



**United States Patent**  
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**MICROPHONE AND SPEAKER  
SYSTEM MAGNETICALLY  
CONNECTED TO AMPLIFY VOICE  
UNDER MASK (“AMPLI-MASK”)**

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6617075B2	9/2003	Mao .....	[4]
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**ABSTRACT**

While masks are effective in stopping the dispersion of particles in the air, they have the unintended consequence of stifling sound when talking. A solution to this common problem would be an amplifier and microphone apparatus that can be installed onto any mask, allowing the speaker to talk uninhibitedly without having to pull down the mask to be heard. Not only would this be more convenient for the user, it would also protect others from excess particles that are dispersed when a mask is removed.

**References Cited**

**U.S. PATENT DOCUMENTS**

6744896B2	6/2004	Tanabe .....	[1]
7235594B2	6/2007	Han .....	[2]

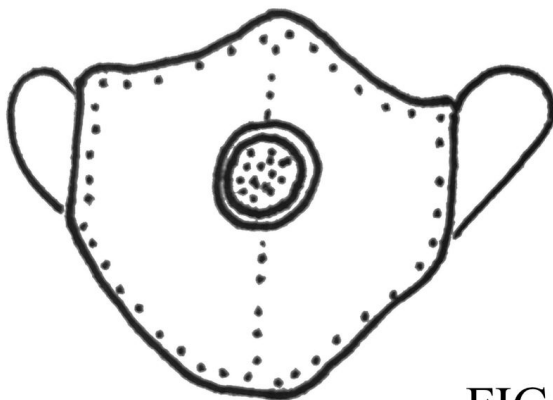


FIG. 1

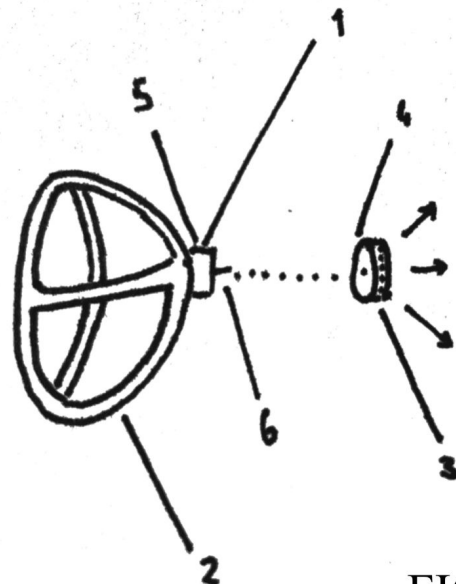


FIG. 2

**MICROPHONE AND SPEAKER SYSTEM MAGNETICALLY CONNECTED TO AMPLIFY VOICE UNDER MASK (“AMPLI-MASK”)**

**FIELD OF THE INVENTION**

Our invention relates to the interactions between electric and magnetic fields, more particularly to their use in creating a movable diaphragm in a speaker. This combined with the sensory applications of the electret microphone to relay voice signals to the internal magnet speaker. The two aforementioned devices will be held within a biodegradable face-hugging cage and be powered by a lithium battery easily recharged with a magnetic power transfer device, all of which contained within a mask that will allow the prevention of spread of a viral or bacterial disease.

**BACKGROUND OF THE INVENTION**

The design of the antiviral mask has not changed significantly since its invention in 1919 during the Spanish Flu outbreak, in which it was used in the same manner it is used today: to stifle the amount of molecules spread by talking and breathing. This face covering is an incredibly simple way of protecting others, yet it has the unintended consequence of significantly inhibiting speech. The human vocal cords produce vibrations that are transferred out the mouth, subsequently vibrating the air and producing sound. With a mask between the mouth and the air, vibrations are severely limited, leading to less sound being produced by the individual speaking.

There have been many inventions designed to amplify voice from the speaker side, a few examples being the megaphone and the dual-way intercommunication microphone that is commonly found in ticket booths and bank tellers. Both of these inventions feature an identical system of amplification: a speaking end, which often has a microphone or other device to pick up sound, and an amplifying end,

which contains a speaker system. The microphone picks up the sound spoken by the user, digitizes it, and transfers the data to the speaker system, where it is reproduced and amplified. The ampli-mask follows the same procedure: the microphone attached to the cage on the inside picks up the user’s voice, transfers it to the speaker via a wiring system, and the speaker reproduces the voice allowing the receiver to hear the user more clearly, while keeping both parties safe.

**OBJECTS OF THE INVENTION**

It is thus the object of the present invention to provide seamless voice amplification through the use of the microphone and speaker within the device to make the user’s voice heard.

Another object of the invention is to create a system that does not deter from the practicality of the mask and its protection properties.

Another object of the invention is to provide an efficient yet compact and lightweight means of charging through a cordless touch system.

The final and most important object of the invention would be to provide a versatile voice amplification system that can be applied to any mask the user may wish.

**SUMMARY OF THE INVENTION**

The ampli-mask object is a microphone and speaker system that comprises:

- an electret condenser microphone that can convert speech into an electric current via a moving diaphragm,
- a plastic mouth cage that is made from biodegradable materials that has the functionality of keeping the microphone away from the user’s face,
- an internal magnet speaker that converts the electrical current received from the microphone and vibrates a magnet at identical frequencies to reproduce speech,
- a lithium coin battery to power both the speaker and microphone that can be replaced upon depletion of charge,

a system to detect speech in order to conserve battery, whereas the system runs at low power until voice is detected and the system is activated, and wireless power transfer system that allows for charging of the device while not being used.

