Oct. 23, 1951 F. T. WALLIN 2,572,787

PORTABLE RESPIRATOR

Filed Dec. 20, 1948 3 Sheets-Sheet 1

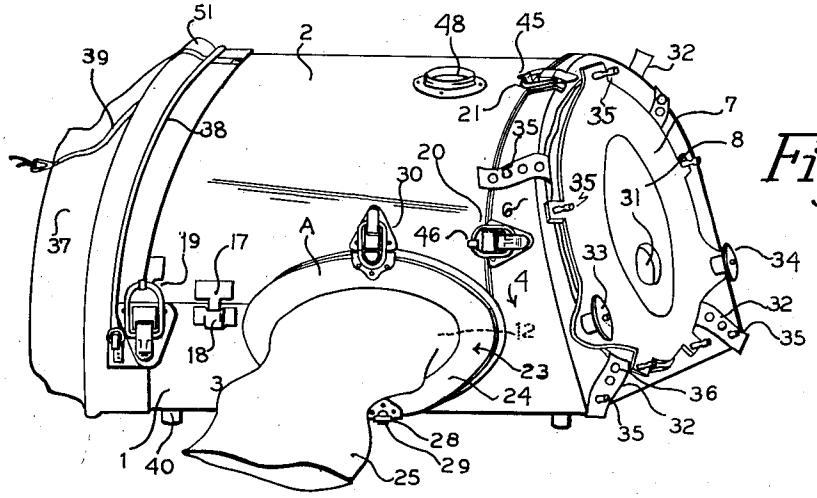


Fig. 1

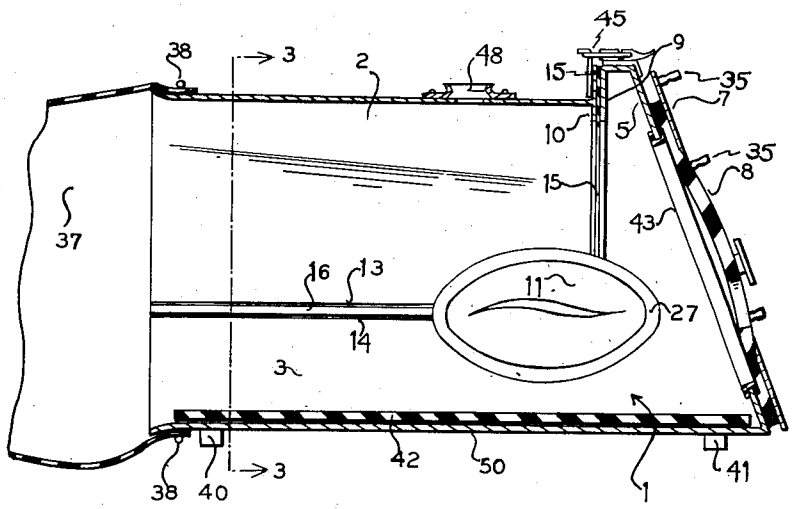


Fig. 2

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PORTABLE RESPIRATOR

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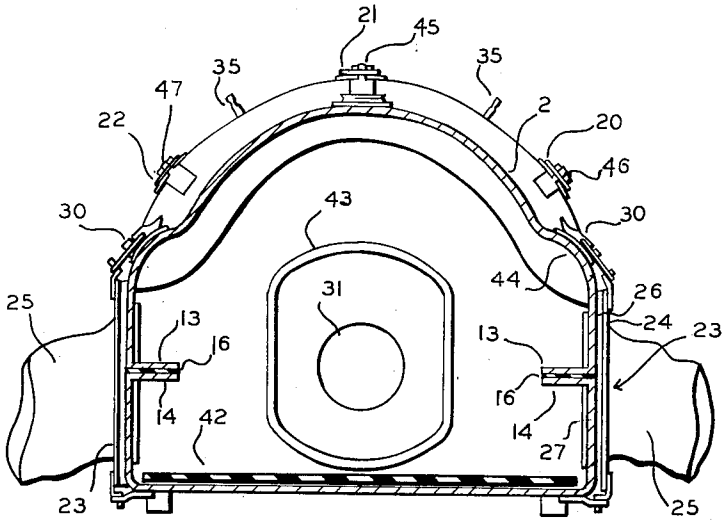


