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3,013,556

HEAD STRAP FOR RESPIRATORY MASKS

Filed April 7, 1959

2 Sheets-Sheet 1

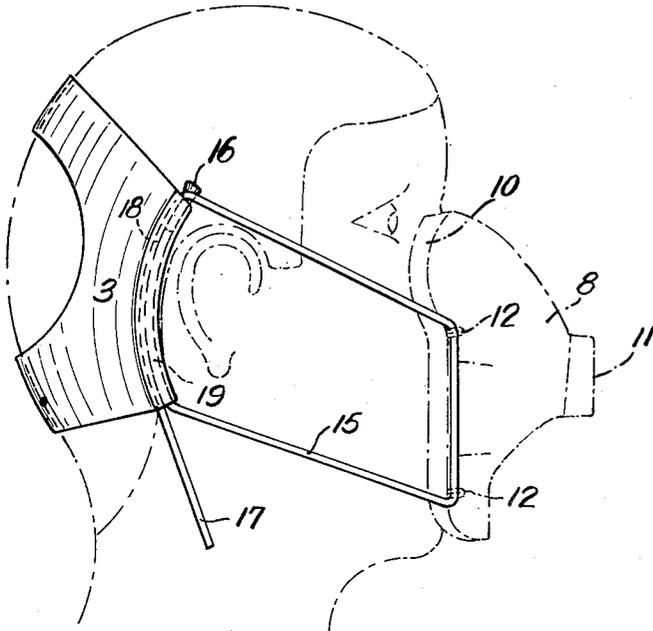


FIG. 1

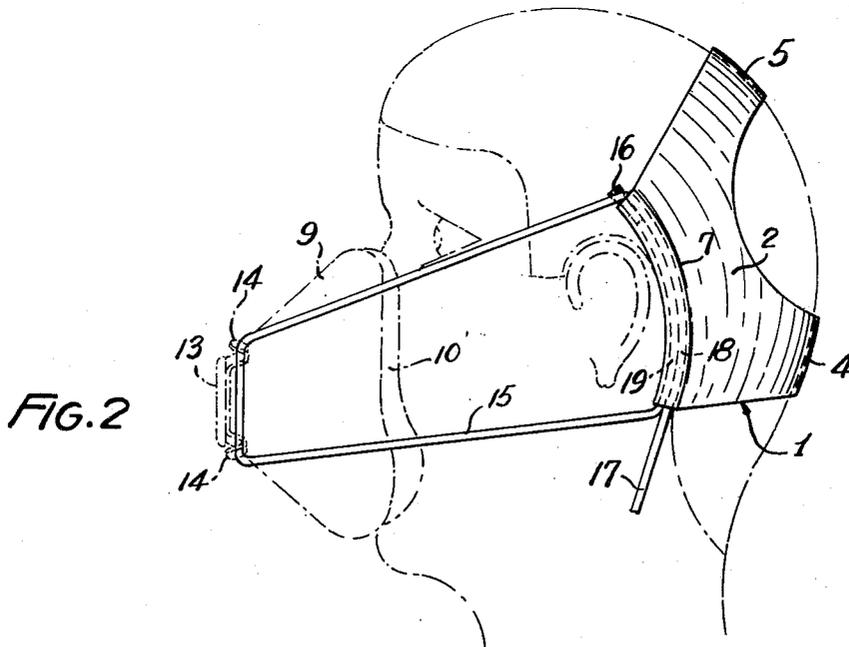


FIG. 2

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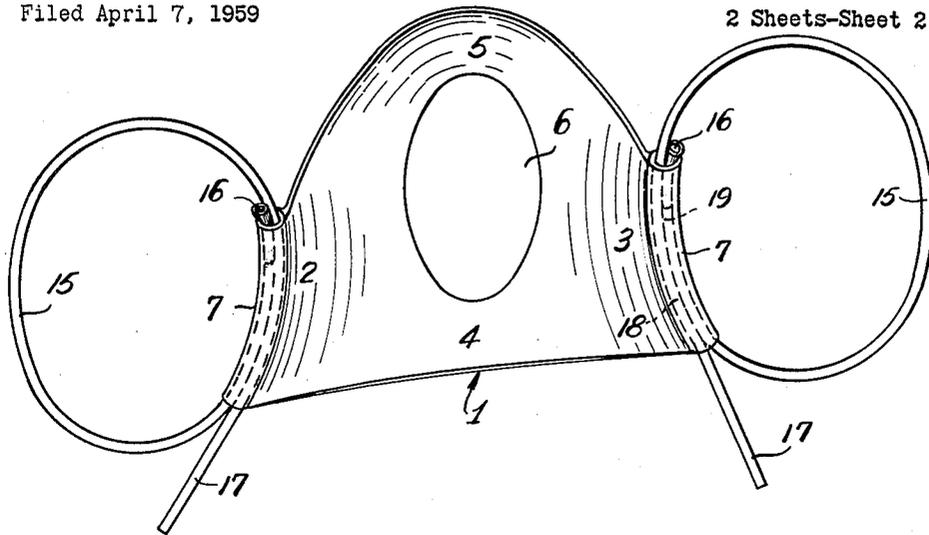


