

Nov. 11, 1930.

A. BRUNI

1,781,266

SOUND AMPLIFIER FOR AIRPLANES

Original Filed Aug. 27, 1928

*Fig. 1.*

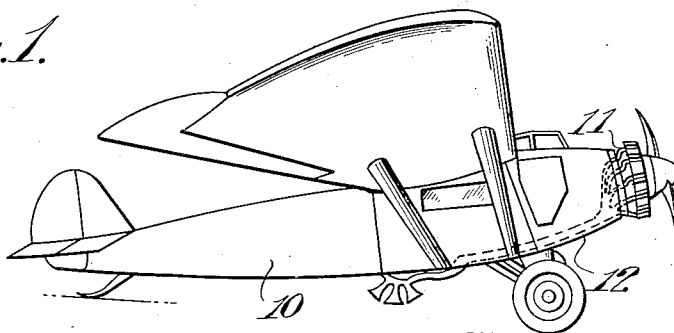
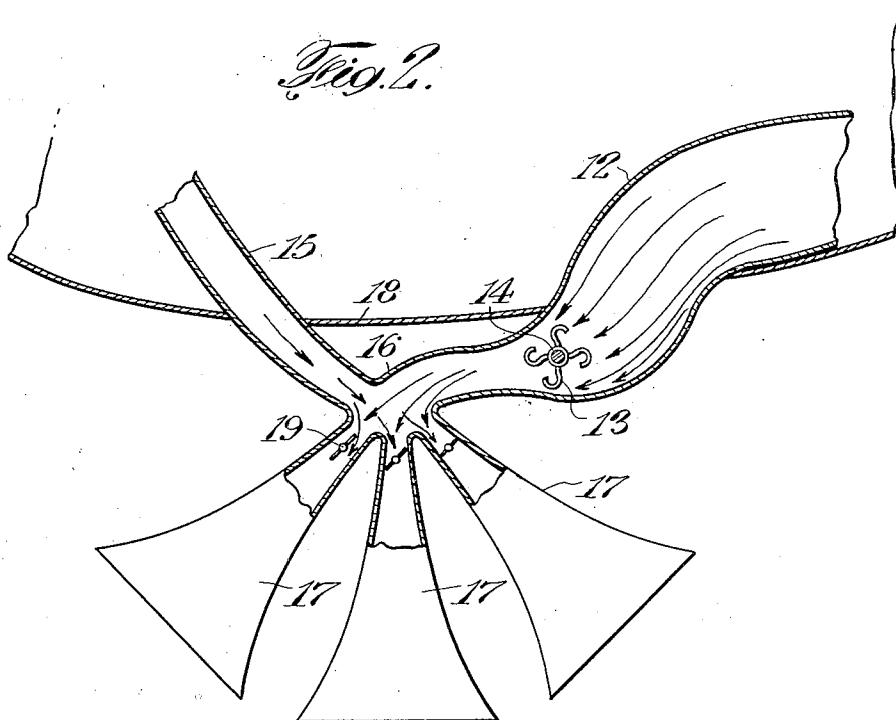


*Fig. 2.*



Inventor

*Amedeo Bruni*

By his Attorneys

*Hoguet & Neary*

## UNITED STATES PATENT OFFICE

AMEDEO BRUNI, OF NEW YORK, N. Y.

SOUND AMPLIFIER FOR AIRPLANES

Application filed August 27, 1928, Serial No. 302,416. Renewed September 25, 1930.

This invention relates to improvements in the art of sound propagation from airplanes.

The invention aims to provide an improved means for propagating sound from an airplane, so as to render the sound audible over a wide area of earth while the airplane is in the air and at high elevations. More particularly, the invention is intended to utilize the exhaust gases, which are emitted from the engine of the airplane at high velocities, for the purpose of augmenting the amplitude and loudness of the sound, speech or music, projected from the airplane.

A further object of the invention is to cause the intermingling of the exhaust of the engine with the sound waves sent out from the airplane and to cause the exhaust to increase the velocity of the sound projection and to force out the sound waves into the atmosphere, to diffuse and disperse them and produce a great volume of sound. The sound waves are thus propagated from the airplane at greater amplitudes, the loudness is increased, and the sound may be heard at greater distances and more distinctly than hitherto.

Another object of the invention is to reduce the exhaust noises present in the airplane engine, to lower these exhaust noises to a steady drone or hum which cannot be heard at any appreciable distances and which is drowned out owing to the great loudness and amplitude of the propagated sound.

Other objects and advantages of this invention will appear as the description proceeds.

Reference is to be had to the accompanying drawings, showing by way of illustration and example a preferred embodiment of the invention and wherein:

Figure 1 is a side elevational view of an airplane having associated therewith a sound propagating device constructed in accordance with the present invention.

Figure 2 is a side elevational view, partly in section, and on an enlarged scale to illustrate the preferred construction of the sound propagating device and the means for utilizing the exhaust gases of the airplane engine therein.

In detail, the invention is shown as applied to an airplane which is generally indicated by the numeral 10 and which may be of any usual, preferred or desired character, as the invention is applicable to an airplane of any type or construction whatsoever. In the airplane disclosed in the drawings, an engine 11 is shown as a rotary engine of the combustion type. The engine is positioned at the front of the plane and has an exhaust conduit 12 leading back along the bottom of the fuselage 18 to around the middle thereof where it discharges into the sound being sent out.

