

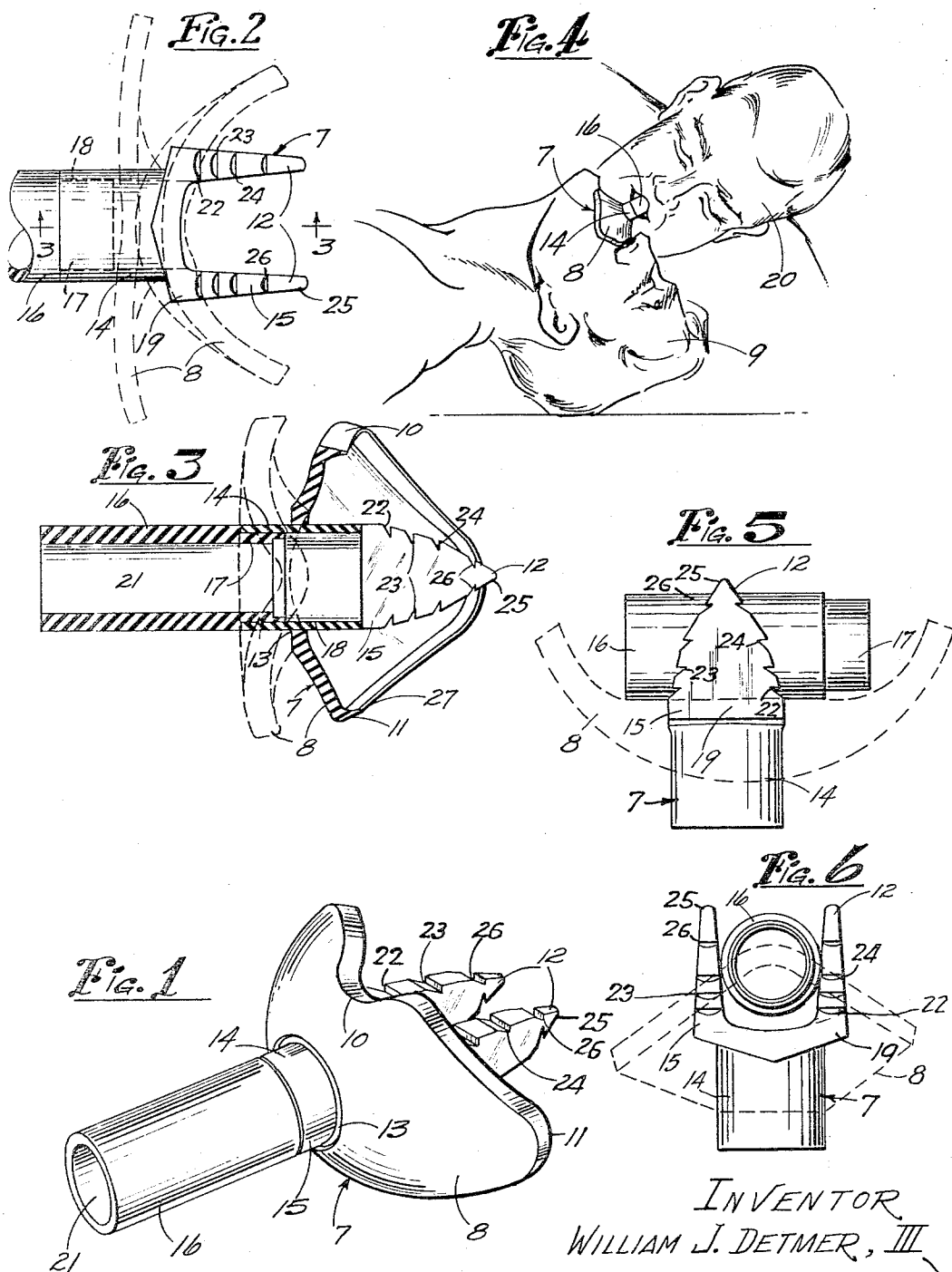
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MOUTH-TO-MOUTH RESUSCITATOR

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MOUTH-TO-MOUTH RESUSCITATOR

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This application is a continuation-in-part of my co-pending application Serial No. 91,903, filed February 27, 1961, and now abandoned.

