July 3, 1962 G. COANDA 3,042,035

MASK

Filed Dec. 9, 1958

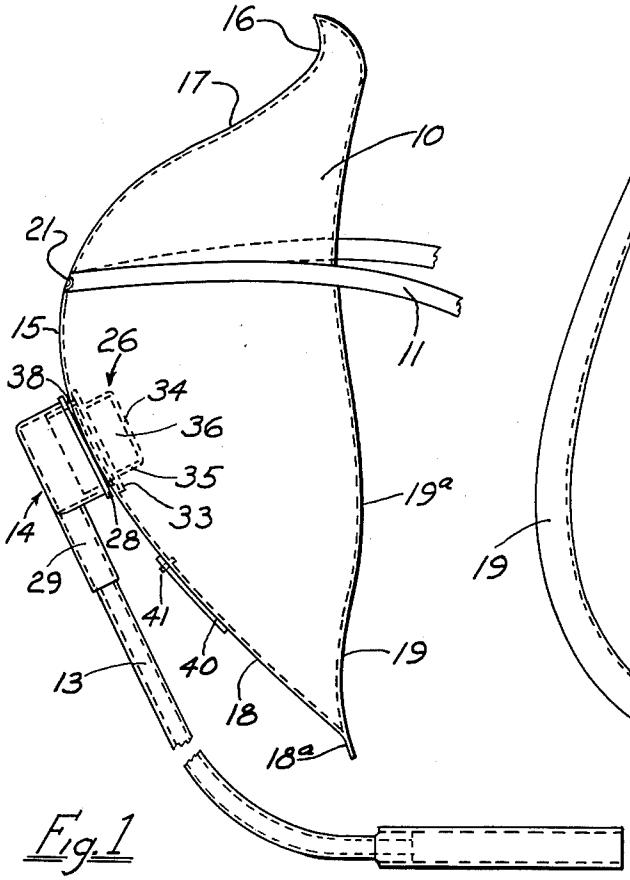


Fig. 1

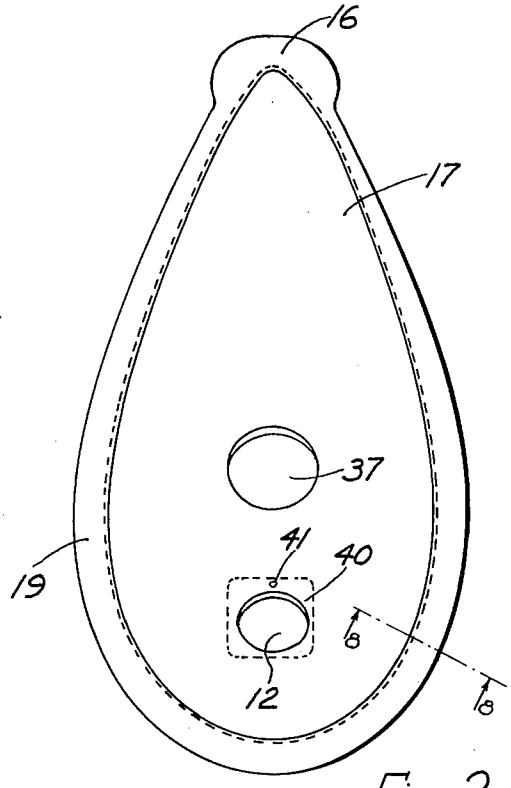


Fig. 2

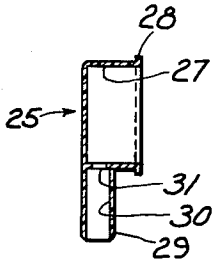


Fig. 4

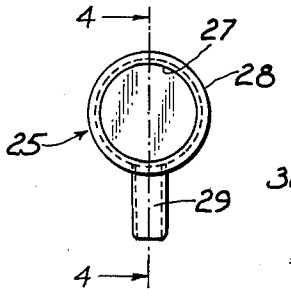


Fig. 3

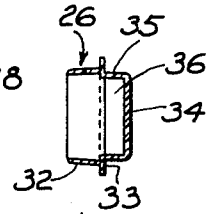


Fig. 6

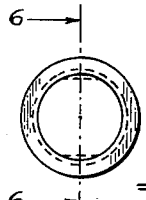


Fig. 5

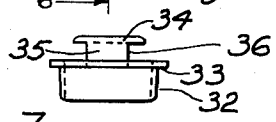


Fig. 7

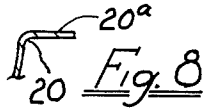


Fig. 8

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MASK

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This invention relates to an inexpensive plastic mask of the type used for administering oxygen or other gases to a patient.

