Aug. 6, 1968 A. F. CHOUINARD ET AL 3,395,703

NEBULIZER

Filed Oct. 22, 1965

Fig. 1

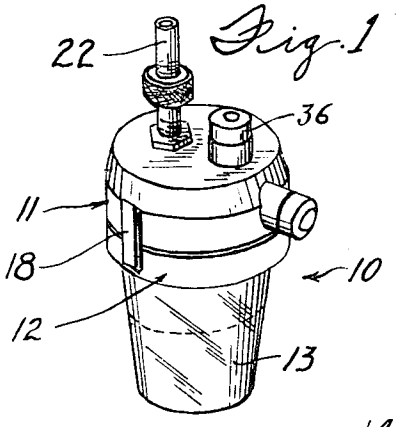


Fig. 2

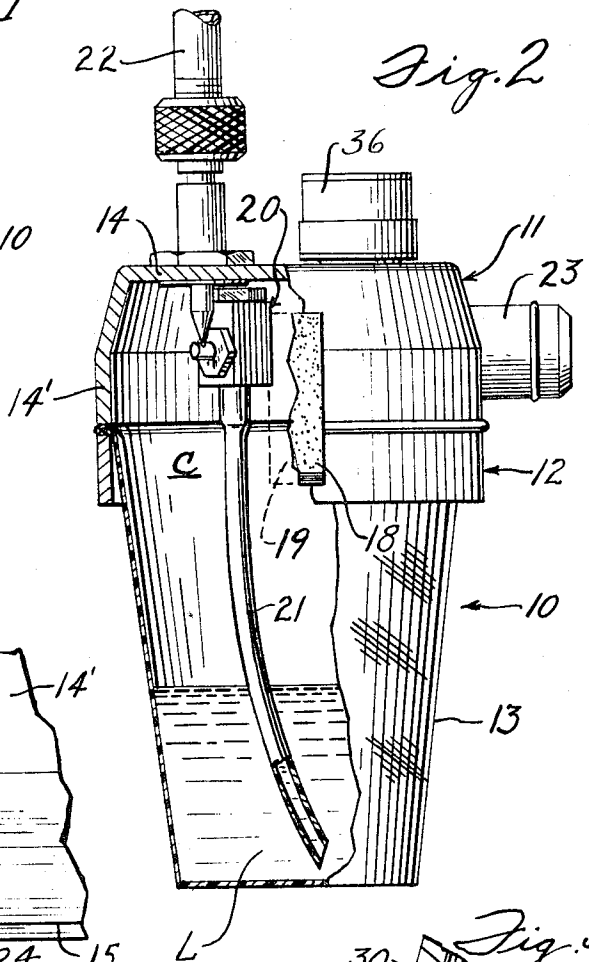


Fig. 4

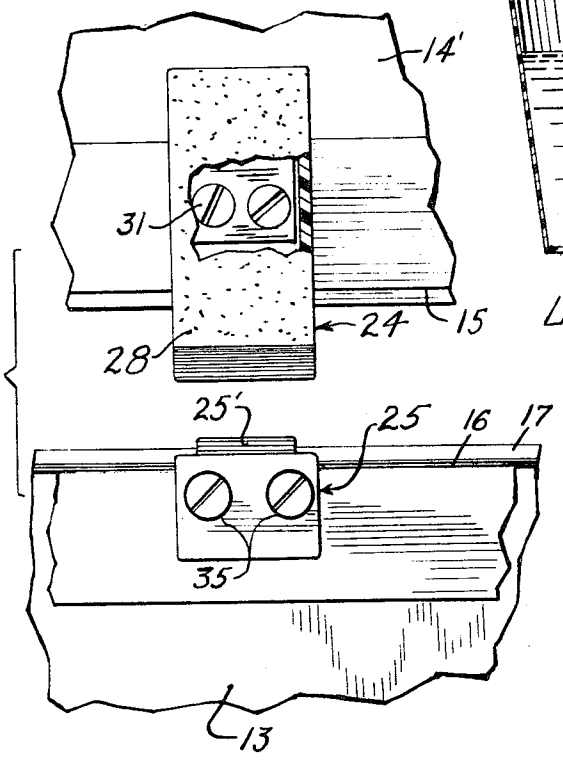
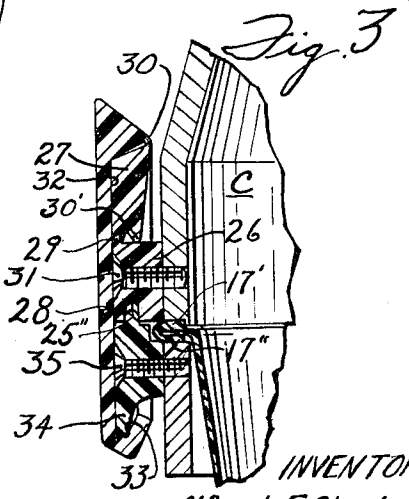


