April 27, 1943. J. A. HEIDBRINK 2,317,608

MASK

Filed Sept. 23, 1941 2 Sheets-Sheet 1

Fig-1

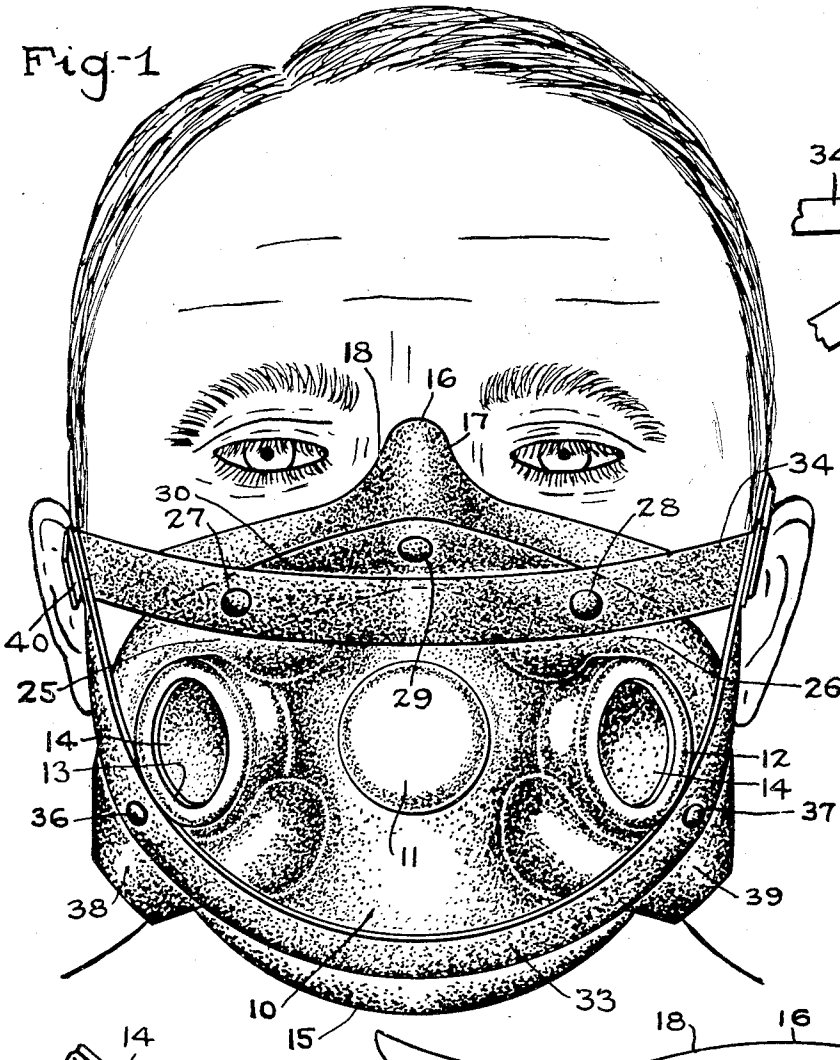
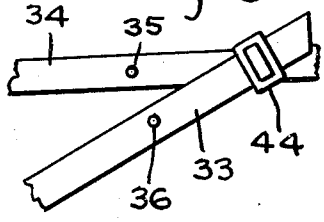