An important problem in the design of a mask is to provide a convenient, inexpensive attachment of the gas supply tube to the mask. The attachment is particularly difficult when it is desired to make the mask of polyethylene plastic and the supply tube of a different plastic, such as polyvinyl chloride. Since the properties of these plastics are substantially different, it is very difficult to attach them together properly.

Another important problem in the design of a mask is to sufficiently diffuse the gas as it enters the mask from the supply tube. The stinging sensation and the dryness, discomfort, and inflammation of mucous membranes which often occur with administration of oxygen through a mask, are usually due to insufficient diffusion.

It is therefore an object of this invention to provide a mask having a gas supply tube attached by a convenient, inexpensive structure.

A further object of the invention is to provide a mask in which the incoming gas is thoroughly diffused within the mask.

A further object of the invention is to provide a single mask which can be used for both continuous flow therapy and, with a demand valve, for intermittent flow therapy.

Other objects of the invention will become apparent from the following description of a preferred embodiment illustrated in the accompanying drawings in which:

FIGURE 1 is a side view of the invention;

FIGURE 2 is a rear view of the plastic mask chamber;

FIGURE 3 is a view directly into the outer cup **25** of the gas supply tube connector **14**;

FIGURE 4 is a sectional view on the line **4—4** of FIGURE 3;

FIGURE 5 is a top view of the baffle unit **26** as viewed from within the mask of FIGURE 1;

FIGURE 6 is a sectional view on the line **6—6** of FIGURE 5;

FIGURE 7 is a front view of the baffle unit of FIGURE 5;

FIGURE 8 is a sectional view on the line **8—8** of FIGURE 2.

As shown in the drawings, the mask has a chamber **10**, a head band **11**, and an exhaust opening **12**. The gas supply tube **13** is attached to the chamber **10** by a connector **14**. The chamber **10** has an apex **15**, a curved bridge **16**, and a flange **19**. The bridge section **17** of the chamber **10** lies between the apex **15** and the bridge **16**. The lower face **18** of the chamber **10** lies between the apex **15** and the bottom **18***a* of the mask. This lower face **18** meets the lower end of the flange **19** at an angle of about 45°, and is adapted to fit over the chin of the patient so that the bottom **18***a* of the mask contacts the patient beneath the point of the chin. In this way, the mask fits a wide variety of patients, allows the patient to open his mouth if desired, and allows the lower lip to be seen by the attendant. A curved area **20** (FIGURE 8) lies between the flange **19** and the wall of the chamber **10**. The flange **19** is preferably the thinnest and most flexible part of the mask and should extend directly outward to form a flat facial contact area **20***a*. Flange **19** curves outwardly about 3½" below the bridge **17** to form a convex bulged area **19***a*. This

bulged area, combined with the flexibility of the wall just above the flange **19** permits the mask to be worn by people with and without dentures.

The chamber **10** is preferably made by vacuum forming from a sheet of low density polyethylene, polypropylene, or an odorless formulation of polyvinyl chloride. The sheet should preferably be about 0.040 inch thick and the sides and edges of the mask are drawn down to about 0.020 inch thick during the vacuum forming. These materials are easy to work with, inexpensive, odorless, relatively transparent, crack resistant, and have the proper combination of rigidity and flexibility. Cellulose acetate, high density polyethylene, or cellulose butyrate may also be used. When materials such as polyethylene or polypropylene are used, the inside surface of the chamber **10** should have a roughened or matte surface. Such a surface may be obtained by forming the chamber **10** of a material which has a rough or matte surface, such as a calendered sheet. If it is desired to use an extruded plastic sheet, or other material having a smooth polished surface, a suitable roughened or matte surface may be obtained by using a form having a roughened or matte surface. Such a form is easily made by sandblasting the surface of a polished form such as is normally used.

The band **11** which holds the mask on the patient's face is attached near the apex **15** by an eyelet **21**. This band is preferably made of elasticized nylon or similar fabric 4–7 mm. wide

The connector **14** is attached to the lower face **18** of the mask, preferably close to the apex **15**. The connector **14** consists of an outer cup **25** and an inner collar **26**. The cup **25** (FIGURES 3–4) has a tapered inner surface **27** and an outer flange **28**. An inlet tube **29** leads into the cup **25** near the bottom, preferably at right angles to the axis of the cup. The tube **29** has a tapered inner surface **30** and a stop **31**.