FIG. 3

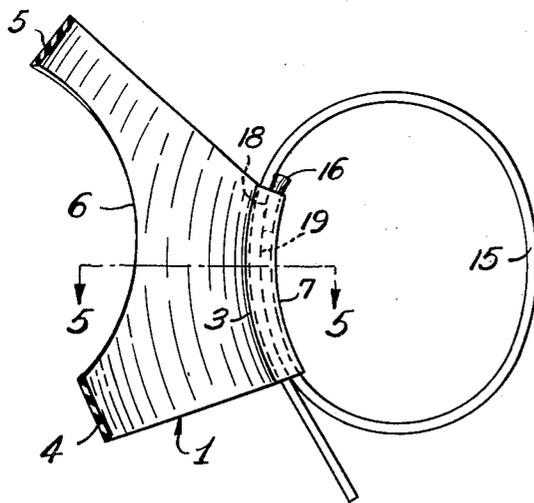


FIG. 4



FIG. 5

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3,013,556

HEAD STRAP FOR RESPIRATORY MASKS

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This invention relates to head straps for respiratory masks and more particularly to an improved head strap construction having means for adjusting tension in applying the mask to the face of a patient.

Heretofore, the use of head straps or harnesses for adjusting and holding respiratory masks in proper place on a patient's face left much to be desired because in such constructions embodying a harness frame adapted to be placed around the back of the patient's head, and having forwardly extending perforated straps or legs to be attached to prongs on the mask, it was extremely difficult to change the face piece while the patient was under anesthesia since it was cumbersome to get the straps back onto the prongs after they were once taken off.

Another undesirable feature was that the ends of the straps extending forwardly of the points where they were attached to the mask prongs would project onto the front and top of the mask at a point where the inhaler casting enters the mask and these loose and floppy ends of the straps would at times interfere with the proper use of the mask.

The present invention is an improvement in head straps or the like for holding and adjusting a mask to a patient's face.

An object of this invention is to provide means for attaching and holding a mask in proper position upon the face of the patient which means may consist of a harness placed around the back of the patient's head and elastic members detachably connecting the harness with the mask wherein such means may easily be attached and removed with respect to the mask.

A further object of the invention is a device of the kind described provided with adjustable elastic means connecting the head strap with the mask whereby the mask may be comfortably placed and retained in a desired adjusted position on the patient's face.

A further object of the invention is to provide means of the type disclosed which can quickly be detached from the mask so that the mask can be removed immediately from the patient's face without discomfort to the patient.

Another important object of the invention is to provide such means which may readily and quickly be removed from the mask by one hand and conversely which may easily be applied to the mask in the same manner.

Other objects and advantages of this invention will become more apparent as the following description of an embodiment thereof progresses, reference being made to the accompanying drawing in which like reference characters are employed to designate like parts throughout the same.

In the drawings:

FIGURE 1 is a side view of a head strap and tensioning means embodying my invention shown applied in use on a patient's head and shown applied to one type of respiratory mask which is provided with a plurality of hooks around the marginal face contacting portion;

FIGURE 2 is a similar view of the device applied in use on a mask and having a retainer ring provided with hooks which is carried in the forward portion of the mask and about the inlet opening of the mask;

FIGURE 3 is a front view of a device embodying my invention showing the looped elastic members which are adapted to be attached to the mask when the device is put into use;

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FIGURE 4 is a side view of one side of the device; and FIGURE 5 is a detail sectional view taken on line 5-5 of FIGURE 4 showing how the elastic members are each retained in a conduit in the body of the head strap.

