

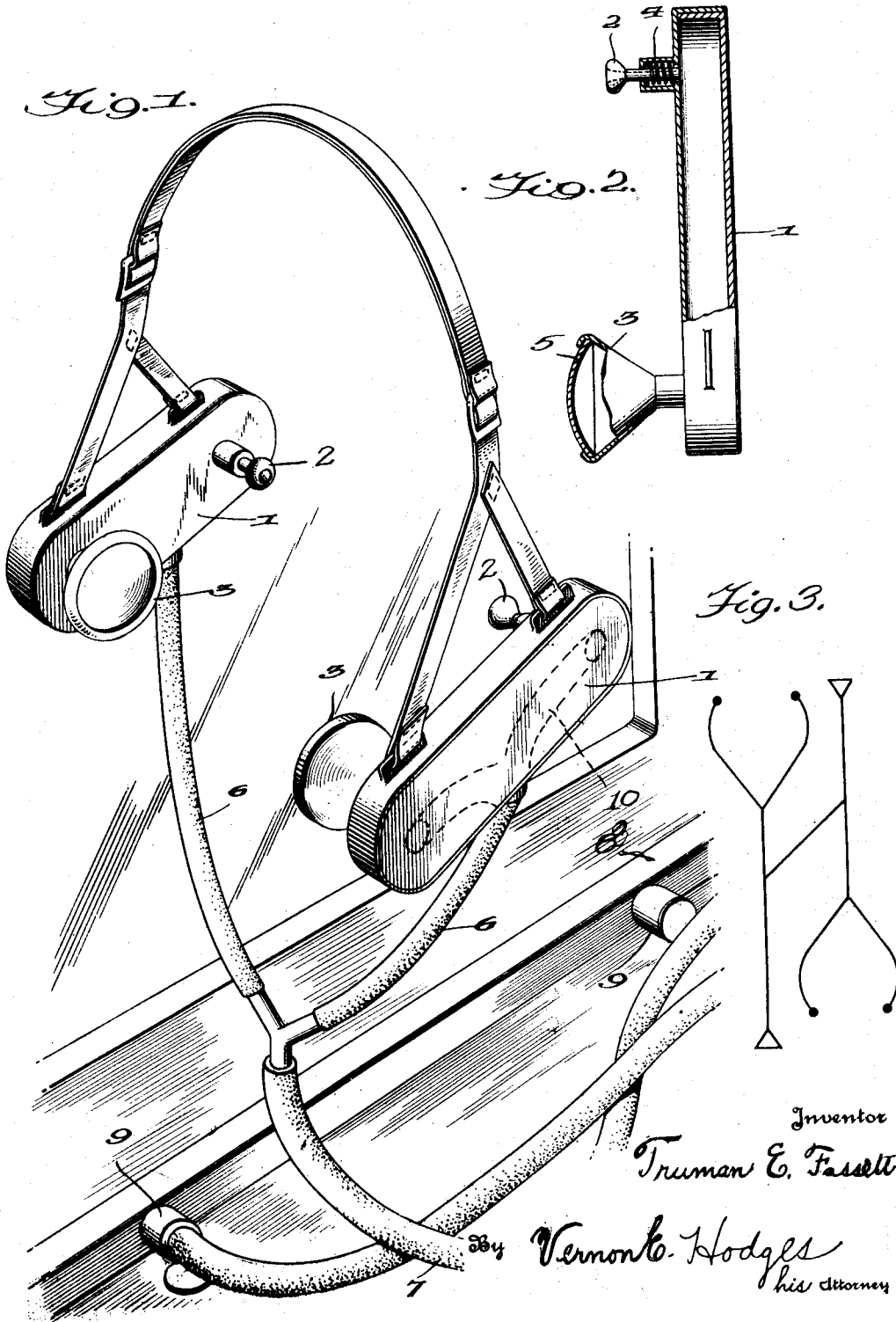
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APPARATUS FOR TRANSMITTING AND RECEIVING VOCAL SOUNDS

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UNITED STATES PATENT OFFICE

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APPARATUS FOR TRANSMITTING AND RECEIVING VOCAL SOUNDS

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My invention relates to apparatus for transmitting and receiving vocal sounds.

