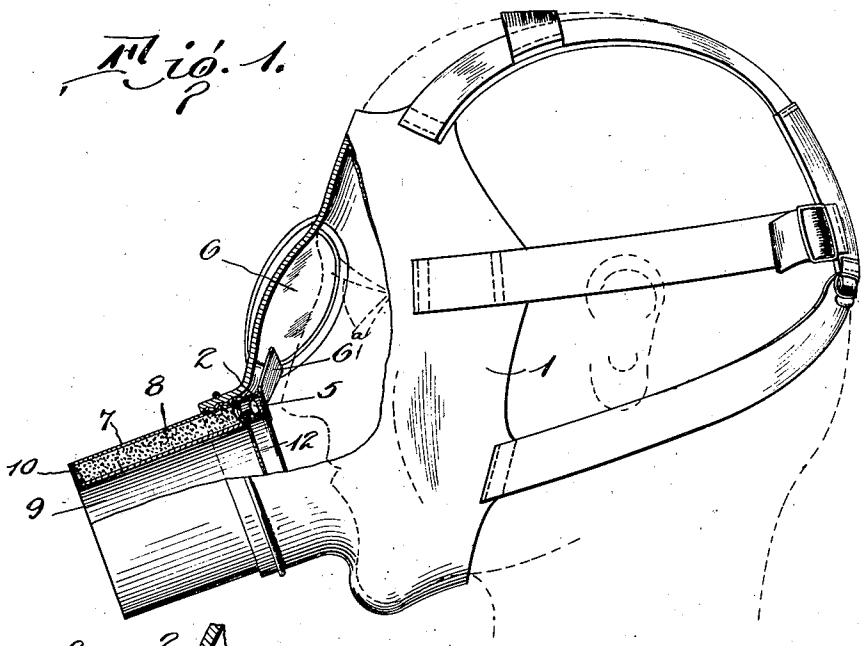
Oct. 1, 1929. L. M. McBRIDE 1,730,227

GAS MASK

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Fig. 1.



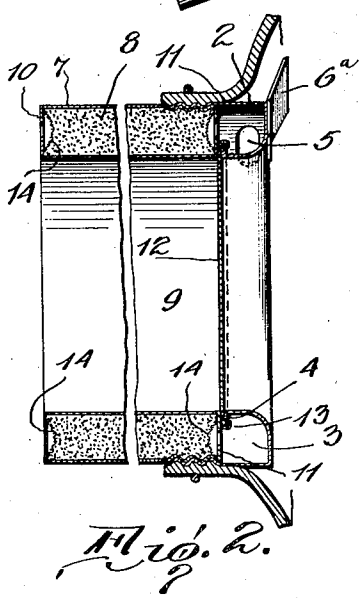


Fig. 2.

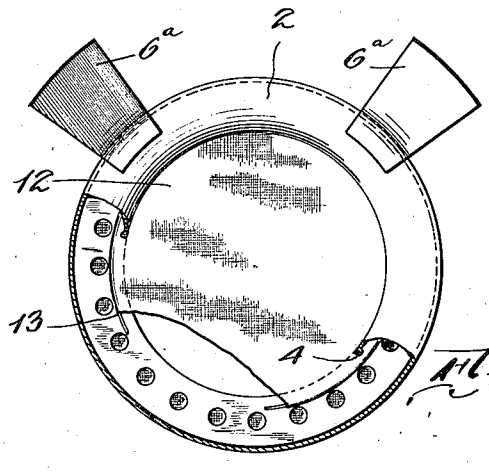


Fig. 3.

Inventor

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Fig. 4.

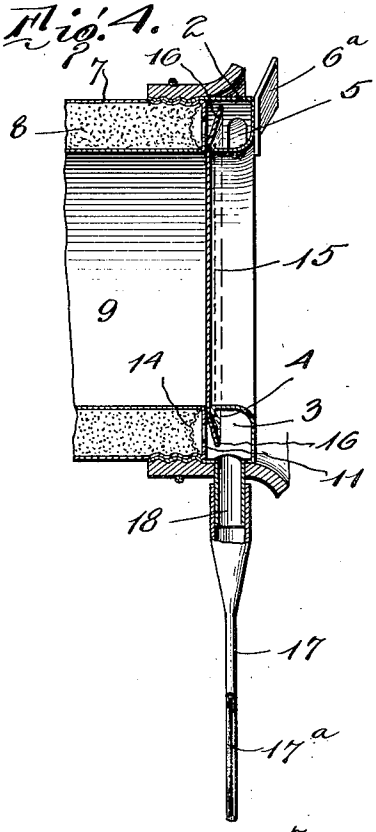


Fig. 5.