Fig-5



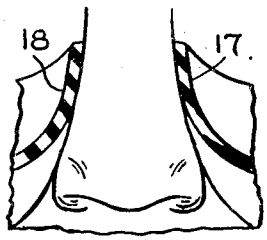
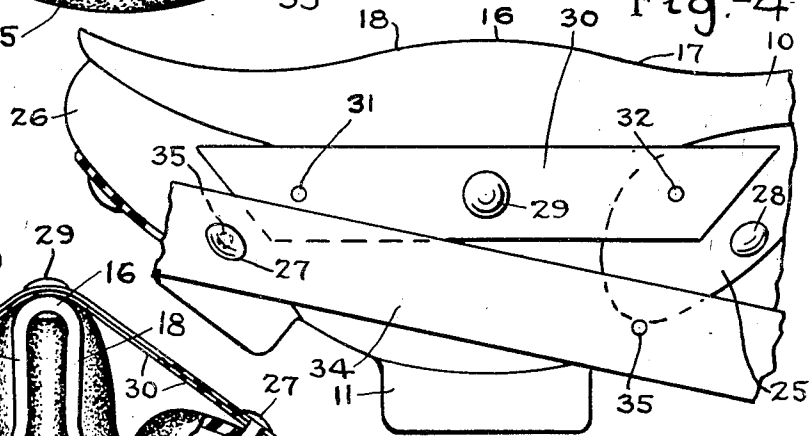




