Dec. 9, 1952 R. A. GEORGE 2,620,794

RESPIRATOR

Filed Aug. 3, 1951

Fig. 1.

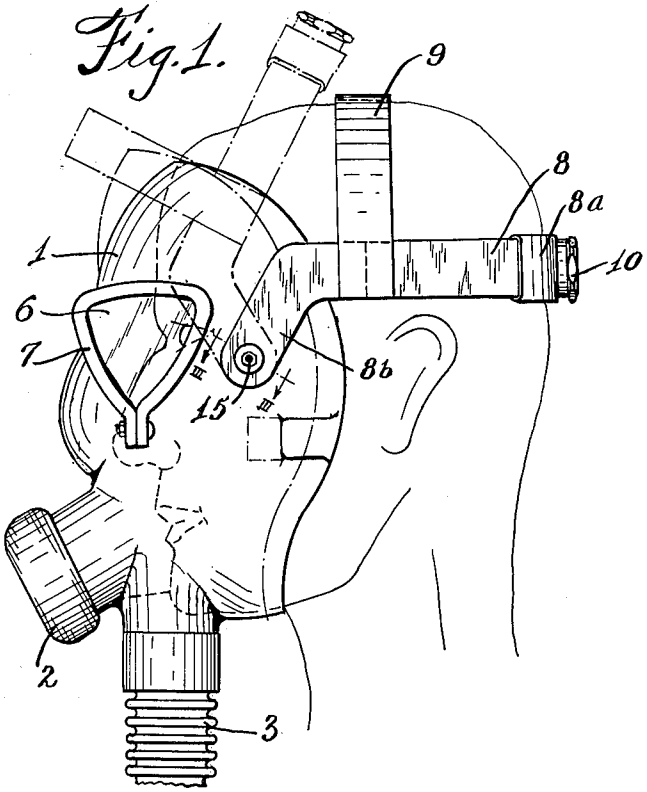


Fig. 3.

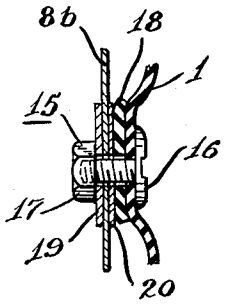


Fig. 4.

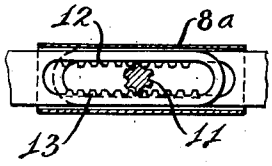


Fig. 2.

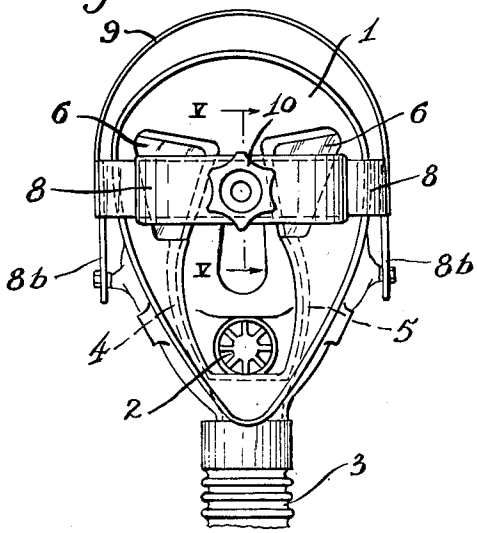
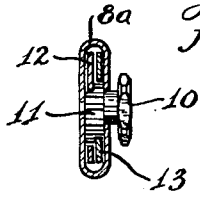


Fig. 5.



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RESPIRATOR

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4 Claims. (Cl. 128—141)

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The present invention relates generally to a respirator, and more particularly to means for mounting the face piece of a respirator on the face of the wearer, and has application to gas masks and similar apparatus.

A conventional type of respirator or gas mask is one having a face piece which is held against the face of the wearer by a plurality of adjustable straps. An outstanding disadvantage of such straps, the ends of which are secured to spaced peripheral portions of the face piece, is that a plurality of adjustments must be made in order to obtain a comfortable and air-tight fit between the face piece and the face of the wearer. Also an appreciable period of time is required for making the adjustments in the various straps which makes it unsuitable in emergency uses, such as in cases where one must quickly put on a respirator to protect himself against noxious gases. A further disadvantage in the case of oxygen masks as used by aviators is that this plurality of adjusting straps requires the use of both hands of the wearer which in certain situations are not freely available such as when a pilot is operating the controls of the plane with one hand.