This invention relates to a new and improved mouth-to-mouth resuscitator.

Mouth-to-mouth resuscitation in an effort to revive a person after drowning is well-known, and I am aware that resuscitator devices for insertion in the mouth of the unconscious person and designed to be blown through in order to get oxygen into the person's lungs have been devised, but the ones that have come to my attention so far have all been objectionable for one or more reasons, and, in a device of this kind, it is well to bear in mind that slight differences may mean the difference between failure and success where the life of the unconscious person is hanging in the balance, and therein lies the importance of the evaluation of the different features incorporated by one having the necessary medical training in order to appreciate what will do the work properly and what may not in a large enough percentage of instances to warrant recommendation of such a device by nationally recognized organizations fully acquainted with the problem. The first few minutes where breathing has stopped are, of course, the most crucial because a short time without oxygen can result in serious brain damage, and, inasmuch as the air which a person exhales still has enough oxygen to revive a victim, resuscitation by mouth-to-mouth insufflation can save the victim's life, and, since it is estimated that about 70% of rescues are performed by members of the immediate family or by neighbors or friends, it is obvious that the knowledge of mouth-to-mouth resuscitation should be broadcast so that as many people as possible will be prepared to revive someone who is unable to breathe for himself, and by the same token, it follows that the resuscitator device, if it is to be universally successful, must, first of all, possess the proper inherent design, and, furthermore, be so simple to operate that any one, including a child, can learn to use it effectively. Also, since time is such an important factor and it is generally instructed that one should not waste valuable time moving the victim to a place where a mechanical resuscitator might be found, or waiting until such equipment can be brought to the scene, it is obvious that:

(1) A successful resuscitator device must be of a compact size that will enable its being either carried on the person, as by a lifeguard for example, or stored in convenient places without difficulty and should, furthermore, be of a low enough cost to place it readily within the reach of all who would or might find a need for it;

(2) It should be so designed that it is either ready for instant use as is or the parts can be quickly put together for immediate use,

(3) Because in many cases of drowning, for example, the jaws may be set so that prying is necessary to open the mouth sufficiently for introduction of the resuscitator, the resuscitator should include, with itself, the means for prying the teeth apart and, in order to insure the mouth remaining open, the device should include means to be positively engaged between the teeth so that there is no possibility of the device slipping out, which would only mean the loss of precious time in reopening the mouth;

(4) A reliable and substantially universally applicable mouth enclosing mask or shield that will make an air-

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tight seal without the necessity for outside pressure application is essential for successful operation, and

(5) At least equally important, if not more so, are non-slip notched teeth-separating wedges to be certain of interlocking engagement with the teeth in the notches regardless of overbite or underbite relationship of the teeth in any given case, because of the necessity of keeping an opening clear for air flow in resuscitation.

The device of my invention includes a pair of laterally spaced teeth separating wedges provided on a cross-head on the end of a tubular inner end portion that is easily insertable with an air-tight fit into the outer end of the neck to permit blowing from the mouthpiece through the victim's open mouth while the wedges, which have notches in the top and bottom edges to receive the teeth, hold the victim's mouth open, a flexible curved plastic mask or shield that has a hole in it to permit its being slipped over the neck with an air-tight rotary slidable fit and also has a notch in one edge to provide clearance for the victim's nose, being disposed in snug engagement over the entire mouth area of the victim and having an inwardly projecting tapered flange that is readily conformable to the contour of the face at all points to seal the mouth as much as possible against escape of air during insufflation.

The spaced teeth separating wedges are molded integral with the crosshead and tubular neck of a fairly stiff plastic material, and these wedges are spaced far enough apart so that the narrow outer end of either wedge can be used effectively as a pry tool while the cross-head and tubular neck serves as a handle in prying the victim's teeth apart to open the mouth and enter the two wedges between the teeth for operation of the resuscitator, and, due to the flexibility of the shield, it can be sprung back out of the way during the prying operation and thereafter sprung forward into its normal position to fit over the mouth of the victim to serve its intended purpose, the shield being fairly flexible to enable such operation. The notches in the top and bottom edges of the wedges insure the teeth taking hold, and, once the operator is certain that an opening is thus afforded for air flow the mouth shield is slid forward to provide the seal. The removable tubular mouthpiece is of such length in relation to the vertical dimension of the shield, and is also of such outside diameter in relation to the space between the two wedges that the mouthpiece when removed can be placed between the wedges and held frictionally and resiliently by the spreading apart of these portions to permit a sizeable saving in packing and shipping costs because of the much smaller carton that can be used, and also permit carrying the article about on the person in the same way when it is not kept in a drawer or cabinet.