Fig. 3



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NEBULIZER

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ABSTRACT OF THE DISCLOSURE

A nebulizer apparatus for medical use having a body containing the nebulizer assembly and collar at the bottom of the body engaging opposite sides of a deformable liquid container and toggle clamps connected between the body and the collar to compress the flange and to hold the nebulizer together as a unit.

This invention relates to a nebulizer by which gas such as oxygen, air, mixtures thereof or the like is mixed with water vapor or the like and thereafter administered to a patient.

In accordance with the invention, there is provided a nebulizer having a body section and a collar by which a container, which is preferably disposable in character, can be held in position. Opposite toggle clamps secured to the body section and to the collar can draw the collar and body section together to deform, bend or otherwise reshape the flange of the container and releasably hold the collar, container and body section together as a unit.

In the drawings:

FIGURE 1 is a perspective view of a nebulizer in accordance with the invention;

FIGURE 2 is an elevational view, partly in section, of the nebulizer shown in FIGURE 1;

FIGURE 3 is a fragmentary sectional view showing a clamp in clamping position; and

FIGURE 4 is an exploded view showing the clamp in its unclamped position.

Referring now to the drawings, there is shown a nebulizer generally indicated at **10** of the type disclosed in U.S. Patents Nos. 2,882,026 and 3,075,523. The nebulizer **10** includes a body section **11** and a collar or ring **12** for holding a cup or open-mouthed container **13**. The body section **11** is shown to be generally bell-shaped in appearance. The body section **11** has a top portion **14** and an annular flange or skirt portion **14'**. The skirt portion **14'** terminates at a continuous annular shoulder **15** which provides a seat.

The collar **12** is annular and has a seat **16** at its upper or top surface. The container **13** is generally frustoconical in appearance. The container **13** has an outwardly extending rolled lip or flange **17** at its open end. As the flange **17** is constructed of relatively thin somewhat resilient material, the flange **17** is deformed when toggle clamps **18** and **19** preferably opposite one another are moved to clamping position, thus forming an effective seal between the container **13**, the body section **11** and the collar **12** as they are held together as a unit, and in this position the body section **11** and the container **13** provide a chamber C. Outwardly extending upper flange portion **17'** forms a seal with the seat **15** which lower flange portion **17''** forms a seal with the seat **16**.

A nebulizer assembly **20** secured to the top portion **14** of the body section **11** has a tube **21** which extends down to the bottom of the container **13** shown to hold liquid L to be vaporized. The nebulizer assembly **20** is shown to be connected to a rigid conduit **22** which may be connected to a source of supply gas such as oxygen, air, mixtures thereof, or the like. Liquid L aspirated through the tube **21** is discharged as fine mist and mixes with the

gas. The nebulized mixture of gas and liquid in the chamber C passes through an outlet conduit **23**. A flexible conduit (not shown) can be connected at one end to the conduit **23** and at its other end of a face mask (not shown).

