March 16, 1943. J. KREISELMAN 2,313,999

APPARATUS FOR ADMINISTERING OXYGEN

Original Filed Oct. 31, 1940

Fig. 2

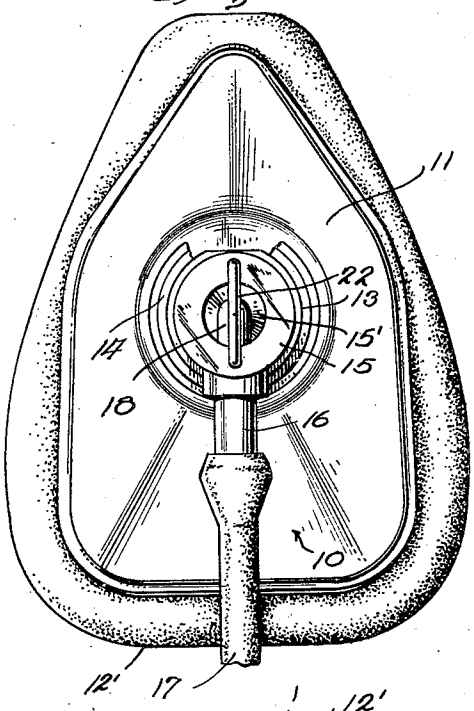


Fig. 1

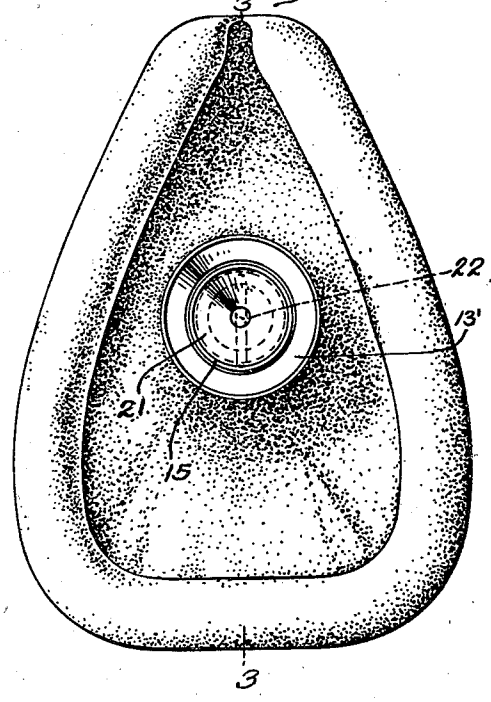
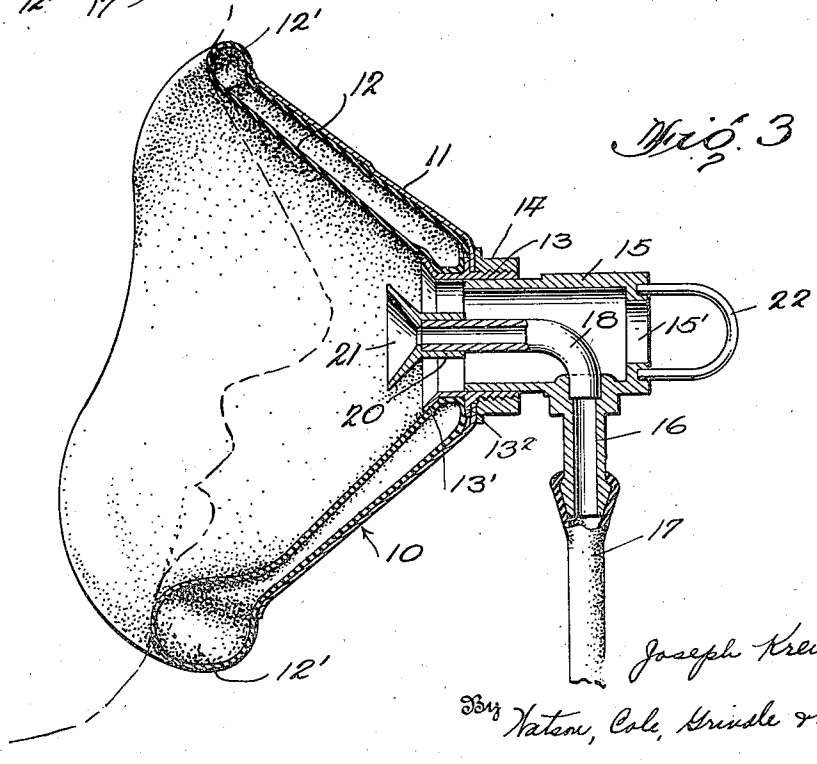


Fig. 3



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APPARATUS FOR ADMINISTERING OXYGEN

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Substituted for abandoned application Serial No. 363,773, October 31, 1940. This application June 30, 1942, Serial No. 449,127

2 Claims. (Cl. 128—205)

This invention relates to apparatus for administering oxygen for medicinal purposes, or for the administration of oxygen containing gases, and relates particularly to oxygen administering apparatus of the portable type, including a face-piece for maintaining a relatively small body or reservoir of oxygen or oxygen containing gas immediately before and around the nose and mouth of the patient.