As shown in Figure 2, the conduit 12 preferably tapers towards its discharge end so that the velocity of the exhaust gases increases as they pass thru the discharge conduit. Near the discharge end of the conduit, there is preferably disposed a fan 13 which is mounted on a shaft 14 in the discharge conduit and is disposed transversely therein. The fan is rotating during the discharge of the gases and, as a consequence, it acts as a muffler and serves to convert the exhaust noises into a low steady hum or a fan noise which is drowned out by the greatly amplified sound propagated from the airplane.

The sound from the airplane is carried thru a tube 15 from the interior of the airplane. The sound may be generated in any desired way as by a phonograph or even by a radio set and the sound waves thus generated are sent to the tube 15 which projects thru the bottom of the fuselage and connects with the discharge end of the conduit 12 at a chamber 16 where the discharge gases and sound waves mingle. In order to obtain the best results, the sound must first be amplified within the airplane itself to a high degree and to this end electrical amplifying units suitable for the purpose may be employed for amplifying the sound before it passes thru the tube 15.

The sound and exhaust gases, after mingling in the chamber 16, pass out together thru mechanical amplifiers such as horns 17. It will be appreciated that the exhaust gases are emitted thru the end of the conduit 12 at extremely high velocity and that they act to force the sound waves out thru the horns

at high velocities also with the result that the sound is still further amplified and its loudness increased. The sound is thus dispersed, diffused and scattered thru the atmosphere by the force of the exhaust and by virtue of its extreme loudness can be heard over a wide area of earth even while the airplane is at very high elevations. The sound may, for example, be heard on the ground while the airplane is as much as 5000 or 6000 feet in the air, while hitherto it has been impossible to distinguish sound from airplane at a distance of over 2000 feet in the air.

In the form of the invention illustrated, there is shown three horns 17, which are arranged angularly with respect to one another and project downward from the bottom of the fuselage 18. The first of the horns is in advance of the center horn so as to render the sound audible to people on the earth in front of the airplane while the rear horn is faced toward the tail of the airplane so as to disperse the sound toward the rear of the airplane. The center horn preferably faces straight downward. One or more of the passages of these horns may be opened or closed as by small butterfly valves 19 so that all three of the horns may be used at once or the horns may be used individually and selectively. By this arrangement, the sound may be disseminated over wide areas or it may be concentrated over a small area, and by alternately opening and closing the passages of the horns, a skilled operator may produce remarkable acoustic effects, such as causing the sound to appear to come from different directions.

My invention probably has its greatest value at the present time as an advertising medium. Thus speeches, political or otherwise, may be sent out from airplanes and may be heard by audiences from the earth. This sort of advertising or campaigning is particularly effective, as the interest of the listener is immediately arrested and a greater effect is obtained than by advertising through ordinary channels.

While the details of construction herein shown are preferred, the invention is capable of wide variations in structural embodiments in practice and I desire to be limited only by the state of the prior art and the scope of the appended claims.

What I claim is:—

1. An apparatus of the kind described comprising an airplane having an engine, a sound tube leading from the interior of the airplane, an exhaust conduit leading from the engine, means forming a chamber into which the sound tube and exhaust conduit discharge and the sound and the exhaust gases mix, and means for propagating the mixture through the atmosphere.

2. An apparatus of the kind described comprising an airplane having an engine, a

sound tube leading from the interior of the airplane and through the bottom of the fuselage, an exhaust conduit leading from the engine and through the bottom of the fuselage, with its end adjacent the end of the sound tube, means associated with the ends of tube and conduit and into which tube and conduit discharge and the sound and the exhaust gases mix, and means for propagating the mixture through the atmosphere.

3. An apparatus of the kind described comprising an airplane having an engine, a sound tube leading from the interior of the airplane, an exhaust conduit leading from the engine, a fan in the conduit near the discharge end, means forming a chamber into which the sound tube and exhaust conduit discharge and the sound and the exhaust gases mix, and means for propagating the mixture through the atmosphere.

4. An apparatus of the kind described comprising an airplane having an engine, a sound tube leading from the interior of the airplane, an exhaust conduit leading from the engine and tapering toward its discharge end, a fan in the tapered end of the conduit, means forming a chamber into which the sound tube and exhaust conduit discharge and the sound and the exhaust gases mix, and means for propagating the mixture through the atmosphere.

5. An apparatus of the kind described comprising an airplane having an engine, a sound tube leading from the interior of the airplane, an exhaust conduit leading from the engine, means forming a chamber into which the sound tube and exhaust conduit discharge and the sound and the exhaust gases mix, and a horn through which the mixture passes and is propagated into the atmosphere.

6. An apparatus of the kind described comprising an airplane having an engine, a sound tube leading from the interior of the airplane, an exhaust conduit leading from the engine, means forming a chamber into which the sound tube and exhaust conduit discharge and the sound and the exhaust gases mix, a plurality of angularly disposed horns through which the mixture passes into the atmosphere, and means for selectively opening and closing the passages of the horns.

7. An apparatus of the kind described comprising an airplane having an engine, a sound tube leading from the interior of the airplane and through the bottom of the fuselage, an exhaust conduit leading from the engine and through the bottom of the fuselage with its end adjacent the end of the sound tube, means associated with the ends of tube and conduit and into which tube and conduit discharge and the sound and the exhaust gases mix, and a plurality of downward-facing angularly disposed horns through which the mixture discharges into the atmosphere.

8. The method of amplifying and propagating sound from an airplane which comprises concentrating the sound in a tube, discharging the engine exhaust into the tube at high velocity, and diffusing the mixture of sound and gas through the atmosphere.

9. The improvement in the art of sound propagation from an airplane which comprises mixing the engine exhaust with the sound and projecting the mixture into the atmosphere.

In testimony whereof, I have signed my name to this specification this 23d day of August, 1928.

AMEDEO BRUNI.