Sept. 3, 1929. J. B. HAWLEY 1,727,105

SOUND AMPLIFIER

Filed Sept. 27, 1924 2 Sheets-Sheet 1

Fig. 1.

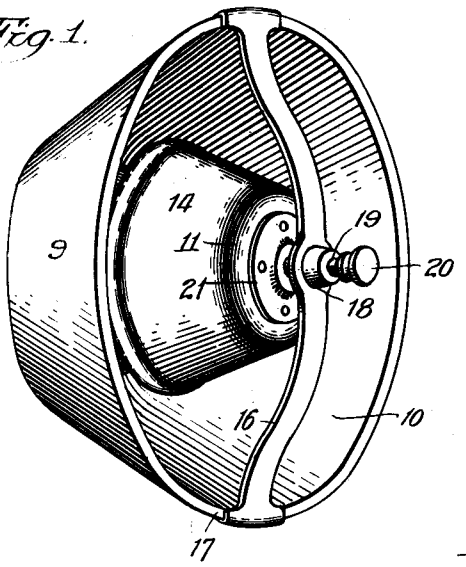


Fig. 2.

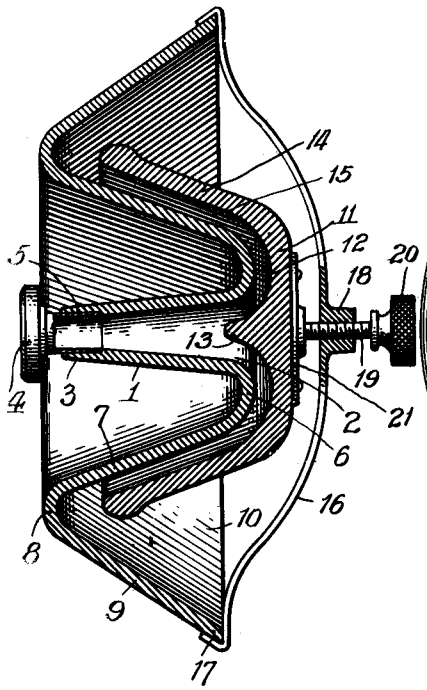
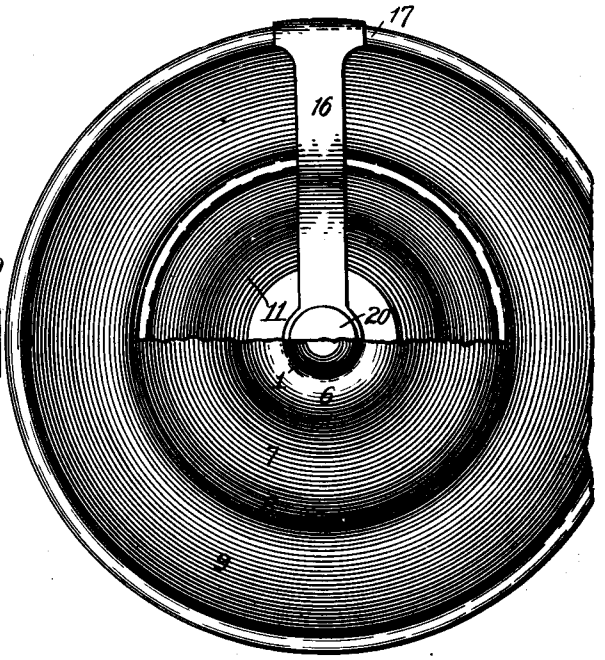


Fig. 3.



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Fig. 4.

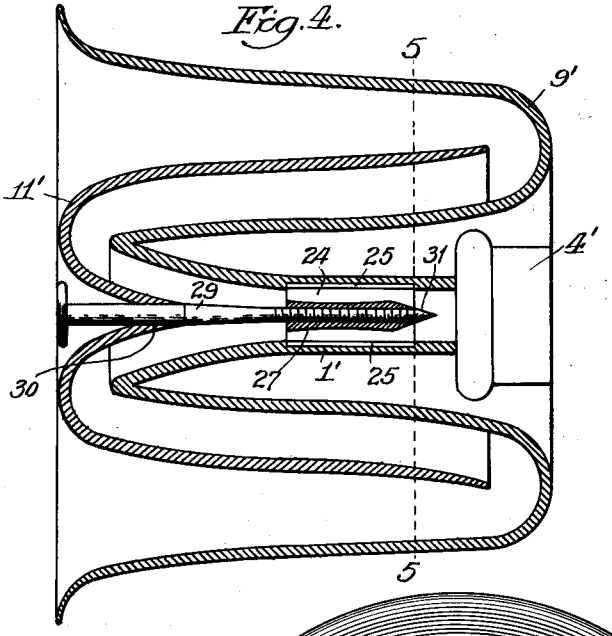


Fig. 6.