In carrying out my invention, one form of which is illustrated in the accompanying drawings, I provide a head strap, indicated generally at 1, comprising side portions 2 and 3, a bottom portion 4 and a top portion 5. An opening 6 is formed in the body of the head strap to receive a portion of the back of the patient's head and is substantially centrally disposed thereof and preferably is elliptical in shape, the longest axis extending vertically of the body.

It will be seen that by this construction, shown as applied to a patient's head in FIGS. 1 and 2, the extended sides 2 and 3 will lie in a direction from the back of the head toward the ears of the patient. The body 1 is preferably formed of a flexible material, such as rubber, latex, fabric or the like, and may have a limited degree of resiliency in all directions, as desired. The body 1 may be formed to assume a set shape, that is, it may have a natural concavity as indicated in FIGURE 3, which will facilitate the comfortable fitting of the device around the back of the patient's head and particularly so when a forward tension is placed upon the head strap, as in applying the same to an anesthesia mask or the like in use on a patient's face.

The side extensions 2 and 3 each terminate in a substantially vertically arranged arched tube 7 open at each end thereof. When the head strap body is constructed of rubber or latex, the tube 7 may also be made of the same material and may be formed as an integral part of the head strap or may be attached thereto by vulcanizing or by dipping.

The tubes 7 are secured in place on the head strap at its opposite sides 2 and 3 along an arc in which the concave side is toward the front of the patient's face when the device is in use.

In further carrying out this invention, I provide means whereby the body of the head strap may be connected under adjustable tension with an anesthesia or inhaler mask, such as is indicated at 8 in FIGURE 1 and at 9 in FIGURE 2. In FIGURE 1, the type of mask shown is similar in construction to that shown in my Patent No. 2,875,757, issued March 3, 1959, and in which the marginal portion of the mask in sealing contact with the frontal contour of a patient's face is cushioned by suitable means, as at 10, the gas intake coupling member being shown at 11, while around the periphery of the mask are a plurality of hooks or prongs 12 which preferably are of metal and may form part of a stiffening member embedded in and extending substantially around the marginal front portion of the mask 8. The prongs 12 project outwardly and forwardly of the mask, as indicated in FIGURE 1, and are adapted to removably receive a tensioning member 15 connecting the mask to each side of the head strap body, as will be described more fully hereinafter.

In FIGURE 2, the type of mask shown at 9 is similar in construction to that shown in FIGURE 1 wherein a marginal cushion 10' is carried by the mask and is adapted to engage the frontal contours of the patient's face in sealing relation thereto. In this type of mask, the same is provided with a fitting or ferrule 13 which fits over a circular boss defining the intake opening to the interior of the mask. This ferrule or ring is provided with a plurality of spaced apart hooks or prongs 14 projecting forwardly of the mask and which are adapted to removably receive a tensioning member 15 connecting each side of the body of the head strap with the mask.

Referring now more particularly to FIGURES 3, 4 and 5, it will be seen that the tubes 7 at the extended ends

2 and 3 of the head strap 1 are open at each end and are each adapted to receive a length of resilient tubing or tensioning member 15, preferably rubber or latex, indicated at 15, one end of which is enlarged or plugged at 16, and the other end 17 is free. These tensioning members 15 are threaded through the respective tubes 7 in each side of the head strap so that their enlarged or plugged ends 16 are disposed at the top of the tube 7, each member 15 passing downwardly from the plugged end 16 through the tube 7 and outwardly in the form of a loop 15. The other end of the member 15 is also threaded through the tube 7, entering at the top of the tube and being in frictional contact with the other portion of the member 15 within the tube 7, the intermediate portion forming a loop and terminating in a free end 17 projecting downwardly and forwardly of the head strap. The free end 17 provides a grip or means by which the tension on the member 15 may be adjusted as desired when it is attached to a mask, as illustrated in FIGURES 1 and 2.

When the head strap is in place and is attached to a mask by passing the loops over the prongs 12 or 14, as the case may be, on each side of the mask, it will be seen that if the mask is not too tight in response to the tension applied by the stretched members 15, the same may be adjusted to a tighter fit by drawing the free ends 17 downwardly, thus decreasing the length of the member 15, placing it under more tension and thus increasing the pressure on the mask against the patient's face. It will be seen in this connection that the frictional contact of the portions 18 and 19 of the loops 15 with each other and the inner walls and confines of the tube 7, is sufficient to hold whatever tension is placed upon the stretched member 15 in adjusting the mask to a patient's face when the manual pull on the ends 17 is released. The plugged or enlarged end of each of the members 15 prevents that end of the tubing 15 from slipping through the tube 7.