The invention is illustrated in the accompanying drawing, in which—

FIG. 1 is a perspective view of the resuscitator assembly made in accordance with my invention;

FIG. 2 is a plan view of the assembly with one end of the mouthpiece broken away to permit showing the parts full size and with the mouth enclosing mask or shield removed but indicated in dotted lines both in its normal and its other position sprung back out of the way;

FIG. 3 is a cross-section on the line 3—3 of FIG. 2;

FIG. 4 is an illustration of how the resuscitator is adapted to be used; and

FIGS. 5 and 6 are views at right angles to one another showing the assembly with the mouthpiece removed and held in the fork defined by the two wedges, permitting packing of the article in a much smaller package for convenience and economy from the shipping and selling standpoints, and also for the greater convenience in carry-

ing the article around on the person in the subsequent use of the article by the ultimate purchaser, the mouthpiece being shown in phantom in both views turned through 90° in relation to its showing in FIGS. 1 and 4, in order to make for maximum compactness.

The same reference numerals are applied to corresponding parts throughout the views.

Referring to the drawing, the resuscitator of my invention is indicated generally by the reference numeral 7 and consists of three parts, the largest of which is a curved generally oblong plastic mouth enclosing mask or shield 8 designed to be engaged over a wide area around the mouth of the person needing resuscitation, as indicated at 9 in FIG. 4, this shield having an arcuate depression 10 in the middle of the upper edge portion to provide clearance for the nose of the victim while the forwardly projecting tapered marginal flange 11 bearing against the victim's face will provide an effective seal against the escape of air during the mouth-to-mouth insufflation. This shield is made of a plastic material like polyethylene, which, in this thickness, is flexible and resilient so that it can give to the necessary extent to conform to the contour of the victim's face when pressed against it to provide a seal without the necessity for any outside pressure thereon and may also be sprung rearwardly out of the way, as indicated in dotted lines in FIGS. 2 and 3, when that becomes necessary for the use of either of the two teeth-separating wedges 12 in prying between the teeth of the victim to open the mouth enough to enter the two wedges between the teeth to be certain of an air opening therebetween preparatory to starting insufflation. The shield 8 has a central opening 13 provided therein for slip-fit but air-tight but slidably and rotatably adjustable extension therethrough of the tubular neck 14 on the part 15, which is one of the two other parts of the resuscitator, in which the tubular mouthpiece 16, constituting the remaining part, fits, the mouthpiece having a reduced concentric end portion 17 fitting snugly in the bore 18 of the neck 14, as shown in FIG. 3, so that the mouthpiece may be removed and stuck between the wedges 12, shown in FIGS. 5 and 6, for handiness in packing in the original shipment of the article from the manufacturer to the distributor or purchaser, and also for convenience later for the ultimate user, where this compactness of the article in semi-disassembled condition is appreciated since it permits carrying the article about on the person, as by a lifeguard for example, or permits keeping the article in any small storage space where it will be available quickly for instant use when needed. Maximum compactness is obtained by turning the shield 8 through 90° from the positions of FIGS. 1 to 4 to that shown in dotted lines in FIGS. 5 and 6, thereby aligning the long dimension of the shield with the length of the mouth-piece 16. The wedges 12 define a fork on a cross-head 19 provided on the inner end of the neck 14, the shield 8 being disposed in engagement with the back of this cross-head to provide a seal on the outside of the upper and lower lips of the victim being resuscitated while the air is being blown into the victim's mouth and on into his lungs by the rescuer, indicated at 20, in FIG. 4. The rescuer 20 uses the mouthpiece 16 when blowing air into the victim's lungs, the air flowing through the bore 21 of the mouthpiece and through the bore 18 into the victim's mouth between the wedges 12 that are disposed between the victim's teeth, holding his mouth open for effective pulmonary ventilation. Slippage of the victim's teeth off the wedges 12 is prevented by having them engaged in either of three sets of shoulder defining notches 22, 23 and 24 provided in the top and bottom edges of these wedges. The vertical spacing and longitudinal spacing of the notches insures adaptability regardless of whether the teeth in a given victim are in vertically opposed relationship normally or whether there is an overbite or underbite relationship.