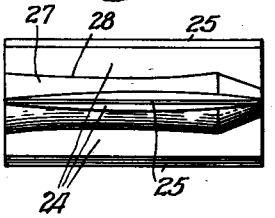


Fig. 5.

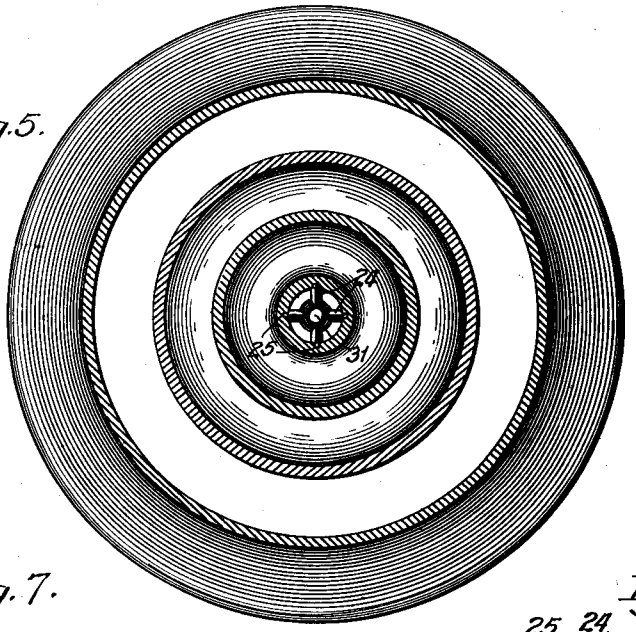
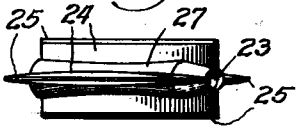


Fig. 7.



Fig. 8.



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Patented Sept. 3, 1929. 1,727,105

UNITED STATES PATENT OFFICE.

JESSE B. HAWLEY, OF WILMETTE, ILLINOIS, ASSIGNOR, BY MESNE ASSIGNMENTS, TO UNITED REPRODUCERS CORPORATION, OF ST. CHARLES, ILLINOIS, A CORPORATION OF NEW JERSEY.

SOUND AMPLIFIER.

Application filed September 27, 1924. Serial No. 740,160.

The present invention relates to sound amplifiers, such as those used in talking machines, radio apparatus and like and similar devices.

Among the objects of the invention are to provide a novel device for amplifying sound free from distortion, and discordant tones, and incorrect timbre, metallic resonance, and the like but which will produce sound or sound waves as nearly true to the original or created sound as possible; to provide for reflecting the emitted reproduced sound waves for purifying the sounds and timbre; to successively reflect such waves; to provide for adjusting the relation of the reflectors with respect to each other; to provide a reflector with a substantially caustic surface for efficiently reflecting a sound conducted to it from the reproducer; to provide a reflector of hollow form and of substantially frusto-conical forms or portions with reflecting surfaces and passage defining walls; to provide a pair of reflectors having their reflecting portions directed toward each other such that the sound incident upon one may be reflected to the other and the latter to reflect the sound by the former and to the exterior of the device, the former reflector being spaced from the other reflector to provide a channel or passage therebetween; to provide for adjusting the space between such reflectors for varying the quality and volume of the sound; to provide one of the reflectors with a projection preferably extending into the discharge end of the sound conveying passage or tube to aid in directing the sound into the reflecting passages; to provide a simple and convenient means for supporting the reflector in position for adjustment to and from the sound conveying tube and the other reflecting portion of the device; and to provide such other objects, advantages and capabilities as will later appear and are inherently possessed by the invention.

In the drawing showing an illustrative embodiment of the invention, Fig. 1 is a perspective view of an amplifier constructed in accordance with the invention; Fig. 2 is a transverse sectional view through the same, Fig. 3 is a front view in elevation, partly broken away, of the device; Fig. 4 is a sectional view of a modified form of my horn; Fig. 5 is a section on line 5—5 of Fig. 4; Fig. 6 is a detail of the threaded adjusting block; Fig. 7 is a view of the adjusting screw; and Fig. 8 is another view of the block shown in Fig. 6.