Fig. 3

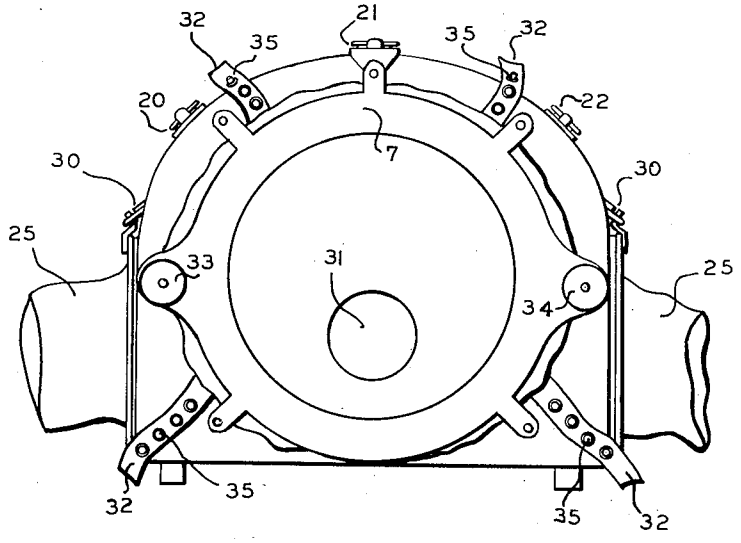


Fig. 4

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PORTABLE RESPIRATOR

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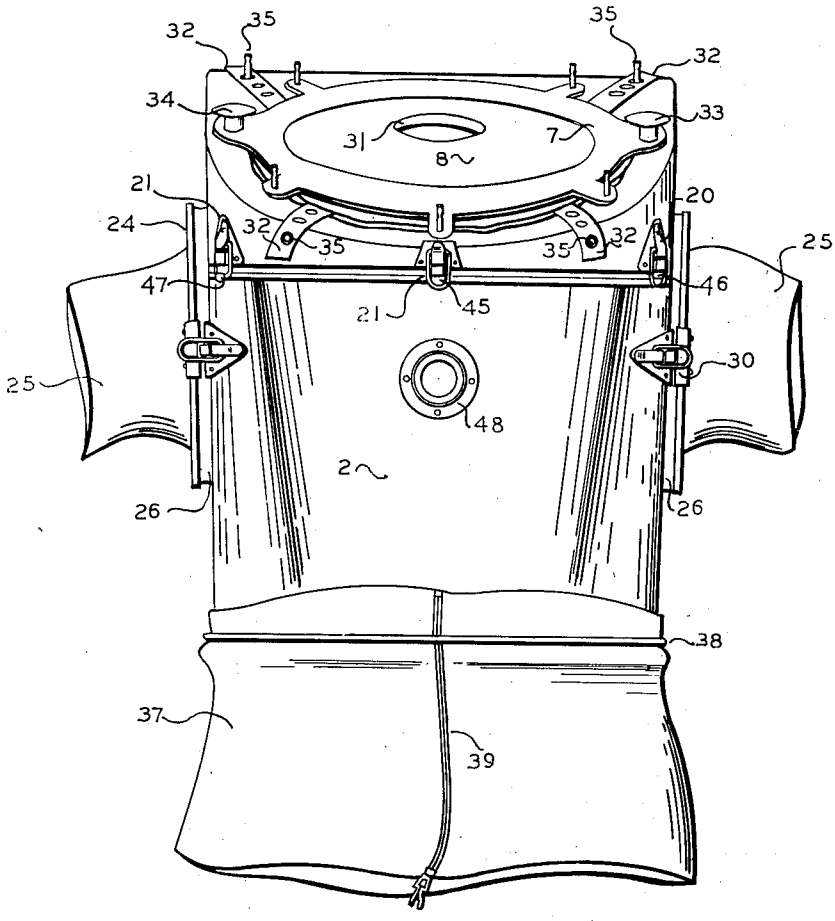


Fig. 5

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UNITED STATES PATENT OFFICE

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PORTABLE RESPIRATOR

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Application December 20, 1948, Serial No. 66,359

7 Claims. (Cl. 128—30)

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The present invention relates to a portable respirator of the type herein described, in which pressure is changed from above atmospheric to below atmospheric in repeated cycles to force about artificial breathing. Respirators of the present type enclose the whole body with the exception of the head and the face or a portion of the body from the neck down below the waist. The present invention is an improvement of the latter modification and has for its purpose the construction of a portable respirator which will be not only light but easy to adjust, may be quickly put on a patient, and provides efficient operation in the application of pressures and vacuums for completely controlling artificial breathing. In the present case, power may be applied electrically or mechanically for producing the necessary operating pressures and vacuums.

