of said loud speaker.

2. A radio loud speaker including, means for oscillating the same to change the direction of sound amplified by said loud speaker.

3. A radio loud speaker including, an amplifying member, a resonating compartment for receiving said amplifying member, and means for oscillating said amplifying member within said compartment to overcome mechanical distortion and vibrations within and about said amplifying member.

4. An input and output unit for radio and phonographic use, including, means for oscillating the input and output units when in operation.

5. A radio loud speaker including, an amplifying unit, means for adjustably holding said unit pivoted to be oscillated, and means for oscillating said unit.

6. A radio loud speaker including, an amplifying unit having a transmitter, means for pivotally holding said unit and adjustable means for oscillating said unit whereby said unit can be oscillated to synchronate with the sound being reproduced by said unit.

7. A phonograph including a resonating compartment, an amplifying unit having a horn pivotally mounted within said resonating compartment and means for moving said horn back and forth within said compartment in accordance with and to synchronize with the record being reproduced so that the horn may be operated to oscillate slow or fast within said compartment.

8. A phonograph including, an amplifying unit and reproducer, a tone arm and means for oscillating said horn to move back and forth to constantly change the direction of outputting sound from said horn to overcome acoustical distortions.

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