Referring more particularly to the drawing, one form of device constructed in accordance with the invention is shown an amplifier comprising a central sound conveying tube 1 preferably diverging toward the forward end 2 thereof and provided at the rear end portion 3 thereof with means for the attachment thereto of a sound reproducer, receiver or the like 4, having a sleeve 5 adapted to be connected with the end 3 of the tube. The forward end of the tube 1 extends and curves laterally to form a connecting portion 6 which extends into a flaring frusto-conical wall or portion 7 flaring toward the rear and arranged substantially in concentric relation with the tube 1, as clearly shown in Fig. 2 of the drawing. The rear end portion 8 of this part extends and curves laterally into a forwardly extending flaring or substantially frusto-conical body portion 9 which is also substantially concentric with the portion 7 and the tube 1, and presenting a mouth 10 at the forward side of the device through which the sound is finally emitted into the atmosphere.

Opposite the open end 2 of the tube is located a reflector 11 having a caustic surface 12 providing a projecting portion 13 extending more or less into the open end portion of the tube 1, as clearly shown in Fig. 2. The reflector 11 has a rearwardly extending substantially annular portion or wall 14 preferably in the form of a frusto-cone and substantially parallel to the wall of the member 7 and spaced therefrom so as to provide a diverging passage 15 between the walls 7 and 12 whereby the sound may travel rearwardly toward the reflecting portion 8 between the walls 7 and 9 of the device.

The reflector 11 is preferably mounted for adjustment so that the space between the reflector and the open end of the tube 2 and the wall 7 may be varied as desired. For the purpose of adjustably mounting this reflector, the body portion 9 has a supporting element 16 clasping the rim 17 of the device and extending in the form of a band or bar across the mouth 10 and provided with a threaded hub 18 in which is threaded a screw

19 provided with a thumb nut 20 at the outer end thereof and pivotally connected at the other end thereof with a plate 21 secured, in any suitable manner, to the forward end of the reflector 6, as clealy shown in Fig. 2 of the drawing. It will be apparent from the above that by turning the thumb nut 20 the screw may be operated to move the reflector 11 longitudinally to and from the open end of the tube 1 and the wall portion 7 so as to vary the space therebetween.

The tube and reflecting portions of the device may be made of any suitable material, such as of wood, metal, papier mâché, or interlaced fibers, made in accordance with my process Serial No. 620,579, filed February 23, 1923.

Figs. 4 to 8 disclose a modified horn construction wherein the horn body portion 9′ is formed with the central sound conveying tube 1′ except that this tube is formed with a channel or seat on its inner periphery into which seat is fitted a block formed with a central, threaded bore 23 and radial wings 24 which are formed with rather sharp knife-like edges 25 and stream-line shaped sides. The central substantially cylindrical hub 27 of the block is also provided with a slight concave curvature 28 to present less independence to the passage of the sound waves from the vibrating diaphragm located in the housing 4′. The reflector 11′ is provided at its central portion with an adjusting screw 29 rigidly attached thereto as at 30. The threaded portion of the screw engages the threads on the inner bore 23 of the block so that when the screw is turned the reflector will be adjusted relatively to the horn walls 9′. The inner end 31 of the screw is pointed to prevent obstruction to the sound waves.

In operation the sound is reproduced or received in the member 4 and emitted into the tube 1 where it is transmitted longitudinally thereof toward the reflector 11 and permitted to expand by reason of the flaring of the tube. The sound will then act against the caustic surface of the reflector and pass into the annular passage between the walls 7 and 14 after it is reflected from the inner surface of the reflector 11 and be transmitted toward the rear partly against the outer surface of the wall 7 and a curved portion 8 between the walls 7 and 9 and then projected from the inner surface of the wall 9 and transmitted to the atmosphere through the mouth 10. When it is desired to vary the quality of the tones and the volume of the sound, the thumb nuts 20 may be manually turned to adjust the position of the reflector 11 with respect to the reflector portions 10 and 8 and the outlet of the tube 1.

While I have herein described and upon the drawings shown a preferred embodiment of the invention, it is to be understood that it is not limited to the particular details, arrangement of parts and constructions described and shown, but that other details, arrangements of parts and constructions are comprehended by the invention without departing from the spirit thereof.