In the present invention, the portable respirator has a housing which is made in two fitted parts which divide at the sides of the respirator and through the arm holes in right angle sections and not longitudinally through the whole of the respirator. This arrangement leaves a rigid head plate supported from the base through which a head opening is provided which is covered by a removable collar adjusted for the desired fit of the patient's neck when the patient is put in the respirator. By making the respirator of separable parts, as described in the present invention, it is possible to make it a firm, strong, light, rigid structure with flexible elements for the neck, arms and waist such that the proper plus and minus pressures may be obtained with great efficiency. The respirator at the same time is comfortable for the patient and is light enough to permit the patient to assume various desired positions. A further important feature of the present respirator is that it is so constructed in its details that the patient can easily be placed in the respirator very quickly, the time being less than two minutes from the start to the proper running and functioning of the respirator. A further advantage is that the respirator is so shaped that it will fit any adult, child, or infant. The respirator of the present invention may be continuously used as in the case of polio victims and may also be used for resuscitation cases such as drownings or electric shocks.

The present invention will be more fully described in the specification below when taken in connection with the drawings illustrating an embodiment thereof in which

Figure 1 shows a perspective view of the respirator as viewed from the side looking slightly towards the front.

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Figure 2 shows a side section in elevation taken lengthwise through the respirator.

Figure 3 shows a section taken on the line 3—3 of Figure 2.

Figure 4 shows a view of the respirator looking at the front end with respect to Figure 1, and Figure 5 shows a plan view as viewed from a position over the respirator.

Referring to the drawings, the respirator is formed of two parts, a chest or body housing 2, and a base part 1. The base part 1 has side sections 3 which extend upwards from the floor 50 of the base to the middle of the arm hole 11 and longitudinally from the arm hole to the end of the respirator. A front backwardly inclined section 4, inclined upright at an angle slanting less than 90° backwards towards the base section 3, is integrally joined to the base. This section 4 has a front flat wall element 5 and a backwardly flanged arched section 6 which in general is the same shape as the chest section 2 but of a larger size. The sections 3, 4, and 5 are all permanently joined as a continuous air tight element and form a strong rigid structure. The front plate 5 carries a flat, clamping ring 7 which clamps to the wall surface 5 and holds in place an adjustable collar disk 8 in the manner as later explained. The arched flanged section 6 has an inwardly extending flange 9 which is positioned in abutting relationship to a similar shaped flange arched section 10 extending upwards and outwards from the inner end of the chest housing 2. These abutting flanges 9 and 10 extend in parallel and abutting relationship from one arm hole position 11 on one side to the other arm hole position 12 on the other side of the respirator.

The chest section 2 and base 3 also are fitted with inwardly extending flanges running along abutting longitudinal edges at the sides of the respirator where the pieces 2 and 3 fit. These longitudinal flanges are shown in Figures 2 and 3 at 13 and 14 at both sides of the respirator. These longitudinal abutting flanges extend substantially from the middle of the arm hole 11 longitudinally along the side of the respirator. These joining flanges along the sides and front have between them rubber gaskets 16 and 15 respectively which are fixed in place on one or the other of the parts of the respirator.

After the patient has been put in the respirator, the chest portion 2 is put in place and locked, after which the arm closures with the

tubular sleeves may be applied and also other adjustable elements, as will be properly explained.

In order to provide proper fitting for the chest section 2, it has guide pins 17 at the sides, engaging in loops 18 which locates the fit of the two elements together. A spring tensioning locking clamp 19 is provided at the end of the sections 2 and 3 so that these ends may be quickly locked in place to make a tight fit at this position. A plurality of locking clamps 20, 21, and 22 are provided between the arched flanges 9 and 10 clamping the front end of the chest section to the arched section 6 extending from the front plate. For this purpose the flange 10 on its external side has tabs or hooks 46, 45, and 47 which extend outwards on the flange 10 beyond the surface of the section 6 so that the clamps 20, 21, and 22 which are mounted on this surface will pull the flange 10 tightly against its abutting flange 9 and compress the rubber gasket 15 to form a tight seal.