With this construction, it will be seen that one of the important advantages resides in permitting the user to remove the mask from the patient's face by simply detaching one of the looped members 15 from the prongs of the mask with one hand and the head strap can be readily applied to adjust and hold the mask to a patient's face by slipping the loops 15 over the prongs of the mask, as indicated in the drawing.

Another important advantage of this invention is that the free ends 17 of the tensioning members 15 are disposed downwardly at the rear portion of the head of the patient and in such position do not interfere with the efficient use of the device, both in adjusting tension and in applying or removing the mask from a patient's face.

Various changes may be made in the details of construction and arrangement of parts of the invention without departing from the spirit thereof or the scope of the appended claims.

I claim:

1. A harness for positioning an inhaler mask on a patient's face, said harness including a body member comprising a sheet of flexible material to fit over the rear of the patient's head, said member having forwardly projecting portions on opposite sides thereof, a tube formed along each of said side portions for adjustably receiving and retaining therein an attaching loop, and a resilient attaching loop threaded through each of said tubes and adapted to releasably engage a peripheral portion of an inhaler mask, each of said loops being formed of a length of resilient material, one end portion of each length being threaded through the respective tubes in one direction and enlarged at its end to provide a plug or stop engageable with the adjacent end of the respective tube in which it is threaded, the other respective ends of the lengths of resilient material being threaded through

said tubes in an opposite direction and extending beyond said tubes to provide gripping means for adjusting the loops linearly to position a mask on the patient's face.

2. A harness for positioning an inhaler mask on a patient's face, said harness including a body member comprising a sheet of flexible material to fit over the rear of the patient's head, said member having forwardly projecting portions on opposite sides thereof, a tube formed along each of said side portions for adjustably receiving and retaining therein an attaching loop, and a resilient attaching loop threaded through each of said tubes and adapted to releasably engage a peripheral portion of an inhaler mask, each loop comprising a length of resilient tubing threaded at its end portions in opposite directions through the respective tubes in close frictional contact with each other and the inner walls of the tubes, and means anchoring one of the respective ends of the loop lengths in the tubes, the opposite ends of the respective loop lengths extending beyond the tubes and providing a hand grip whereby the loops may be adjusted to bring and retain a mask in a selected and comfortable position on the patient.

3. A harness for positioning an inhaler mask on a patient's face, said harness including a body member comprising a sheet of flexible material to fit over the rear of the patient's head, said member having forwardly projecting portions on opposite sides thereof, a tube formed along each of said side portions for adjustably receiving and retaining therein an attaching loop, said tubes being arched forwardly of said body member and disposed to be located behind the patient's ears in use, and a pair of resilient attaching loops adapted to releasably connect said body member side portions with an inhaler mask, each attaching loop having end portions passing through the respective tube in opposite directions and in frictional contact with the inner walls of the tubes and with each other, one of the ends of each loop extending through the tube and beyond the same to provide a hand grip whereby the loops may be tensionally adjusted to bring and retain a mask into a selected and comfortable position on the patient's face, and anchoring means on the other end portion of each loop to prevent the same from being drawn through its respective tube in one direction.

4. A harness for positioning an inhaler mask on a patient's face, said harness including a body member comprising a sheet of flexible material to fit over the rear of the patient's head, said member having forwardly projecting portions on opposite sides thereof, a tube formed along each of said side portions for adjustably receiving and retaining therein an attaching loop, said tubes being arched forwardly of said body member and disposed to be located behind the patient's ears in use, and a pair of resilient attaching loops adapted to releasably connect said body member side portions with an inhaler mask, each attaching loop having end portions passing through the respective tubes in opposite directions and in frictional contact with the inner walls of the tubes and with each other, one of said loop ends of each loop being enlarged to form a plug whereby said plugged end is prevented from being drawn through said respective tubes, the other ends of each loop extending through the tube and beyond the same to provide a hand grip whereby the loops may be tensionally adjusted to bring and retain a mask into a selected and comfortable position on the patient's face.

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