As the clamps **18** and **19** are identical in construction only one is shown and described in detail for the sake of brevity. The clamp **18** has one plastic part **24** and another plastic part **25**, each being of unitary construction. The part **24** has sections **26**, **27** and **28**, sections **26** and **27** being connected by a hinge **29** and sections **27** and **28** being connected by a hinge **30**. The section **26** is suitably secured to the body section **11**, as by screws **31**. The section **28** has a recess **32** into which the sections **26** and **27** can be received as indicated in FIGURE 3. The hinge **30** is overcenter with respect to the heel or or support **30'**. The part **25** has an upstanding guide lug **25'** which fits into, but does not bottom in, a recess **25''** in the section **26**. In the clamped position shown in FIGURE 3 for example the sections **27** and **28** are shown to be overcenter and hence hold the body section **11**, the collar **12** and the container **13** in clamped position. The section **28** has an inclined gripping surface **33** at the end of the recess for engaging depending projection **34** of part **25**. Part **25** is suitably secured to the collar **12** as by screws **35**.

A combined pressure relief valve and whistle **36** secured to the top portion **14** relieves any excess pressure which may exist in the chamber C.

To connect the body section **11** and the container **13**, the collar **12** is slipped around the container **13**, with parts **25** aligned with parts **24** respectively. The section **28** is hooked to the projection **34** and by toggle action the clamps **18** and **19** are snapped into clamped position as indicated in FIGURES 1, 2 and 3. The clamps **18** and **19** can be released from clamping position for removal of the container **13**.

Other embodiments and modifications of this invention will suggest themselves to those skilled in the art, and all such of these as come within the spirit of this invention are included within its scope as best defined by the appended claims.

We claim:

1. Nebulizer apparatus comprising: a container adapted to contain a liquid to be nebulized having an outwardly extending flange, said flange being thin and compressible, a body section having a skirt portion terminating in a seat adapted to engage one side of the flange, an inlet for passage of dry gas, and an outlet for passage of a mixture of liquid and gas, a liquid nebulizer mounted in the body and connected between the inlet and the outlet, the nebulizer being adapated to entrain particles of finely divided liquid in said gas, a collar having a seat adapted to engage another side of the flange of the container, means for clamping the container flange between the body seat and the collar seat, said clamping means including a pair of clamps disposed opposite each other, each clamping means having a first part secured to said body section and a second part secured to said collar.

2. Nebulizer as claimed in claim **1** wherein said clamps are of the toggle type, and the container as disposable.

3. Nebulizer apparatus as claimed in claim **1** where said first part of each clamp includes a unitary member having first, second and third sections and a first hinge portion joins said first and second sections and a second hinge portion joins said second and third sections, said first section being secured to said body section, said second section having a heel, said heel being movable into engagement with the first section for limiting the rotation of the second section about the first hinge, said second hinge being in an overcenter position with respect to the

first hinge when the heel abuts the first section, said second and third sections cooperating to provide an overcenter locking arrangement, said third section having a gripping surface and a recess for receiving the second and third sections when the second hinge is moved to the overcenter position, and wherein said second part of each clamp includes a depending projection, said depending projection being engageable by said gripping surface so that respective second and third sections of each clamp can be moved to overcenter position to hold the clamp in clamped position.

4. Nebulizer as claimed in claim 1 wherein said body section has a continuous, downwardly facing shoulder against which the flange of the container can seat.

5. Nebulizer apparatus comprising: a body section having an inlet for passage of dry gas and an outlet for passage of a mixture of gas and liquid and having an annular skirt portion terminating at an annular seat, a liquid nebulizer mounted in the body section between the inlet and outlet and adapted to entrain particles of finely divided liquid in the gas, a plastic container having a hook-shaped, relatively thin annular flange adapted to seal at one of its sides with said body seat, said container adapted to contain liquid to be vaporized, an annular collar having a seat at one end adapted to form a seal with another side of said flange, said flange being compressible, and means secured partly to said body section and partly to said collar to urge said collar and said body section toward each other to compress said flange and to releasably hold said collar, said container and said body section together as a unit.

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