After the two sections have been put together, the sleeve assemblies 23 to close the arm-holes or openings are put in place. This comprises an outer stiff flat oval ring 24 from the inner edge of which a tubular gum rubber sleeve 25 extends. This tubular sleeve is sealed to the ring 24 on the inside surface of the ring facing the respirator, and against the outer surface of the sealed edge of the rubber sleeve is a sponge or soft rubber clamping ring 26 which lies against the flat surface 27 of the ring 24 around the arm hole 11. The outside wall section 3 of the respirator just below the arm opening is provided with a loop 28 in which a projecting tab 29 engages for attaching the flat ring 24 firmly to the side of the respirator for sealing the sleeve in position. The assembly 23 is quickly put on by inserting the tab 29 in the slot 28 and then pressing the opposite side of the ring 24 at A against the flat 27 about the arm hole, finally closing the spring latch 30 in place, thus clamping the gasket 26 under tension. The plate 24 is rigid so that the rubber gasket between the plate and the side of the respirator forms a tight seal at that point. The rubber sleeve 25 extends down around the arm of the patient and is tied by a band passing around the sleeve. Each arm closure is put on in the same way with a sponge rubber gasket making a tight seal against the chest piece. The arm closures are preferably marked with different colors in combination with a color spot on the chest piece so as to identify the proper closure for the proper arm opening.

The collar disk 8 covering the head hole 43 is of a soft thick gum or sponge rubber material and has a neck opening 31 positioned towards the lower end of the head hole opening in the front plate off center from the clamping ring 7. The collar disk 8 for the neck is provided with four or more straps 32, etc., by means of which the collar 8 may be stretched so that the neck opening 31 in the collar becomes properly enlarged to fit the neck of the patient in the respirator. The collar opening 31 is of course flexible so that it may be pulled over the head of the patient when the patient is put in the respirator. After the collar 8 is put over the head of the patient, the clamping ring 7 is put in place and the hand nuts 33 and 34 are put on loosely after which the straps 32 are pulled outwards and fastened on the pins 35 to produce the desired stretch of the neck opening 31. The straps are of course provided with a series of holes 36 so

that varying adjustment may be made for the neck opening. The neck opening 31 should of course be tight enough so as to prevent a substantial leakage and yet be free enough to permit the patient to be comfortable.

Extending from the bottom of the respirator is a flexible rubber waist 37 which is sealed around and to the bottom of the base 50 and held tight by a strap 38 passing about the lower part of the chest piece 2 of the respirator just within the lip edge 51. This rubber waist 37 is provided with an air tight slide fastener element 39 which may be a zipper, having abutting rubber beads which cover over the mechanical interlocking elements of the zipper. A broad strap may be applied and tightened around the rubber waist to make it hug closely the patient's body so that a good air seal may be had at this part of the body.

The base section of the respirator may be raised slightly by supporting brackets 40 and 41, while within the base there is a rubber pad or sheet 42 on which the patient rests. From a consideration of Figure 2, it will be seen that when the clamping ring 7 and the rubber disk 8 are removed, the head hole 43 for the patient will be sufficiently large for the head of any patient to pass through, so that the person can readily be placed in the respirator with substantially no difficulty whatsoever. This will permit the collar to be put on very quickly and will also allow the operator to adjust quickly the collar to the proper tension and comfort of the patient.

Attention is further called to the shape of the chest piece as seen in the section shown in Figure 3 wherein the wall is abruptly sloped outwards at 44 rather than downwards, the outwardly inclined section providing the surface on which the lock 30 is mounted for clamping the arm closure in position. By having the surface directed as indicated at 44, the arm closure may be drawn inward rather than upward and therefore provide a positive clamping of the arm closure pieces.

The respirator is operated through a single opening 48 at the top from which a hose may extend to the power plant and supply the necessary variations in air pressure. A manual operated blower may be mounted directly over the air opening 48 or a hose may be connected from 48 to a motor operated blower of the type commonly used in this work.

The device of the present invention may be used for any purpose for which a full size or portable respirator may be used. The respirator of the present invention can be carried and handled by an ordinary individual and can be used either as a temporary apparatus or for continuous operation.

Having now described my invention, I claim:

1. A respirator of the type described having a housing adapted to enclose the body of the patient from the neck to the waist, said housing being in two readily separable parts. one part comprising a base to accommodate the patient's back, said base having as a unitary structure, low side walls with recessed sections on each side forming a portion of the arm holes to accommodate the arms of a patient, and an upwardly extending face plate with a backwardly extending continuous side wall forming a part of the arm opening uniting with said previously mentioned side wall forming a line of junction between the separable parts extending in a longitudinal plane parallel to the base, and upward-

ly transverse thereto with an intersection in the arm openings at the sides of the respirator.