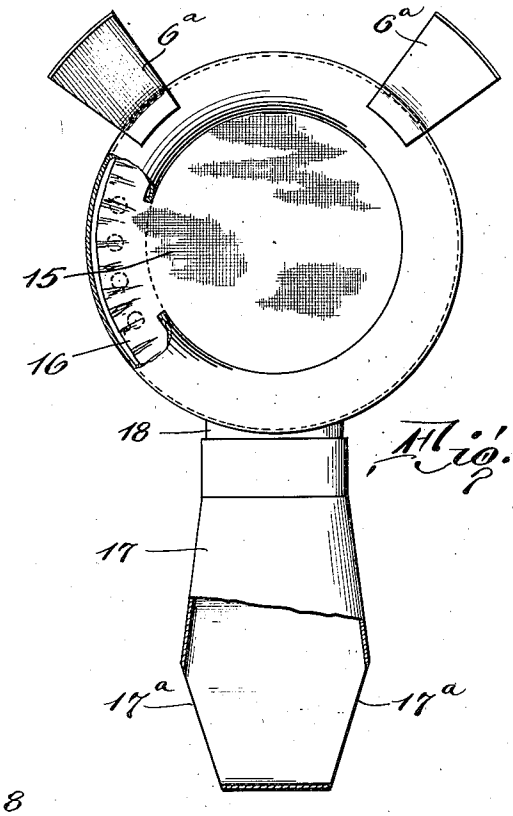


Fig. 6.

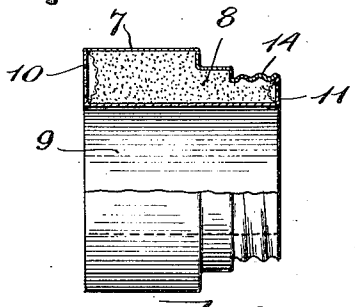


Fig. 8.

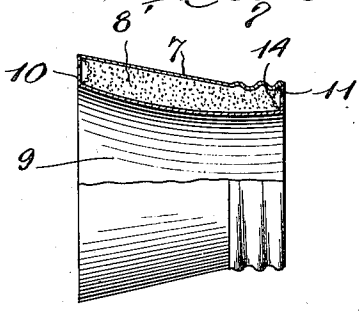
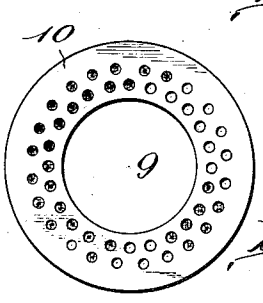


Fig. 7.



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GAS MASK

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Fig. 9.

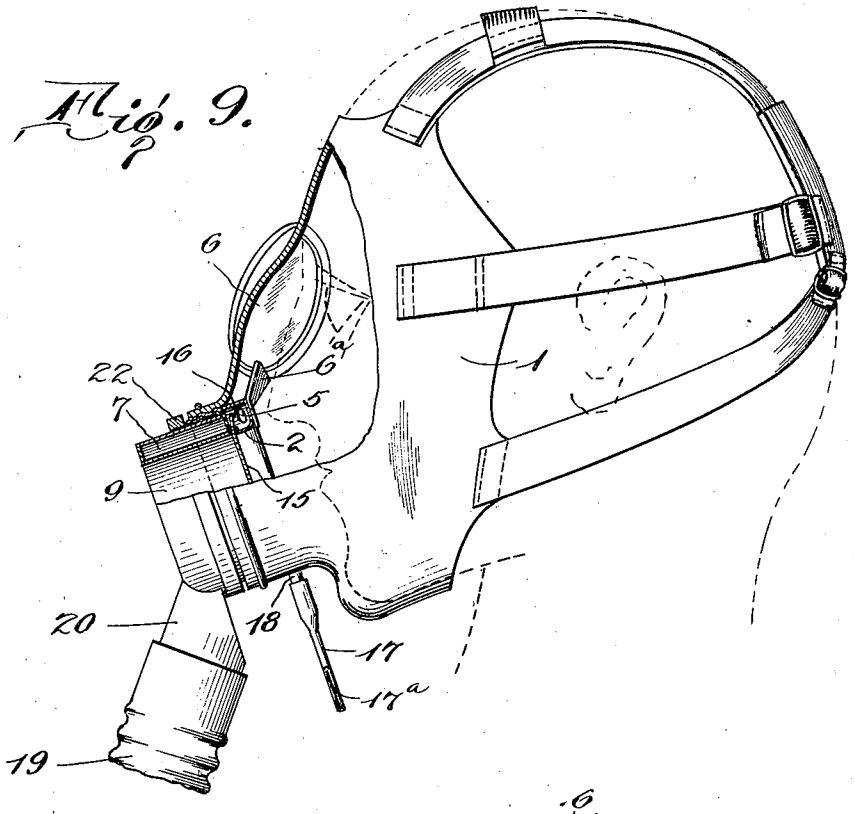


Fig. 11.