The parts 15 and 16 are molded of the same plastic material (polyethylene) having a lesser degree of flexibil-

ity than the plastic shield 8, due to difference in thickness, it being important, obviously, that the wedge 12 that is used in prying open the victim's mouth be stiff enough for that purpose while still being yieldable to the slight degree necessary so as not to mar the teeth as a metal object might be apt to if used for that purpose. The spacing of the wedges 12 is more than adequate for unrestricted air flow between the wedges during insufflation, but the $\frac{3}{4}$ inch or $1\frac{3}{16}$ inch spacing of the outer ends is what I found by experimenting is approximately what is needed for the successful use of these wedges as prying tools, any less spacing being wrong from the standpoint that there is not enough operating clearance for whichever wedge is being used in prying to permit a person to pry the mouth open quickly enough in an emergency. Of course, after the mouth has been pried open, the shield 8 which has been sprung back out of the way can be sprung forward again to its normal curvature and operative position with respect to the wedges, illustrated in FIGS. 1 and 2.

The tips of the wedges 12 are pointed as indicated at 25 to facilitate entry between the teeth and start prying the victim's mouth open, and there is at least one notch 26 on each side of the pointed end portion 25 into which the teeth can enter to prevent slipping off in the hurried operation of a nervous rescuer. Usually once the jaws have been opened part way to the point of entry of the teeth in notches 26, it is much easier to go on from there by a twisting motion of the wedges 12 to get the jaws opened far enough for the teeth to take hold in notches 22, 23 or 24 along the upper and lower edges of the wedges 12. The shield 8 is then in contact with the victim's face around the mouth and the highly flexible thin tapered edge portion 27 of the major flange 11 is flexed by such contact to conform to the contour of the victim's face at all points around the periphery of the shield to insure an effective seal against the escape of air during the mouth-to-mouth insufflation.

In operation, the device is used as shown in FIG. 4, entered in the victim's mouth with the head held as far back as possible, as by lifting of the neck and then pressing the chin outwardly while forcing the forehead inwardly to be sure that the air passages are not blocked and there is nothing to interfere with air reaching the victim's lungs during the mouth-to-mouth insufflation. The present device is an oral airway device 7 for giving mouth-to-mouth resuscitation, using expired air breathing, the effectiveness of mouth-to-mouth resuscitation being greatly increased by the use of this special type of oral airway device, as stated in the Journal of American Medical Association issued May 17, 1958, page 327:

"The effectiveness and ease of performance of mouth-to-mouth breathing can be improved by the use of such adjuncts as an ordinary anesthesia face mask, an oropharyngeal airway, or an endotracheal tube. These are useful, and mouth-to-mask, mouth-to-airway, and mouth-to-tube breathing should be encouraged when these devices are available."

and, on page 338:

"The mouth-to-airway technique, which is described in detail elsewhere, is more aesthetic, easier to perform, produces less gastric distention, and results in better pulmonary ventilation than direct mouth-to-mouth breathing."

With this device 7 a positive pressure can be maintained on a breath-to-breath basis, the rescuer always ventilating the victim through the end of a tube that is smaller than the adult mouth. The device 7 does not extend over an inch into the oral cavity, the wedges 12 being only a little more than an inch in overall length and being entered only to the point where the teeth engage behind the shoulders defined by the notches 22, 23 or 24. This is highly important inasmuch as the unskilled or lay rescuer will not push the tongue back into the pharynx and thereby cause an obstruction, which objection was com-

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mon with certain devices previously tried, as stated in New York State Journal of Medicine, Feb. 1, 1960, vol. 50, No. 3, Collins & Saland, page 338:

"The tongue has been pushed back into the pharynx to create obstruction instead of correcting any existing obstructions."

and, as stated in Journal of American Medical Association, Feb. 20, 1960, vol. 172, page 815:

"Experience is necessary, however, even then, to choose the right size to prevent trauma and to avoid pushing the tongue back to further block the air passages."