Fig-3

Fig-4



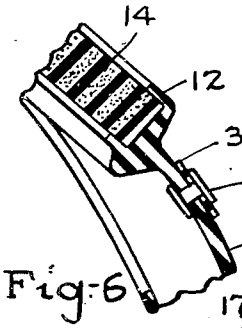




Fig-6

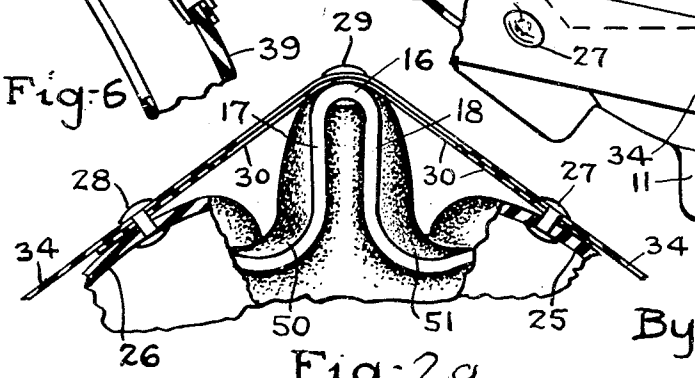



Fig-2a

Inventor
Jay A. Heidbrink
By A. C. Whiteley
Attorney

April 27, 1943. J. A. HEIDBRINK 2,317,608

MASK

Filed Sept. 23, 1941 2 Sheets-Sheet 2

Fig-7

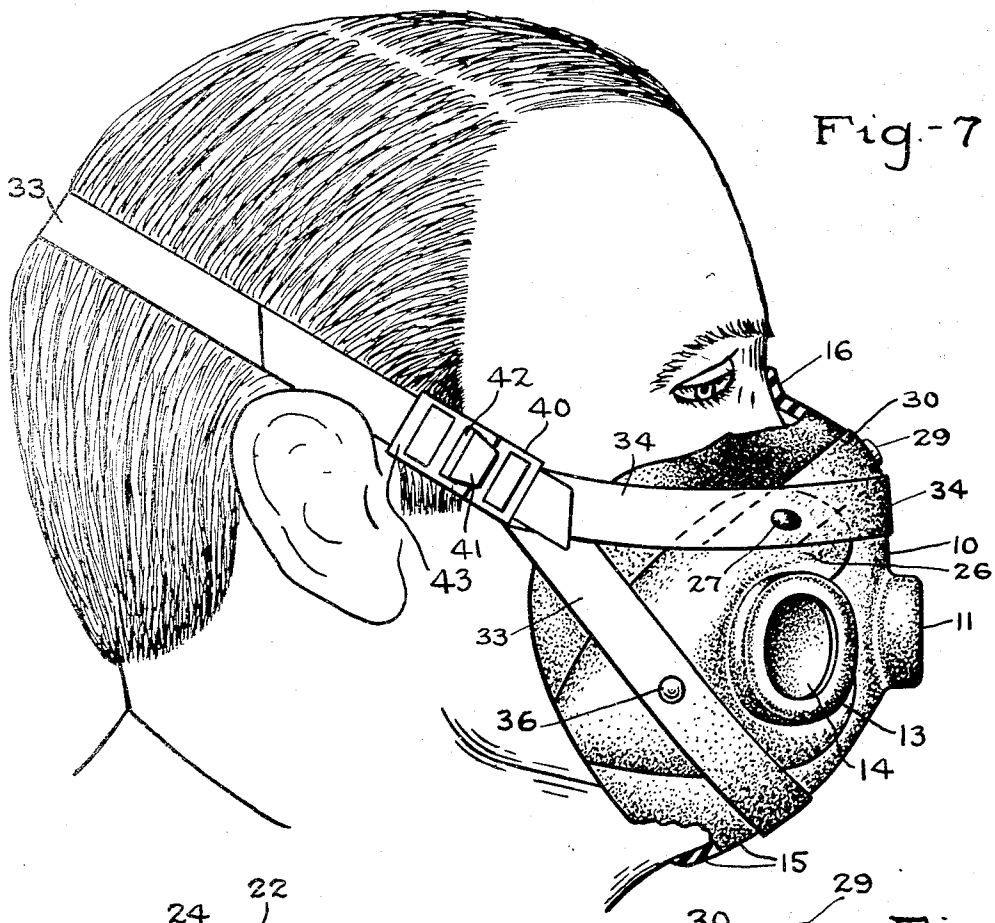



Fig-8

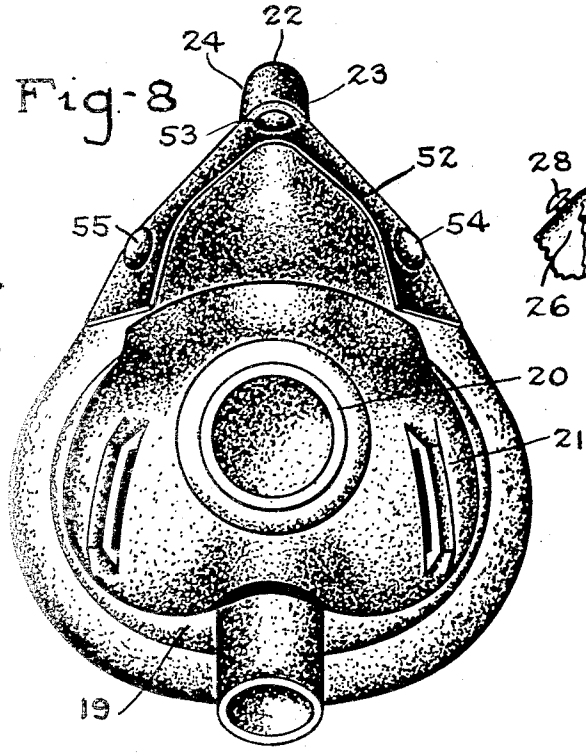
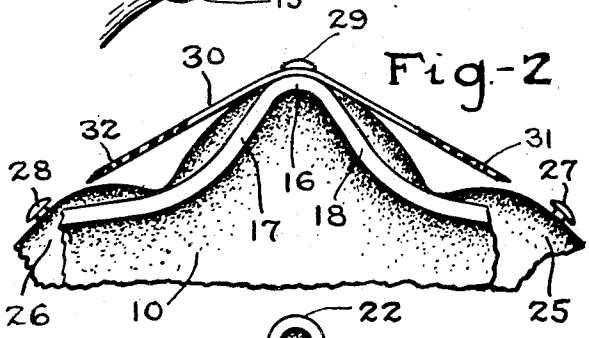



Fig-2



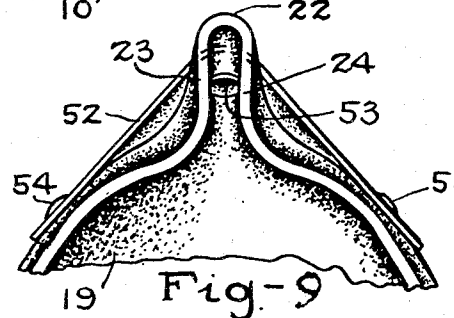




Fig-9

Inventor
Jay A. Heidbrink.
By A. C. Whiteley
Attorney.