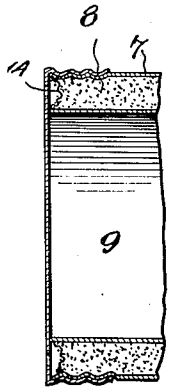
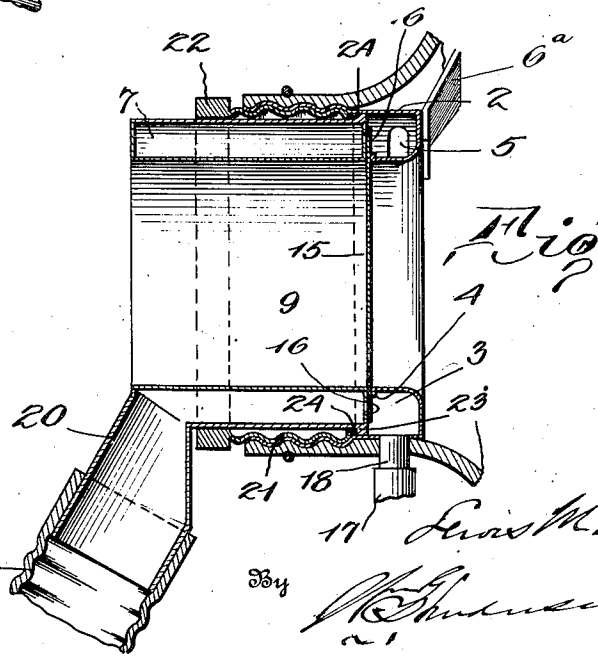


Fig. 10.



Inventor

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By

Attorney

Patented Oct. 1, 1929 1,730,227

UNITED STATES PATENT OFFICE

LEWIS M. McBRIDE, OF WASHINGTON, DISTRICT OF COLUMBIA

GAS MASK

Application filed March 31, 1923. Serial No. 628,990.

My invention relates to gas masks. It has for its objects to construct a mask having means for transmission of speech of the wearer through the canister together with means for respiration of air through a chemical purifying substance; also wherein the canister may be readily removed from the face-piece and replaced by another; also wherein the canister may be readily refilled with the air purifying agent thereby permitting the ready renewal of the chemicals; also wherein is provided a self-contained speaking gas mask of minimum size and weight, whether with or without valves, thereby eliminating the usual canister carrying case and appended breathing tube; also wherein is provided a canister having no interior contained valves or parts subject to deterioration other than the chemical ingredients; also wherein inhalations may be through the canister and exhalations through a valve outlet without passing through the canister; also wherein the mask may be readily transformed from a self contained type to the usual breathing tube type, and vice versa, without alteration in the face-piece of the mask; also wherein the inflowing purified air from the canister into the face-piece is deflected in the direction of the eye-pieces or lenses.

To the accomplishment of the foregoing and such other objects as may hereinafter appear the invention consists in the features hereinafter particularly described and then sought to be clearly defined by the claims, reference being had to the accompanying drawings forming a part hereof, and in which

Figure 1 is a perspective view of the mask face-piece, with portions broken away, and embodying features of the invention;

Figure 2 is a vertical section through the canister and part of the face-piece, on an enlarged scale, with portions broken away;

Figure 3 is an end view of the canister receiver of the face-piece and diaphragm seat and chamber, with portions of the chamber wall and diaphragm broken away;

Figure 4 is a vertical section through a portion of the canister and canister-receiver and face-piece, illustrating the diaphragm of a form to prevent exhalations through the canister and having a flutter valve for the exhalations;

Figure 5 is an end view of Figure 4, with a portion of the wall of the valve chamber and seat broken away;

Figure 6 is a vertical section through a canister of varying cross diameters, or step-down formation;

Figure 7 is an end view of Figure 6;

Figure 8 is a vertical section through a canister of bell-shape or flaring type;

Figure 9 is a perspective of a face-piece of a modified form of mask for connection with a canister of ordinary type;

Figure 10 is a vertical section through the speaking tube of the mask illustrated in Figure 9, with means for attachment to the diaphragm air chamber of the mask;

Figure 11 is a view showing one end of the respirator shell provided with a detachable screw cap.