The solution of the problem of transmitting vocal sound, while excluding extraneous and conflicting sound and noise in a practical and inexpensive manner has long baffled inventors and scientists. The problem of verbal communication, in flight more particularly, involves exclusion of motor noise and rush of air interference, and, if accomplished at all, must be done by some instrument which will not be affected by vibration. Any means of transmission and reception of sound especially in air planes must be protected from wind and extraneous sounds; and, in order to be acceptable to the science of aviation, the hands of the pilot must be free for the operation of the controls.

The principle of this invention is based upon the fact that vocal sounds exist inside the head and chest, filling the entire resonance system, and not, as is generally supposed, at the outside of the mouth.

I have, therefore, worked upon the principle of collecting and transmitting the vocal vibrations not necessarily at the mouth alone but also through the vibrant walls of the human resonance chambers, for instance under the cheek-bones, although it is possible to collect them either at the chest or throat, but not with the same degree of clearness as from the cheek-bones.

By the application of a diaphragm transmitter or even an open cone pressed tightly against the cheek, chest or throat, as the case may be, so as to exclude extraneous sounds, and connected with an ear-piece or receiver designed to fit the outer ear so as to exclude extraneous sound, it is possible to transmit speech with perfect clearness, and irrespective of outside noise of wind, motor, or what not, since the circuit between transmitter and receiver is closed, thereby not influenced by the outside air disturbance. In other words, both transmitter and receiver being covered, all extraneous sound is practically excluded.

My invention lends itself well not only to aerial conversations between two or more individuals, but may be used as well in any noisy place, such as offices, mills and the like,

for dictation or confidential conversation. In short, its application is not limited to aviation, or by distance, noise, vibration or number of individuals using it.

While I have by no means sought to mention or illustrate and describe all possible mechanism or applications of this invention, I have shown a practical application, and shall proceed to describe the mechanism shown as illustrative merely of a tried form of apparatus for exemplifying my invention.

In the accompanying drawing:

Fig. 1 is a perspective view of the instruments employed at each end of the line, showing their application to both ears and cheeks;

Fig. 2 is a longitudinal sectional view through the box or chamber shown connecting one of the receivers and one of the transmitters, and

Fig. 3 is a diagrammatic view of the apparatus as a whole.

In the preferred embodiment of my invention, two transmitters and receivers are employed at each end of the line, and, as shown in Figs. 1 and 2, each transmitter is mounted on a frame which also carries one of the receivers or ear pieces. This frame is in the form of a closed box or chamber and the transmitter and receiver communicate with the chamber within said box. They are thus in communication with each other. The box or chamber 1 may be variously constructed, and is preferably made of as light material as practical, as it is adapted to be strapped or otherwise secured to some portion of the head. As illustrated, two of these instruments are connected with a head-piece, although it is obvious that a single instrument could, if desired, be used instead of the two. However, both ears have to be covered. These instruments are disposed at a suitable angle, so that the ear-piece 2 may be inserted lightly in the outer ear, and the transmitter or cone 3 is held tightly against the cheek.

The stem of the ear-piece 2 is tubular and opens into the box or chamber 1. In order to lessen the pressure upon the ear, and at the same time insure retaining its proper position within the outer ear, the ear-piece 2 is backed by a light spring 4, which maintains

the required pressure. It is understood that the transmitter 3 shall be pressed tightly against the cheek and that the ear-piece 2 shall be fitted to, and extend sufficiently into, the outer ear to plug the ear, so to speak, for the purpose of excluding sounds from the outside. The transmitter 3 may be an ordinary cone with a hollow stem opening into the chamber 1; or, if desired, it may have a diaphragm 5 at its outer end.

When two of these instruments are employed, as viewed in Fig. 1, tubular connections 6 extend from each box or chamber 1, and preferably form a juncture with a single tube 7 which extends to similar instruments adapted to be employed by the other party or parties, at the opposite end of the line, with whom communication is to be had. In Fig. 1, I have illustrated this in connection with a transmission tube 8, which might extend along the fuselage of an airplane, in a coach or other vehicle; and by plugging the end of the tube 7 at a socket 9 in the transmission tube, the various occupants of the vehicle can plug in with their instruments and be placed in communication with the party at the other end of the apparatus.