An object of the present invention is to provide a novel respirator which is devoid of the above mentioned disadvantages of types commonly used.

A more specific object of the invention is to provide in a respirator, a novel pivotally mounted headgear which is easily and quickly clamped on the head of the wearer and which requires the use of only one hand for adjusting the face piece in air-tight relationship with the face of the wearer.

A still more specific object of the invention is to provide a respirator having a headgear of such construction and mounted on a molded rubber face piece in such a way as to insure an air-tight seal of the marginal edge portion of the face piece about the chin, cheeks and forehead of the wearer, which air-tight seal is obtained by the simple expedient of pivotally moving the headgear relative to the face piece on which it is pivotally mounted and then adjusting the girth of an element of the headgear.

Other objects and advantages of the invention will become more apparent from the following description taken with the accompanying drawing wherein:

Figure 1 is a side view of a respirator involving the principles of the present invention and wherein the respirator is shown in the mounted position on the face of the wearer;

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Figure 2 is a front elevation view of the respirator shown in Figure 1;

Figure 3 is an enlarged cross-sectional view of the pivot assembly taken along line 3—3 of Figure 1;

Figure 4 is an enlarged longitudinal cross-sectional view taken through the head piece adjusting means shown in Figure 1 and,

Figure 5 is a cross-sectional view taken along 5—5 of Figure 2.

Referring more particularly to Figures 1 and 2, numeral 1 denotes a face piece of flexible material, preferably molded rubber or rubber-like substance, and having a marginal edge portion or perimeter which is adapted to fit against the chin, cheeks and forehead of the wearer. The face piece is provided with an exhalation valve 2 in the form of wheel-like rubber element, to the hub portion of which is secured the center of a flexible rubber diaphragm, the circumferential portion of which will flex outwardly and allow exhaled air to pass outwardly of the face piece but which when drawn inwardly by inspiration of the wearer will close the holes formed between the spaces of the wheel-like element. Fastened to face piece 1 is an inhalator tube 3 preferably of flexible tubing which leads filtered air, such as from a filter unit or chemical cartridge or perhaps oxygen from a suitable oxygen tank (not shown). The upper end of tubing 3 leads to a pair of air passages 4 and 5 which are integrally molded in the face piece and having outlets immediately below the bottom edges of the eye pieces 6. Such eye pieces 6 may be made of plastic material or glass and may be firmly clamped on the face piece 1 by means of clamping frames 7.

An important feature of the invention is the construction and method of connection of the head piece to the face piece. The head piece comprises a headband element 8 preferably made of stiff sheet material, such as fibre, adapted to extend about the back of the head of the wearer and having an integrally secured crown element 9 disposed at right angles to element 8 and which is adapted to encircle the top of the head.

An adjusting knob 10 is provided for turning a pinion 11 which is engageable with the teeth in an upper rack 12 and a lower rack 13 secured to overlapping portions of headband element 8 so that by turning the knob 10 in one direction the overlapping strip portions of head piece element 8 will move relatively in one direction, to decrease the girth or circumference of the head piece element 8, and when turned in the oppo-

site direction, will cause relative movement in an opposite direction to increase the circumference of the head piece element 8. Encircling the hub or adjusting knob 10 and the rack elements is a flattened tubular element 8a forming a cover for the pinions and racks.

The forward end portions of head piece element 8 preferably extend forwardly and downwardly at an angle and their extremities are pivotally connected by pivots 15 to the face piece 1. Thus, when it is desired to mount the mask on the face of the wearer, the headgear is pivotally moved from the position shown in dot-and-dash lines to the full line position. The forwardly and downwardly inclined disposition of the end portions of head piece element 8 is quite important not only for providing suitable clearance for the ears of the wearer but for obtaining a vertical component of force on the face piece as the head piece is moved from the dot-and-dash line to the full line position. More specifically, if such downward extensions were not provided, then as adjusting knob 10 is turned to tighten the head piece element 8 about the head of the wearer only a horizontal force would be applied to the face piece to urge it against the face of the wearer without an upward force to insure an air-tight fit between the chin portion of the face piece and the chin of the wearer. Thus, it will be seen that by virtue of the forwardly and downwardly extending end portions of head piece element 8 there is provided an upward component of force to firmly hold the chin portion of the face piece against the chin of the wearer as well as a horizontal component of force to insure an air-tight fit of the marginal portions of the face piece which engage the cheek and forehead of the wearer.