In the drawings the numeral 1 designates a mask face-piece which may be of any approved type or form of construction. The face-piece has attached in any suitable manner a threaded annular metal ring 2 placed opposite to the position of the mouth of the wearer. This ring is formed with an interior annular chamber 3 to receive air passing from a canister hereinafter described, and a seat 4 for a diaphragm hereinafter specified, and the wall of chamber 3 is formed with openings 5 disposed preferably adjacent to the eye-pieces or lenses 6 of the face-piece and from the chamber extend deflectors 6^a for directing towards the lenses air which flows from the chamber into the face-piece of the mask for the purpose of keeping the lenses cool and clear. The threaded ring 2 serves to support from the face-piece what for convenience I will designate a combined respirator and speaking tube. This comprises a double walled casing, preferably cylindrical in form, having an outer chamber 7 which may contain the chemical substance 8 designed to purify the air that is inhaled through the respirator, or canister, and an inner chamber or tube 9 which serves for the transmission of speech or voice waves. The outer end wall 10 and the inner end wall 11 of cham-

ber 8 will be formed with apertures or perforations for inhalation of air through the chemical in the chamber and the air entering through the inner end wall will discharge into the air chamber 3 and pass thence through openings 5 into the mask. At the inner end of the respirator, so as to cover the otherwise open end of the voice chamber or tube 9, there is placed a diaphragm 12 of suitable material impervious to gas but capable of vibration, to a greater or less extent, under the impulse of voice waves. This diaphragm is held in space against its seat 4 by pressure of the end wall of chamber 8 thereagainst when the respirator is positioned in the retaining ring 2 of the face-piece, and the peripheral edge of the diaphragm in some instances may be stiffened by an annular wire to form a bead 13; and the respirator may be held in the retaining ring of the face-piece by external threads on the respirator engaging the threads of the ring, as illustrated, or otherwise. It is preferred to place in each end of the chemical holding chamber 8 of the respirator fine mesh screens 14 of suitable material to prevent escape or leakage of the chemical substance if it be of a fine granulated or pulverulent character. The respirator may be of the form illustrated in Figures 2, 6, or 8 as desired; the form shown in Figure 6 having different diameters, or stepped down, and that shown in Figure 8 being bell-shaped or flaring in formation so as to increase the volume or clearness of the voice waves emitted through the speaking tube. In the form illustrated in Figures 1 to 3 the inhalations as well as the exhalations are through the chemical containing chamber 8. In Figures 4 and 5 I have illustrated a variation in which the inhalations are through the chemical containing chamber 8 but the exhalations are from the chamber 3 through what I term a flutter-valve, that is, a valve that opens sufficiently under the pressure of exhalations and immediately closes or collapses under inhalations so as to prevent gases entering the air chamber 3 and from thence into the mask. This is effected by using a gas impervious diaphragm 15 of larger diameter than the previously described diaphragm so that the portion of the diaphragm which extends beyond its seat will constitute a flap-valve 16 which will overlie the openings in the adjacent end of the chemical containing chamber 8 so as to uncover the openings in inhaling through the chemical chamber as indicated in Figure 4 and close said openings in exhaling. In this case exhalations will be from chamber 3 through the flutter-valve 17 which will be of rubber or equivalent material, preferably of the form illustrated, with its edges slitted, for instance as indicated at 17^a, and which will communicate through a tube or nipple 18, or otherwise, with the chamber 3. It will be observed that while this flutter-valve is in communication with the chamber 3 it is entirely outside thereof and also outside of the mask so that voice transmission will not be impaired by disturbances created by presence of the valve within the face-piece or mask. Being entirely outside of the mask it will not cause such disturbing influences.