The present device 7 precludes vomiting and pulmonary aspiration in the patient not deeply comatose and with an active gag reflex, as other devices tried heretofore and discussed in Journal of American Medical Association, Feb. 20, 1960, vol. 172, page 814:

"In contrast, the hazards of instrumentation of the throat of a semiconscious victim with an active gag reflex are laryngospasm or vomiting and aspiration. If rescue efforts involve manipulations in the pharynx, a victim of asphyxia is prone either to vomit or the regurgitate passively, with the resulting danger of acid stomach contents entering his lungs."

Device 7 is not harmful under any circumstances inasmuch as it only requires contact with the face, to effect the required seal, and inflation is effected by forcing expired air into the victim, and that mode of operation in general has received the approval of the medical profession, as indicated in Journal of American Medical Association, Feb. 20, 1960, vol. 172, page 814:

"Methods which simply require contact with the face and inflation through the nose or mouth can do little harm under any circumstances."

The fact that the notches 22-24 have the victim's teeth engaged therein to insure holding the mouth open during expired air breathing is important because this lends itself to the head-tilt oral method which the medical profession has in general approved, as illustrated in Journal of American Medical Association, Feb. 20, 1960, vol. 172, pages 812-815, in an article entitled, "Head-Tilt Method of Oral Resuscitation."

The notched edges 26 with pointed ends 25 of wedges 12 also act as a jaw block to open the teeth as in the case of a tight jaw or trismus which frequently occur in cases of electrical shock, drowning, etc., as indicated in the Journal of American Medical Association, Feb. 20, 1960, vol. 172, page 814:

"Efforts at opening the mouth of a victim of asphyxia in the early stages are likely to be traumatic or to fail completely, since such victims have an interval of increased skeletal muscle tone, including trismus."

The notched edges 22-24 of the wedges 12 also help to preclude the likelihood of the victim, upon regaining consciousness, spitting out the device 7, and with these notched wedges it is unnecessary for the rescuer to rely on inserting his thumb in the mouth of the victim, that practice not only being unsanitary but also hazardous especially in near-conscious victims, as stated in Journal of American Medical Association, Feb. 20, 1960, vol. 172, page 813:

"Insertion of the thumb in the victim's mouth through sharp teeth is hazardous, especially in ear-conscious victims."

The conformability of the shield 8 to fit all faces and configurations is obviously important and makes it as useful on victims without teeth as on others who have teeth. The device 7 can be reversed and the neck 14 placed between the victim's teeth and face and expired air breathing can be accomplished when it is impossible to open the jaws of the victim in the early stages of

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asphyxia. By using suction on the end of the mouth-piece 16 in the event blowing through it is not successful, the rescuer can dislodge an obstruction in many instances, so that the device 7 can also be classified as an aspirator.

The device 7 herein disclosed has been thoroughly tested and fifty victims artificially rendered unconscious were resuscitated successfully by about five hundred different lay rescue workers, to be certain that the device is reliable enough to offer to the general public as a reliable mouth to mouth resuscitator, having in mind what was stated in New York State Journal of Medicine, vol. 60, No. 3, Feb. 1, 1960:

"In an effort to improve the efficiency of the method, many devices have been introduced recently. At first glance these appear to have merit but before any can be endorsed for use by laymen they should be scrutinized carefully, submitted to tests by several different clinics, and then field trials should be held in which selected groups of lay rescue workers apply the device. This type of investigation and accumulation of case experience is a necessity before any gadget is released to the general public or before any device is endorsed by an official agency."

In conclusion, I will add that the cut-out portion 10 of the flexible shield 8 is intended for clearance under the victim's nose. If the rescuer finds that the air blown in is apparently not reaching the lungs, which should be evident from an absence of any chest movement, he can pinch the nose to close off escape of air through the nostrils during the further insufflation.

It is believed the foregoing description conveys a good understanding of the objects and advantages of my invention. The appended claims have been drawn to cover all legitimate modification and adaptations.