The microphone component of the system is housed in the plastic mouth cage, serving as the base for the entire system. The plastic mouth cage is a half-dome that surrounds the mouth, containing four large holes on each side to allow for minimal obstruction to the user's breathing. At the apex of the mouth cage (directly-opposite the mouth) rests the microphone, attached to the mouth cage. It rests away from the mouth so the user is still able to speak. The microphone has an additional functionality of only activating when it detects speaking; with this system in place, the ampli-mask can save battery life and prevent the user from broadcasting ambient noises such as breathing. On the backside of the microphone component is the lithium battery that powers the system, along with an induction pad on the back in order to recharge the battery, eliminating the need to buy new batteries (reducing waste). The microphone mouth cage, battery, and charging pad are all one unit that is housed inside the mask. The system rests within the mask and is attached by two clip mechanisms built into the plastic cage.

The speaker component of the system is a separate piece altogether that can connect to the microphone component to complete the invention. The speaker component consists of an internal magnet speaker and a magnetic pad on its back to allow for it to hold onto the microphone component through the material of the mask. To connect the two parts, a metal wire runs from the back of the speaker to click into the microphone component to allow for the microphone to send the electric currents containing the speech information that the speaker will recreate. To connect the two, the mask must be punctured to allow for the connection of the hardware; even though puncturing a mask may seem counter-intuitive, the magnetic connection between the speaker

and microphone will allow for the miniscule hole to be sealed, preventing molecules from entering through the intrusion.

The only limitation of the invention is the fact that once the mask is punctured, it may only be worn with the system, for if it is worn without, a hole will expose the user to possible infection or spread.

A wired connection is imperative for the invention because it provides the quickest transfer of electricity. As seen with a speech jammer, if an individual's speech is played back to them only a few milliseconds later, it inhibits the ability to speak because an individual is unable to listen and speak simultaneously. Thus, a wired connection would make for instant amplification of voice, eliminating any possibility for feedback or delay.

This invention is novel in a number of aspects, the most obvious being the ability to speak and have voice heard clearly while still wearing a face covering. The ability to speak in a mask is stifled when a mask is worn, but with a speaker and microphone system the voice can be broadcast with complete understanding. The invention also incentivizes the user to keep the mask covering the mouth. Commonly people who are wearing masks become frustrated when they cannot be heard, causing them to pull down their mask and spread molecules through speech. The microphone and speaker system eliminates the need for pulling down one's mask since their speech can be heard regularly. Another novel aspect of the invention is its ability to be installed on any mask; due to the two-part system, the user can clamp the apparatus onto separate masks instead of needing to buy a singular mask system that broadcasts voice. The ability to install the system onto any mask allows for the user a more clean experience since the apparatus can be rotated between several different masks, cleaning those that are not currently in use. When the user wishes not to use the amplifier system, it can charge wirelessly through induction until its next usage.

The ampli-mask will ultimately be used to increase communication while keeping all parties involved safe.

## BRIEF DESCRIPTION OF THE DRAWING

The above objects, features and advantages of our invention will become more readily apparent from the following description.

FIG. 1 is an illustration of the overall system of our invention while attached to a mask of your choosing. A frontal view will only display the speaker portion of the invention

FIG. 2 is an illustration of a side view of the cage apparatus that will house the microphone within the mask. It also displays the connective device between the microphone and the speaker that will send signals to the speaker.

### SPECIFIC DESCRIPTION

The mask microphone and speaker apparatus shown in FIG. 1 is the front view of what the invention would look like when installed properly onto a mask. The speaker rests outside the mask while the power source, microphone, and speaker all rest inside.

FIG. 2 illustrates the individual parts of the invention. The interior components (FIG. 2) are pictured on the left. The biodegradable plastic mouth cage [2] is the main housing for most of the components. On the apex of the cage rests the electret condenser microphone [1], away from the speaker's mouth. The lithium coin battery [4] also rests within the plastic cage, but for demonstration purposes it is pictured on the right next to the internal magnet speaker [3]. Still inside the plastic cage is the system in which to detect a user's voice using the electret condenser microphone [5] and a wireless power transfer that allows the lithium battery to be charged when not in use. The combination of the low-power voice detection and wireless charging create a device that need not be charged often. Moving on to the outside of the housing (FIG. 2, item 3), the internal magnetic speaker [3] is connected to the main components within the

mask via a metal cable that clicks into place and is magnetically held. The dots between the two components represent the connection between the two, allowing for the flow of electricity and subsequently the reproduction of sound. A wired connection is best for the invention because it offers the quickest transmission of electricity. Otherwise, the speaking may become delayed, making it challenging for the user to speak if their perceived voice comes out slower than expected.

**We claim:**

1. An amplification system that can be installed on any mask, comprising:
  - an electret condenser microphone that can convert speech into an electric current via a moving diaphragm,
  - a plastic mouth cage that is made from biodegradable materials that has the functionality of keeping the microphone away from the user's face,
  - an internal magnet speaker that converts the electrical current received from the microphone and vibrates a magnet at identical frequencies to reproduce speech,
  - a lithium coin battery to power both the speaker and microphone that can be replaced upon depletion of charge,
  - a system to detect speech in order to conserve battery, whereas the system runs at low power until voice is detected and the system is activated,
  - a wireless power transfer system that allows for charging of the device while not being used.
  - and a wired connection between the two separated components to allow for fast electric current movement, eliminating delay.