In Figures 9 and 10, I have illustrated a mask containing some of the features of my invention with a modification adapting the features to be used in connection with a gas canister of ordinary construction. In this form the air purifying chemical is omitted from the respirator and the latter will be connected by a flexible tube 19 with a chemical containing canister of ordinary construction adapted as usual to be attached to the body of the wearer. In this instance the respirator will have the voice or speaking tube 9 and the gas impervious diaphragm 15 and flutter-valve 17 as described for the form illustrated in Figures 4 and 5, and the chamber 7 instead of containing a chemical will be made to communicate with a gas canister of ordinary construction through a nipple 20 leading from the chamber 7 and the flexible conducting or breathing tube 19, the outer end of the chamber being closed except for the nipple 20 opening into the chamber. The respirator will be coupled to the respirator retaining ring 2 of the mask by a loose-fitting threaded ring 21 engaging the threads of the ring 2 and provided with a knurled flange or collar 22 for its manipulation, the other end of the loose-fitting ring having a bearing against a circular boss or shoulder 23 formed on the end of the respirator shell, with a suitable packing 24 interposed between the end of the ring and shoulder to form a packed joint at that point, if desired. This loose-fitting coupling ring enables the respirator shell to be coupled to the respirator retaining ring of the face-piece of the mask without turning the respirator shell and consequently prevents twisting of the connecting or breathing tube which leads from the canister. In this form the respirations are through the breathing tube leading from the ordinary canister and through the chamber 7 of the respirator and the chamber 3 into the mask, while the exhalations are through the chamber 3 and the flutter-valve 17 as described for the form illustrated in Figures 4 and 5. Otherwise than as specified the construction and operation is the same as described for Figures 4 and 5.

To provide for ready renewal of the chemical in chamber 7 one end of the respirator shell may be formed with a separable screw cap 25, as shown in Figure 11.

Some of the advantages resulting from this invention are a gas mask containing a speaking tube or voice transmitter that enables the wearer to verbally or telephonically communicate with others; the elimination of internally contained valves in a mask which

are subject to deterioration, or disturbing influences within the mask or canister; a respirator which may be readily removed and replaced by another if containing chemicals for purification of air; a respirator which can be readily renewed with the chemical substances for air purification; a self-contained speaking gas mask of minimum size and weight; and also the readiness with which the mask is convertible from the self contained type to the usual breathing tube type, or vice-versa, without alteration in the face-piece of the mask. The mask is particularly serviceable for use in industrial plants where it is essential that workmen be able to converse with one another or over the telephone, and also for use by firemen or policemen where the ability to communicate one with the other is most important.

I have described with particularity the preferred details of the several parts but it is to be understood that changes may be made therein and essential features of the invention retained.

Having described my invention and set forth its merits what I claim is:

1. A gas mask comprising a face-piece, a respirator embodying a chamber for passage of air to the interior of the face-piece and a chamber for voice transmission, encircled by the first mentioned chamber and a gas impervious diaphragm positioned to set-up voice vibrations in the voice transmission chamber and exclude the passage of air from said chamber to the interior of the face-piece.

2. A gas mask comprising a face-piece, a respirator embodying a chamber for voice transmission, a chamber for passage of air and a chamber at the end thereof and in communication therewith and with the interior of the face-piece and formed with a diaphragm seat, and a gas-impervious diaphragm positioned on said seat to set-up voice vibrations in the voice transmission chamber and exclude the passage of air from said chamber to the interior of the face-piece.

3. A gas mask comprising a face-piece, a respirator embodying a chamber for passage of air and a voice transmission chamber, a member attached to the face-piece and having an inwardly extending flange to form an air chamber between the member and flange in communication with the interior of the face-piece, and a diaphragm seated against said flange to exclude passage of air from the voice transmission chamber to interior of the face-piece, the air chamber of the respirator communicating with the air chamber formed by the flange.

4. A gas mask comprising a face-piece, a respirator embodying a chamber for passage of air and a voice transmission chamber, a member attached to the face-piece and having an inwardly extending flange to form an air chamber between the member and flange in communication with the interior of the face-piece and with the first mentioned air chamber, and a diaphragm seated against said flange to exclude passage of air from the voice transmission chamber to the interior of the face-piece, said diaphragm being extended beyond the voice transmission chamber to form a valve controlling the flow of air from the respirator into the interior of the face-piece.

5. A gas mask comprising a face-piece, a respirator embodying a chamber for the passage of air, and a voice transmission chamber, encircled by the first mentioned chamber, a diaphragm positioned to exclude air from the voice transmission chamber into the interior of the face-piece, and means for attachment of the respirator to the face-piece.

6. A gas mask comprising a face-piece, an open ended voice transmission chamber, a gas-impervious vibratory diaphragm positioned within said voice transmission chamber to set up sound vibrations therein and to exclude passage of gas to the interior of the face-piece, an air chamber for the passage of purified air positioned about and encircling said voice transmission chamber, an annular air chamber adjacent the inner end of said first mentioned air chamber and communicating therewith and having an opening in its upper part communicating with the interior of the face-piece.

In testimony whereof I affix my signature.

LEWIS M. McBRIDE.