The principle of transmission and reception which involves the collection of vocal vibrations from the vibrant walls of the human resonance chambers, as distinguished from the mouth, the provision of closed communication tubes from one end of the line to the other, and the provision of receivers communicating with the transmitters, all in connection with or involving means for excluding extraneous sounds, is the crux of my invention. It is to this end that transmitters are provided which may be pressed tightly against the resonant walls of the bodies of the respective parties communicating with each other, to exclude extraneous sounds, that receivers or ear-pieces are employed which will plug the outer ear to the exclusion of extraneous sounds and provide direct communication of the transmitted sound to the ear drum, and that closed transmission tubes are utilized connecting the instruments at one end of the line with those at the other.

The transmitters and receivers at each end of the line are preferably mounted in a single instrument, so as to communicate with each other, thus enabling the speaker to talk with the person at the other end of the line and also to hear his own voice while it is being transmitted to another. These elements contribute largely to the successful operation and use of my invention.

In aviation, pilots are frequently under the necessity, while instructing students in the art, of stopping their engines. Tests of my apparatus show that this is unnecessary, and that it is possible for the pilot and student, or any two or more persons, in an airplane to

communicate freely back and forth in a natural tone of voice.

This is not true of other forms of apparatus that have been proposed, for the reason that they all involve the use of telephonic or speaking tube transmitters which collect and transmit the sound vibrations as they come from the mouth of the speaker. If these transmitters are held at the proper distance from the mouth for distinct transmission, they are so far away as to permit the entrance of extraneous sounds, which prevents clear reception at the other end. If the transmitters are held close enough to the mouth to prevent the admission of outside noises, the sound transmitted is muffled and indistinct. In either case, satisfactory communication is impossible.

I claim:

1. In an apparatus for transmitting and receiving vocal sounds, transmitters designed to be placed and held against any resonant wall of the bodies of the respective parties communicating with each other, for collecting vocal sound vibrations and excluding extraneous sounds, receivers at the opposite ends of each line, and tubular connections between the transmitters and receivers of the respective lines.

2. In an apparatus for transmitting and receiving vocal sounds, transmitters designed to be placed and held against any resonant wall of the bodies of the respective parties communicating with each other, for collecting vocal sound vibrations and excluding extraneous sounds, receivers at the opposite ends of each line, and tubes connecting the transmitters and receivers of the respective lines, the said tubes communicating with each other.

3. In an apparatus for transmitting and receiving vocal sounds, transmitters designed to be placed and held against any resonant wall of the bodies of the respective parties communicating with each other, for collecting vocal sound vibrations and excluding extraneous sounds, receivers at the opposite ends of each line, the said receivers being provided with means for excluding extraneous sounds, and tubular connections between the transmitters and receivers of the respective lines.

4. In an apparatus for transmitting and receiving vocal sounds, transmitters designed to be placed and held against any resonant wall of the bodies of the respective parties communicating with each other, for collecting vocal sound vibrations and excluding extraneous sounds, receivers at the opposite ends of each line, the said receivers being provided with means for excluding extraneous sounds, and tubes connecting the transmitters and receivers of the respective lines, the said tubes communicating with each other.

5. In an apparatus for transmitting and receiving vocal sounds, transmitters designed to be placed and held against any resonant wall of the bodies of the respective parties communicating with each other, for collecting vocal sound vibrations and excluding extraneous sounds, receivers at the opposite ends of each line, a common transmission tube, and tubular connections leading from the transmitters and receivers to the common transmission tube.

6. In an apparatus for transmitting and receiving vocal sounds, transmitters designed to be placed and held against any resonant wall of the bodies of the respective parties communicating with each other, for collecting vocal sound vibrations and excluding extraneous sounds, receivers at the opposite ends of each line, a common transmission tube, tubular connections leading from the transmitters and receivers to the common transmission tube, and means for plugging additional instruments into the latter.

In testimony whereof I affix my signature.

TRUMAN E. FASSETT.