Having thus described my invention, I claim:

1. A sound amplifier comprising a horn member formed with a central passage, a flaring annular wall extending rearwardly from the forward end of said passage, a flaring reflector opposite the forward end of said central passage and spaced from the same and the wall to provide a reflex passage therebetween for the sound leaving the forward end of the central passage, a threaded block in the central passage and formed with apertures having stream-line surfaces to provide minimum obstruction to the passage of sound waves, a threaded adjusting member carried by the reflector and threadedly engaging said block to provide for the adjustment of said reflector relative to said horn member.

2. A sound amplifier comprising a sound transmitting passage, sound reflecting means at one end of the passage, a supporting member within the passage, a supporting element secured to said reflecting means and connected to said member for supporting the reflecting means in given relation to said passage.

3. A sound amplifier comprising a sound transmitting passage, a sound reflecting means at an end of said passage, a supporting member within said passage, a supporting element secured to said reflecting means and adjustably connected to said member whereby the relation of said reflecting means and said passage may be varied as desired.

4. A sound amplifier comprising a sound transmitting passage having a flared outlet end, a sound reflecting member having a tapered central part extending into said flared outlet end, and means for rotatably supporting said reflecting member whereby it may be adjusted with relation to said outlet end.

5. A sound amplifier comprising a sound transmitting passage having a sound outlet end, a sound reflecting member opposite said end, means associated with said passage and said member for rotatably supporting said member, said means being adapted when said member is rotated to permit relative adjustment of said passage and said member.

6. A sound amplifier comprising a horn member formed with a central passage, a flaring annular wall extending rearwardly from the forward end of said passage, a flaring sound guide opposite the forward end of said central passage and spaced from the same and the wall to provide a sound passage therebetween for the sound leaving the for-

ward end of the central passage, a threaded block in the central passage and formed with apertures having stream-line surfaces to provide minimum obstruction to the passage of sound waves, a threaded adjusting member carried by the guide and threadedly engaging said block to provide for the adjustment of said guide relative to said horn member.

7. A sound amplifier having a tubular portion forming a flaring sound conveying passage, a supporting element in said tubular portion, said tubular portion having an extension bent backwardly and outwardly, a sound directing member disposed opposite the mouth of said tubular portion and arranged to direct the sound waves backwardly along said extension, and means secured to said directing member and adjustably connected to said element for adjusting the relation of said directing member with relation to said tubular portion and said extension.

8. A sound amplifier comprising a central tubular portion open at the forward end thereof, a sound directing member opposite said open end and having a rearwardly extending portion, the forward end of the tubular portion continuing rearwardly and being spaced from the rearwardly extending portion of the sound directing member to provide a sound passage therebetween, a spider in said tubular portion, and means carried by said sound directing member and adjustably connected to said spider.

9. A sound amplifier comprising a central tubular portion open at the forward end thereof, a sound directing member opposite said open end and having a rearwardly extending portion, the forward end of the tubular portion continuing rearwardly and being spaced from the rearwardly extending portion of the central tubular portion to provide a compactly arranged horn wall, and a sound directing means for receiving and directing the sound emitted from said tubular portion, an element secured within said tubular portion, and a member secured to said sound directing member and adjustably connected to said element for adjusting said latter member.

10. A sound amplifier comprising a central hollow conical member, an outer hollow frusto-conical member, and an intermediate hollow frusto-conical member having its smaller end connected to the larger end of the central member and the larger end connected to the smaller end of the outer member and a sound directing means opposite to and beyond the larger end of the central member and extending toward and terminating near to the smaller end of the outer member and being spaced therefrom to form a passage therebetween, and means for adjustably mounting said sound directing means for varying the space between said means and the intermediate member.

11. A sound amplifier comprising a central hollow conical member, an outer hollow frusto-conical member, and an intermediate hollow frusto-conical member having its smaller end connected to the larger end of the central member and its larger end connected to the smaller end of the outer member and a reflector opposite to and beyond the larger end of the central member and extending toward and terminating near to the smaller end of the outer member and being spaced therefrom to form a passage therebetween, a supporting element carried by said outer member, and means thereon for adjustably holding the reflector opposite to and in spaced relation with the larger end of the central member.

In witness whereof, I hereunto subscribe my name to this specification.

JESSE B. HAWLEY.