Various portable appliances for the administration of oxygen have heretofore been designed or suggested, and are now in common use for purposes of resuscitation or whenever it is desured to supply to a patient oxygen in greater concentration than in atmospheric air. Apparatus of the portable type and embodying face-pieces may be contrasted with apparatus of larger size such as those which include head enveloping tents or even rooms in which patients may be placed. A characteristic of the tent or room type of oxygen administering apparatus is that there is no likelihood that the regular breathing of the patient may be interrupted or retarded by mechanical failure, the body of oxygen available to the patient at all times being relatively large.

In an apparatus which includes a face-piece which seals off the surrounding atmosphere from the nose and mouth of the patient, there is always the possibility that, through some stoppage, it may be made impossible for the patient either to receive an adequate supply of the gas being administered or of the atmospheric air, to his great distress. Thus, there may be the failure of a valve in the event that the face-piece employed includes a valve, and valve failures are not infrequent, or some other mishap may serve to interrupt free communication between the patient's lungs and the source of oxygen supply, the results being sometimes most serious.

A purpose of the present invention is to provide, to be used in apparatus for administering oxygen or like gases to a patient under any circumstances, a face-piece which is so designed that the patient will actually receive the gas which is being administered in a substantially uncontaminated condition but which is so designed and constructed that the lungs of the patient are at all times in communication with the outside atmosphere. In other words, while a face-piece of relatively small size is employed, it does not comprise a seal which wholly interrupts communication between the patient's lungs and the outside atmosphere. No valves are employed and the device is so constructed that there is no possibility that the patient's breathing may be checked, even though the supply of oxygen may fail.

A further purpose of the invention is to provide, in a face-piece of the type just above described, means which ensures the least possible wastage of the gas being administered. It will be appreciated, of course, that in a face-piece the interior of which is always in communication with the surrounding atmosphere, there is the possibility that much of the oxygen introduced into the face-piece may be wasted instead of being usefully employed. In accordance with the present invention, however, this tendency toward wastage is minimized, a regulated current of oxygen being introduced in such manner that it flows directly to the vicinity of the nose and mouth of the patient and a baffle being employed to direct any atmospheric air which may be drawn into the face-piece as the patient inhales, laterally of the stream of incoming oxygen, or away from the patient's nose and mouth. During expiration some oxygen may escape but this is minimized by the action of the baffle and by otherwise carefully proportioning the face-piece as to size and shape.

The improved apparatus is suitable for use in hospitals, first aid stations, and the like, but may also be advantageously employed by aviators and others who reach high altitudes, likewise by the operators of undersea craft. In fact, the improved apparatus, by reason of its extreme simplicity, may be employed in almost any instance where it is desired to administer oxygen, no skilled operator being required. It may be fabricated at low cost, is compact, rugged, and may be conveniently stored ready for use in small space. One form of the face-piece is illustrated by way of example in the accompanying drawing, in which:

Figures 1 and 2 are front and rear elevations of the face-piece, respectively; and

Figure 3 shows the face-piece in section, the section being taken along the line 3—3 of Figure 1, the profile of the face of a patient or user being indicated in dotted lines.

The body or shell of the face-piece is indicated generally at 10 and comprises a metallic member 11 which may be said to be roughly frusto-conical, together with a liner 12 of resilient material. This liner may advantageously be fabricated of a thin sheet of rubber, being fixed into the shape of a hollow walled generally frusto-conical member the outer surface of which fits snugly against the inner surface of the metallic member 11, the

enlarged outer edge of which, indicated at 12', comprises a face engaging cushioned edge for the face-piece, adapted to make close contact with the face of a patient or user.