Patented Apr. 27, 1943 2,317,608

# UNITED STATES PATENT OFFICE

2,317,608

## MASK

Jay A. Heidbrink, Minneapolis, Minn., assignor to Air Reduction Company, Incorporated, New York, N. Y., a corporation of New York

Application September 23, 1941, Serial No. 412,021

3 Claims. (Cl. 128—146)

My invention relates to masks and means for strapping them in position on the face and has for its object to provide holding means that will have a tendency to cause the portion of the mask which encloses the upper part of the nose to be drawn in against the sides of the nose and thereby to make a tight seal as well as to hold the mask in position on the face without employment of a saddle or other stiffening member.

In practice it has been found that owing to variations in the size and shape of the nose, complete sealing at the sides of the nose is difficult. Yet in masks of the type used in high aviation and also in connection with oxygen therapy it may be very desirable and in certain cases necessarily essential to have an absolutely tight seal. Attempts have been made to effect this seal by means of various metallic or other solid spring-like parts engaging the outside of the mask and engaging parts of it adjacent the sides of the nose-enclosing part thereof to take care of the tendency for the mask to spread at those points.

I have discovered that by attaching strap members, either elastic or non-elastic, to mask portions at either side of the nose-enclosing portions and to the top of the nose-enclosing portion with such attached portions slightly shortened over the normal distance between the points of attachment on the mask and then by means of straps around the back of the head and over the nose portion, the pull on the parts of the mask will be established such as to cause the sides of the nose-enclosing portion to draw in and make a sealing contact.

I have further discovered that by this strap arrangement at the upper part of the mask and a second strap going around or adjacent the chin or upper lip part of the mask I am able to hold the mask firmly in position so as to resist tendency of stripping it from the face, without the use of a stiff or solid saddle member.

It is a particular object of my invention therefore, to secure the means for strapping the mask upon the face so as to cause the tension of the straps when applied to the face of a wearer both to have the effect of bringing the sides of the nose receiving portion of the mask against the side of the nose and of holding the mask firmly in position without the use of a solid saddle member.

My invention is designed particularly to be employed in connection with the types of mask disclosed in application of Boothby and Bulbulian, Serial No. 388,482 and application of Boothby, Bulbulian and Lovelace, Serial No. 287,087, and is shown applied to masks of this type.

The full objects and advantages of my invention will appear in the description in the specification now to be given and the novel features of the construction by which the desired advantageous results are obtained will be particularly pointed out in the claims.

In the drawings illustrating an application of my invention in one form:

Fig. 1 is a front elevational part perspective view showing the mask in position upon the face of a wearer.

Fig. 2 is a part sectional view of the nose-enclosing portion of the mask viewed from the inside front showing the position of the parts, as to one side, when the tapes are not attached.

Fig. 2a is a similar view showing how the attachment of the tapes pulls the sides of the nose-enclosing portions together to produce more effective sealing along the sides of the nose.

Fig. 3 is a sectional view showing the parts adjacent the sides of the nose.

Fig. 4 is a partial elevation view from the front showing the position of the parts when the straps are unfastened.

Fig. 5 illustrates the manner of securing together the main straps for holding the mask in position.

Fig. 6 is a sectional detail view showing one of the buttons and straps in position.

Fig. 7 is a side part perspective view of the mask in position as worn.

Fig. 8 shows the invention applied to a different type of mask.

Fig. 9 is a view of the mask structure of Fig. 8 similar to Fig. 2 where the strap portions are formed integrally with the mask.