2. A respirator of the type described having a housing adapted to enclose the body of the patient from the neck to the waist, said housing being in two readily separable parts, one part comprising a base to accommodate the patient's back, said base having as a unitary structure, low side walls with recessed sections on each side forming a portion of the arm holes to accommodate the arms of a patient, and a backwardly inclined upwardly extending face plate having a head opening with a backwardly extending side wall running continuously around the face plate and uniting with said previously mentioned side walls as a unitary structure, said second part comprising an arched body section having an edge complementary to the edge of the first part with a portion completing substantially one quarter of the arm opening and a plurality of fasteners positioned transversely of the junction edges of the two parts for sealing the parts together.

3. A respirator of the type described having a housing adapted to enclose the body of the patient from the neck to the waist, said housing being in two readily separable parts having a line of junction at each side of the housing corresponding to the sides of the body to arm openings therein and another line of junction for said parts substantially in a plane perpendicular to the first line extending from the top of the housing to the said arm opening, the junction edges of each part having extending flanges, a rubber-like gasket lining said flanges and clamping fasteners positioned transversely to said junction edges having means for compressing the gasket between said flanges all along the junction edge.

4. A respirator of the type described having a housing adapted to enclose the body of the patient from the neck to the waist, said housing being in two readily separable parts, one part comprising a base to accommodate the patient's back, said base having as a unitary structure low side walls with recessed sections on each side forming a portion of the arm holes to accommodate the arms of a patient, and a backwardly inclined upwardly extending face plate having a head opening with a backwardly extending side wall running continuously around the face plate and uniting with said previously mentioned side walls as a unitary structure, said second part comprising an arched body section having a forward flanged edge with tab elements extending beyond the surface of said backwardly extending side wall, facing a corresponding flange on said backwardly extending side wall providing sealing surfaces, and a plurality of fasteners positioned on the surfaces of said backwardly extending side walls and interlocking with said tab elements.

5. A respirator of the type described having a housing adapted to enclose the body of the patient from the neck to the waist, said housing being in two readily separable parts having a line of junction intersecting at an angle in sections of the parts forming arm openings, said arm hole

openings having a substantially flat surface around the same, a flat hard ring element having a flexible rubber sleeve extending into the ring at its inner edge thereof and over the inner ring surface, a soft clamping gasket facing over said sleeve on the inner ring surface, said ring having an opening coinciding with said arm opening, a tab at the bottom side of the ring insertable in a loop attached to the outside of the housing below the arm opening and a latch fastener part on the outside of the ring opposite the tab and part on the housing for clamping the ring to the housing.

6. A respirator of the type described having a housing adapted to enclose the body of the patient from the neck to the waist, said housing being in two readily separable parts having a line of junction intersecting at an angle in sections of the parts forming arm openings, said arm hole openings having a substantially flat surface around the same, a flat hard ring element having a flexible rubber sleeve extending into the ring at its inner edge thereof and over the inner ring surface, a soft clamping gasket facing over said sleeve on the inner ring surface, said ring having an opening coinciding with said arm opening, a tab at the bottom side of the ring insertable in a loop attached to the outside of the housing below the arm opening and a latch fastener part on the outside of the ring opposite the tab and part on the housing for clamping the ring to the housing, the surface of said housing being sloped at an angle to said clamping surface at the position of said latch to permit pressure to be exerted by the latch on said clamping gasket.

7. A respirator of the type described having a housing adapted to enclose the body of the patient from the neck to the waist, said housing being in two readily separable parts having a line of junction intersecting at an angle in sections of the parts forming arm openings, said arm hole openings having a substantially flat surface around the same, a flat hard ring element having a flexible rubber sleeve extending into the ring at its inner edge thereof and over the inner ring surface, a soft clamping gasket facing over said sleeve on the inner ring surface, said ring having an opening coinciding with said arm opening, a tab extending from the edge of the ring insertable in a loop attached to the outside of the housing in a corresponding position, and a latch fastener part of which is attached on the outside of the ring opposite the tab and part on the housing for clamping the ring to the housing.

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REFERENCES CITED

The following references are of record in the file of this patent:

UNITED STATES PATENTS

Number	Name	Date
2,314,955	Slater	Mar. 30, 1943
2,354,397	Miller	July 25, 1944
2,480,980	Terhaar	Sept. 6, 1949