The annular edge of the liner 12, at the small end thereof, is retained between two flanges 13', and 13^2 of a generally cylindrical member 13, the flange 13' being frusto-conical, as shown, and the flange 13^2 disposed in a plane normal to the axis of the member 13. The outward end of the cylinder 13 is threaded and receives a nut 14 which may be designated a clamping nut since it is intended to cooperate with the stationary flange 13^2 in clamping the sheet metal member 11 in the position shown. The interior of the cylinder 13 is truly cylindrical and receives with a close sliding fit one end of a second generally cylindrical member 15, both ends of which are open as illustrated. Member 15 is provided at one point with a lateral tubular extension 16, which is preferably integral with the tubular member, and to the outer end of this lateral extension is detachably connected the end of a flexible conduit 17 the other end of which may be connected to an oxygen flask, suitable regulating and cut-off valves being interposed between the face-piece and flask. Affixed to member 15 is the oxygen duct or conduit 18, this conduit being preferably attached in the manner indicated, having one end tightly pressed into a countersink formed in the inner end of the conduit 16, the major portion of duct 18 extending axially of the tubular member 15 and terminating at a point just within the body of the face-piece, as shown. Encircling this inner end of the oxygen conduit 18, and supported thereon, is a short cylindrical element 20 which in turn serves as a supporting base for the baffle 21, this baffle being frusto-conical in form as shown. At the outer end of the tubular member 15, and bridging the axial aperture 15' is a bar 22 which serves to prevent accidental blocking of the aperture, and likewise constitutes a means to be engaged by a hook for suspending the face-piece when not in use. Preferably the cylindrical member 15 is readily detachable from the remainder of the face-piece, to facilitate sterilization, and it is desirable to have the baffle adjustable with respect to the flange 13', as in the embodiment illustrated, in order that the resistance to flow of gas through the tubular member 15 may be regulated and the position of the oxygen discharge port relatively to the user's face, varied within limits.

When the face-piece is in the position in which it is shown in Figure 3, in relation to the head of a patient or user, the face engaging edge of the face-piece will substantially seal off the space within the face-piece from the external atmosphere insofar as communication between the edge of the face-piece and the wearer's face is concerned. However, the interior of the face-piece is always in communication with the atmosphere, the tube 15 being always open at its outer as well as at its inner end. A controlled current of oxygen will be allowed to flow through the oxygen line described into the interior of the face-piece, so long as the device is in use, the oxygen current issuing from the mouth of the tube 18 and passing directly toward the nose and mouth of the wearer of the face-piece so that, when the wearer inhales, he will inhale practically pure oxygen.

The rate of flow of oxygen may be regulated so as to provide the patient with as much oxygen as he needs while breathing normally. Should the patient's breathing be irregular, however, and should he withdraw from the face-piece at one inhalation an unusually large volume of gas, he may exhaust all of the oxygen from the face-piece and also draw in a certain amount of atmospheric air. However, the oxygen will be inhaled first because it is close to the patient's nose and mouth, any air being drawn in being deflected by the baffle 21 outwardly and away from the patient's nose. When expiration occurs, a certain portion of the incoming oxygen may be forced out through the aperture 15' in the end of the tubular member 15, but by carefully regulating the inflow of oxygen to the patient's needs, the loss may be minimized. Despite the possible loss of oxygen, however, the great advantage of having at hand an oxygen administering appliance which cannot fail to operate as long as the oxygen supply is uninterrupted renders the face-piece of great utility for many purposes. Naturally, minor changes in design may be effected without substantially modifying the functioning of the device and that form of the face-piece illustrated and described is but one of a number which embody the invention.

This application is a substitute for my prior application, Serial No. 363,773, filed October 31, 1940 which became abandoned January 17, 1942.

Having thus described the invention, what is claimed as new and desired to be secured by Letters Patent is:

1. In an apparatus for administering oxygen or like gas, a face-piece having the shape of a hollow shell the edge of which is formed to rest against the face of a patient and to encircle his nose and mouth, and the body or wall of which substantially seals off from the atmosphere, when the face-piece is in use, a restricted space from which the patient will draw breath, said wall or body having an aperture formed therein at a point remote from said face engaging edge, a tubular member being secured in said aperture the ends of which are open and the axis of which is disposed substantially normally to the plane of the face engaging edge, the diameter of said tube being sufficiently great to insure free breathing at all times, a conduit extending axially of said member for leading oxygen to a point of discharge adjacent the inner end of said member, and a baffle mounted on the inner end of said conduit, for the purpose set forth.

2. In an apparatus for administering oxygen or like gas, a face-piece having the shape of a hollow shell the edge of which is formed to rest against the face of a patient and to encircle his nose and mouth, and the body or wall of which substantially seals off from the atmosphere, when the face-piece is in use, a restricted space from which the patient will draw breath, said wall or body having an aperture formed therein at a point remote from said face engaging edge, a tubular member being secured in said aperture the ends of which are open and the axis of which is disposed substantially normally to the plane of the face engaging edge, the diameter of said tube being sufficiently great to insure free breathing at all times, a conduit extending axially of said member for leading oxygen to a point of discharge within the face-piece, and a conical baffle disposed coaxially with said conduit and supported on the inner end thereof, for distributing incoming air so as to envelop incoming oxygen.

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