As illustrated, a mask of a type disclosed in the aforesaid application of Boothby and Bulbulian, comprises a main mask body 10 having a central microphone chamber 11 and laterally disposed valve turrets 12 and 13, in which any suitable valve mechanism may be seated such for example as the sponge rubber discs 14 exhibited in Fig. 6. In this construction a portion of the mask goes under the chin, as indicated at 15, Figs. 1 and 7. The microphone turret 11 is located at the center of the mask and above it a nose-engaging portion 16 which is provided with side portions 17 and 18 which should come in at the sides of the nose and engage those sides with sufficient tightness and pressure to insure complete sealing.

The form of mask shown in Fig. 8, as illustrated in the above designated application of Boothby, Bulbulian and Lovelace has a mask body 19 and a single central valve turret 20 and, as shown, is provided with a saddle member 21. This form of mask also has at its upper center a portion 22 which has side wall members 23 and 24, Fig. 9, adapted to engage and, when properly set, seal, the sides of the nose against passage of air inside the chamber. The primary part of my invention so far as it relates to the closing of the sides of the nose-engaging portion of the mask against the sides of the nose to make a good sealing contact applies to either of these forms of mask, or to any form of mask wherein such a sealing is requisite. This feature is well illustrated in Figs. 1, 2 and 4.

The mask body proper has portions 25 and 26 which rise above portions of the cheek forming part of the chamber enclosed by the mask, and upon these parts are secured double-headed button-like members 27 and 28. Also at the center laterally of the nose-enclosing portion and away from the top is a third button 29.

As the mask is formed it is difficult or impossible to so shape the nose-enclosing portion 16, 17 and 18 that it will fit accurately the sides of different types of noses unless the mask is made of very rigid material. When this is done and the mask is made to conform to the bony structure of an average man a fair fit may be obtained, but for the type of mask which goes over the whole face and under the chin the very fact that faces are of different widths makes it impossible, even when conformance to the bony structure has been attempted, to have a reasonably close fit, for, obviously, if the mask is made to adapt itself to a narrow face it will be distorted and tend to pull side walls 17, 18 apart on a wide face.

I have discovered, however, that by attaching a member such as the tape 30, preferably but not necessarily of elastic material, to the button 29 at the center, and making the holes 31 and 32 in said tape substantially less in distance from the center button 29 to the side buttons 27 and 28, to which last-named buttons tape 30 will be fastened through holes 31 and 32, a pull of the mask material is set up upon the portion 25 and 26 thereof which brings the side walls 17 and 18 of nose-engaging portion of the mask together as indicated in Fig. 2, to yieldingly clasp the wearer's nose, as indicated in Fig. 3.

This relation as to distance is well shown in Fig. 4. Since this is a direct frontal inverted view of the mask itself it does not fully disclose the nose-enclosing portion at 16, 17, 18. It does, however, accurately show, and is intended to show, the relation in distance between the central button 29 and the side buttons 27 and 28 when the tape 30 has not been secured to the buttons, as indicated in Fig. 2.

As there shown it becomes very clear that the distance between 29 and 31 is considerably less than the distance between 29 and 27, likewise the distance between 29 and 32 is considerably less than the distance between 29 and 28.

The securing strap 33 passing around the back of the head, as shown in Fig. 7, has a branch 34 which, as shown in Figs. 1, 4 and 7, passes across the front of the mask and over the nose-receiving portion thereof and is secured to the mask through openings 35 in said strap, cooperating with buttons 27 and 28. And Fig. 4 clearly shows that the distance between the openings 35 indicated in dotted lines under button 28 is greater than the distance between openings 31 and 32 of the tape member 30. The main body of fastening strap 33 engages the mask body over that portion which goes under the chin of the wearer as shown in Figs. 1 and 7, and is secured by means of buttons 36 and 37 to mask portions 38 and 39, and the branch strap 34 is secured to the main strap through a buckle arrangement 40 at one side, as indicated in Fig. 7. The member 40 terminates in a hook 41 which is adapted to pass through a keeper eye 42 in a buckle member 43 which receives and holds the other end of fastening strap 33. As shown in Fig. 5, the branch strap 30 is secured to main strap 33 by means of a buckle arrangement 44.