I claim:

1. A mouth-to-mouth resuscitator comprising a tubular mouth piece providing an unobstructed opening longitudinally therethrough and having a smooth unobstructed exterior of substantially uniform diameter substantially the full length thereof, a pair of laterally spaced elongated teeth-separating projections rigid with and in spaced parallel substantially vertical planes on opposite sides of that end of said mouth piece remote from the end inserted in the rescuer's mouth and substantially parallel to the longitudinal axis of said mouth piece, said projections having teeth-engaging shoulders provided thereon in longitudinally spaced relation on the top and bottom edges of said projections to prevent slippage once the projections are entered between the upper and lower teeth of a victim requiring resuscitation, said projections' upper and lower edges including outwardly converging outer end portions terminating in points to facilitate entry of said projections between the victim's teeth, and a mouth-enclosing flexible shield of oblong shape for sealing around the mouth of the victim, said shield having a central opening receiving the tubular mouth piece with a close slidably adjustable fit on the smooth unobstructed exterior of the mouth piece, whereby to enable adjustment of the shield longitudinally with respect to said mouth piece and accordingly alter the longitudinally spaced relationship between the shield and teeth-separating projections to better adapt the device to the victim and better suit the needs of a given resuscitation, said shield including a flange on the outer rim thereof and projecting in the same direction as the first-mentioned projections to engage the face of the victim all around the mouth to provide an air-tight seal.

2. An apparatus as defined in claim 1 in which each teeth-separating projection is thick at the end rigid with the end of the mouth piece and tapers to a relatively thin outer end that is pointed and adapted to be used as a pry to force the victim's teeth apart preliminary to further wedging action with the projection until the teeth are separated enough and are engaged behind the shoulders on the projection.

3. An apparatus as defined in claim 1 wherein the shield is normally cupped and projects toward the end of the mouth piece carrying the teeth-separating projections, but is adapted to be flexed to be cupped in the opposite direction away from said teeth-separating projections to be out of the way during entry of the projections between the teeth of the victim and interlocking of the teeth with the shoulders on the projections, the shield being thereafter sprung back to its normal shape and adjusted along the mouth piece to engage the face of the victim properly around the mouth.

4. A mouth-to-mouth resuscitator comprising a tubular mouth piece providing an unobstructed opening longitudinally therethrough and having a smooth unobstructed exterior of substantially uniform diameter the full length thereof, a pair of laterally spaced elongated teeth-separating projections rigid with and in spaced substantially parallel vertical planes on opposite sides of that end of said mouth piece remote from the end inserted in the rescuer's mouth and substantially parallel to the longitudinal axis of said mouth piece, said projections having teeth-engaging shoulders provided thereon in longitudinally spaced relation on the top and bottom edges of said projections to prevent slippage once the projections are entered between the upper and lower teeth of a victim requiring resuscitation, said projections' upper and lower edges including outwardly converging outer end portions terminating in points to facilitate entry of said projections between the victim's teeth, and a mouth-enclosing flexible shield of oblong shape for sealing around the mouth of the victim, said shield having a central opening receiving the tubular mouth piece with a close slidably adjustable fit on the smooth unobstructed exterior of the mouth piece, whereby to enable adjustment of the shield longitudinally with respect to said mouth piece and accordingly alter the longitudi-

nally spaced relationship between the shield and teeth-separating projections to better adapt the device to the victim and better suit the needs of a given resuscitation, said shield including a flange on the outer rim thereof and projecting in the same direction as the first-mentioned projections to engage the face of the victim all around the mouth to provide an air-tight seal, said projections being spaced apart a distance substantially equal to the outside diameter of the mouth piece to accommodate therebetween a length of the mouth piece, the mouth piece having a disconnectible length insertable with a close fit between said projections in crosswise relationship to the rest of the mouth piece, for compactness in packaging and storage and carrying on a person.

5. An apparatus as defined in claim 4 wherein the projections are laterally flexible with respect to one another and have flat inner surfaces converging toward the inner ends of said projections for wedging engagement of the mouth piece length therebetween.

6. An apparatus as defined in claim 4 wherein the shield is rotatably adjustable with respect to the mouth piece to dispose the shield with its long dimension in longitudinal alignment with the length of mouth piece inserted between the projections, for compactness in packaging or storage and carrying on a person.

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