The headgear is pivotally mounted to the face piece by means of a pivot assembly more clearly shown in Figure 3 and comprising a bolt 16 the bottom surface of the head of which engages a marginal portion surrounding a hole formed in face piece 1 and a nut 17. A rubber washer 18 is provided as well as washers 19 and 20, preferably of fibre. Thus it will be seen that by suitable tightening up of nut 17 any selective amount of frictional grip can be secured, to offer resistance against pivotal movement of the headgear with respect to the face piece, and so that after the pivotal movement has been completed the headgear will remain in a fixed position with respect to the face piece rather than be freely swingable relatively thereto. Of course, other well-known pivotal assemblies may be substituted for obtaining this same result.

In operation, for example when the respirator is used by an aviator as an oxygen mask in which case tube 3 is connected to a suitable oxygen tank (not shown), when the aviator wishes to mount the respirator, he grasps face piece 1 with one hand placing it against his face, then he slides the same hand upwardly over the face piece grasping the head piece when in the dot-and-dash position, and pivotally moves it to the full line position at which time he continues the sliding movement of the same hand until it reaches adjusting knob 10. Finally he turns knob 10 so as to decrease the girth or tighten head piece element 8 about the rear part of the head and in so doing exerts a pulling force horizontally as well as upwardly on the face piece so as to clamp it in air-tight relationship to the chin, cheek and head of the wearer.

It will be apparent, of course, that other forms of face pieces may be used still retaining the benefits the novel headgear pivotal mounting and constructional details disclosed herein.

Thus, it will be seen that I have provided a respirator which is highly efficient in operation, which is of relatively simple construction and which can be very quickly mounted merely by the use of one hand so as to free the other hand of the wearer for other uses such as piloting an airplane; also I have provided a novel headgear construction which is pivotally secured to a face piece so that by a simple pivotal movement the necessary clamping may be secured between the face piece and the face of the wearer and so that upon tightening of the headgear there will be insured an air-tight seal about the chin, cheek and forehead of the wearer.

While I have illustrated and described a specific embodiment of my invention, it will be understood that this is by way of illustration only, and that various changes and modifications may be made within the contemplation of my invention and within the scope of the following claims.

I claim:

1. In combination, a face piece of rubber-like material having a perimetrical edge portion adapted to fit about the chin, cheek and forehead of the wearer, and a headgear having rigid forwardly projecting end portions pivotally mounted on said face piece and adapted, when pivotally moved to encircle the head of the wearer, to clamp the face piece against the face of the wearer.

2. A respirator comprising, in combination, a face piece of rubber-like material having a marginal portion adapted to fit about the chin, cheek and forehead of the wearer, and a headband having end portions pivotally mounted on said face piece and including adjusting means mounted on the headband for adjusting its girth, said end portions of the headband extending angularly downwardly from a horizontally extending portion when the headband is in position about the head of the wearer so that upon decreasing the perimeter of said headband by said adjusting means the marginal portion of said face piece will become tightly clamped against the chin, cheeks and forehead of the wearer in an air-tight manner.

3. A respirator comprising, in combination, a molded rubber face piece having a marginal portion extending about its entire perimeter and adapted to fit against the chin, cheeks and forehead of the wearer, and including an exhalation valve and a flexible inhalation tubing, and a headgear of relatively stiff strip material comprising a crown portion and an integrally connected portion at right angles thereto including a girth adjusting means, said last named portion adapted to extend horizontally around the back of the head of the wearer and including integrally forward end portions extending downwardly and forwardly at an angle, and pivotal means for pivotally connecting the extremities of said forward end portions to opposite portions of said face piece adjacent the cheek portions of the face piece, said pivotal means including a bolt and nut adapted to be tightened to provide an adjustable frictional fit so that the headgear will be frictionally and yieldably held at any desired position with respect to the face piece, whereby upon tightening of the headgear by said girth adjusting means, said forward end portions thereof will exert a vertical component of force

to assure an air-tight fit about the chin of the wearer as well as the cheeks and forehead.

4. A respirator comprising, in combination, a face piece having a marginal portion adapted to fit on the face to enclose the mouth and nose of the wearer, and a headgear having a rigid, inverted U-shaped strap adapted to extend vertically over the crown of the head and a U-shaped strap adapted to extend horizontally about the back of the head, the latter strap having adjusting means for adjusting the girth thereof and having integral and rigid forwardly extending end portions pivotally mounted on opposite sides of said face piece so that said marginal portion of the face piece will become tightly clamped upon the face of the wearer in an air-tight manner when said headgear is pivotally moved onto the head.

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