The collar **26** (FIGURES 5–7) has a generally cylindrical flange **32** and an annular rim **33**. The outer surface of the flange **32** is tapered so as to wedge into the cup **25** against the tapered surface **27**. The collar **26** preferably has a baffle plate **34**, baffle plate supports **35**, and slot-shaped gas ports **36**. The supports **35** are wider than the inlet tube **29** and, when assembled, are approximately in line therewith.

The cup **25** and the collar **26** are preferably molded of rigid polyvinyl chloride or other cementable, plastic material. The connector **14** is attached to the mask by placing cement or solvent on the outer surface of the flange **32**, placing the baffle unit inside the chamber **10** with the flange **32** projecting outwardly through the inlet **37**, and wedging the flange **32** tightly into the tapered section **27** of the cup. In this manner an annular portion **38** of the chamber wall lies between the cup flange **28** and the baffle unit rim **33** and fits tightly around the flange **32**. Thus the connector is firmly attached to the mask, but may be turned to allow the supply tube **13** to extend in any desired direction.

If desired, the exhaust opening **12** may be covered by a piece of flexible plastic or rubber sheet material **40** which is attached above the opening by a single, centrally-located eyelet or rivet **41**. The flapper valve thus formed by the piece of sheet material **40** can be pivoted about the eyelet **41** so as to cover the opening **12** when the mask is to be used with a demand valve for intermittent gas administration. When the mask is used without a demand valve for continuous gas administration, the valve **40** is pivoted around the eyelet **41** to a position at one side of the opening **12**.

I claim:

1. A gas administration mask comprising: a plastic chamber adapted to fit over a patient's nose and mouth; a

flexible, flat outwardly extending flange around the edge of said chamber; a uniform curved area integrally connecting said flange to said chamber; an outlet on said chamber; a piece of thin, flexible sheet material forming a flapper valve over said outlet; and a single eyelet rotatably attaching one end of said valve to the outside of the chamber.

2. A gas administration mask comprising: a chamber; a gas supply tube; a connector attaching said tube to the chamber, and having a cup-shaped outer member and an inner collar member; a portion of said collar member telescoped into a portion of the cup-shaped member and attached therein; a first annular flange on the cup-shaped member and a second annular flange on the collar member; and a portion of the chamber wall between said flanges.

3. A gas administration mask according to claim 2, in which the connector member is rotatable with relation to the chamber and the portion of the chamber wall between the flanges fits tightly around the inner collar member.

4. A gas administration mask according to claim 2 in which a gas supply tube extends from the outer cup at right angles to the axis thereof.

5. A gas administration device according to claim 2, in which support members project from said second flange into the chamber; a baffle plate is mounted on said support members; and slot-like ports open from the collar member into the chamber between the support members.

6. A gas administration mask comprising: a chamber adapted to fit over the nose of a patient, said chamber having a thin plastic wall formed of a normally translucent material, a centrally located apex, and an open side opposite said apex; a flange on the chamber surrounding said open side and shaped to rest against the face of a patient; a bridge section of the flange adapted to receive and to fit around the bridge of a patient's nose; a connector attached to the chamber wall; a passage

through said connector; a gas supply tube attached to the connector and communicating with said passage; an inner surface on the chamber wall; and a rough, matte finish on at least a major portion of said surface surrounding the apex, said matte finish rendering the normally translucent chamber wall substantially transparent.

7. A gas administration mask according to claim 6, in which the plastic chamber is made of a material selected from a class consisting of polyethylene and polypropylene and is substantially 0.020 to 0.040 inch thick.

8. A gas administration mask comprising: a chamber adapted to fit over the nose of a patient, said chamber including a thin plastic wall, a front face having a centrally located apex, and an open side opposite said apex; a flange on the chamber surrounding said open side and shaped to rest against the face of a patient; a bridge section of the flange adapted to receive and to fit around the bridge of a patient's nose; a rigid connector passing through a portion of the front face of the chamber wall, permanently attached in rotatable relation to said wall, and including a tubular body having an axial passage; a rigid inlet tube attached to the connector, projecting at right angles to the axis thereof, and having an axial bore communicating with the connector passage; and a flexible gas supply tube attached to and extending axially from said inlet tube.

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