With the structure thus described, when the tape strap 30 is left free the mask body naturally spreads until it takes something like the position of Fig. 4 when the same is viewed directly toward the upper edge of the mask body. Viewed from the front it will take the position of Fig. 2. When, however, the openings 31 and 32 of strap 30 are applied to the buttons 27 and 28, the strap of course being already secured to button 29, it will have the effect of pulling in on portions 25 and 26 of the mask and that in turn will push down and in on portions indicated at 50 and 51 of Fig. 2*a* causing the sides 17 and 18 of the nose-receiving part of the mask to be drawn together, thus bringing those sides into close and sealing contact with the sides of the nose.

From the above arrangement it will be seen, as indicated in Figs. 1 and 7, that the mask body of the form of Fig. 1 is held upon the face by a single strap passing over the upper back of the head just above the ears, one part of the strap going over the high point of the nose-receiving part of the mask and the other strap going over the chin-contacting part. In order to accommodate this arrangement, in cooperation with the tape or strap 30, the distance between the two holes 35 on main strap member 34 adapted to be attached buttons 27 and 28 is somewhat greater than the distance between the holes 31 and 32 also adapted to be attached to said buttons. It follows that the tape 30 exercises the greater pull to hold the side walls of the nose-receiving portion together, as shown in Fig. 2, but the main strap 34 also aids in doing this in addition to its function of holding the mask on the face of the wearer.

The principle of my invention for holding the sides of the nose-receiving part of the mask together may be applied to other types of masks, such as that shown in Fig. 8, in which a special enclosing strip 52 may be secured to a central button 53 and to side buttons 54 and 55 and thereby draw together the sides of the nose-receiving portion of the mask there shown.

The advantages of my invention will be apparent from the above noted description. Although the arrangement is not complex and is easily understood after it has been done, it remedies a difficulty and defect in mask construction that has long been known and for which various types of unsuccessful efforts to remedy the same have been undertaken.

I claim:

1. In a mask structure comprising a body portion formed with margins shaped and positioned to contact the face of a wearer and provide a breathing chamber in said body portion, and having a part for receiving the nose of the wearer, an elongated member secured at its center to the

top center of said nose-receiving portion and secured at its ends to portions of the mask at points removed laterally from said central securing means, the extent of said member at each side of said center being less than the underlying distance along the mask surface, which elongated member thereby operates to pull the mask portions at the sides of the nose-receiving part thereof together so as to effect a sealing contact along the sides of the nose when the mask is worn.

2. In a mask structure comprising a body portion formed with margins shaped and positioned to contact the face of a wearer and provide a breathing chamber in said body portion, and having a part for receiving the nose of the wearer, an elongated member secured at its center the top center of said nose-receiving portion and secured at its ends to portions of the mask at points removed laterally from said central securing means, the extent of said member at each side of said center being less than the underlying distance along the mask surface, which elongated member thereby operates to pull the mask portions at the sides of the nose-receiving part thereof together so as to effect a sealing contact along the sides of the nose when the mask is worn, and strapping means for holding the mask upon the face secured to the mask at said lateral points and cooperating with the first named means to hold the mask in position with the sides of the nose in sealing engagement.

3. In a mask structure comprising a body portion formed with margins shaped and positioned to contact the face of a wearer and provide a breathing chamber in said body portion, and having a part for receiving the nose of the wearer, a button secured to the center of said nose-receiving portion and other buttons secured to portions of the mask at points removed laterally from said central button, a tape-like member having openings therein to secure the same to the said buttons, the distance between the central opening and the end openings of the member being less than the distance between the central button and the laterally-disposed buttons when the mask is in normal position, whereby the tape-like member when attached to the buttons will operate to pull the mask portions at the sides of the nose-receiving part thereof together so as to effect a sealing contact along the sides of the nose when the mask is worn.

JAY A. HEIDBRINK.