

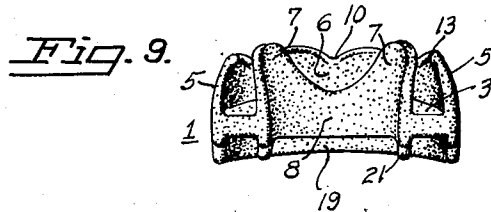
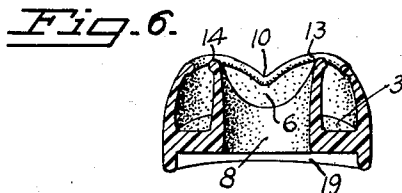
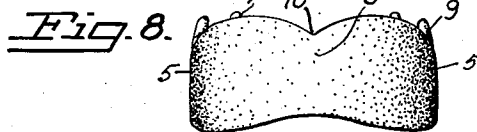
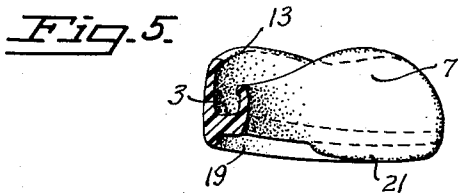
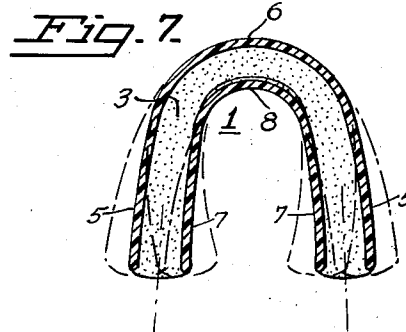
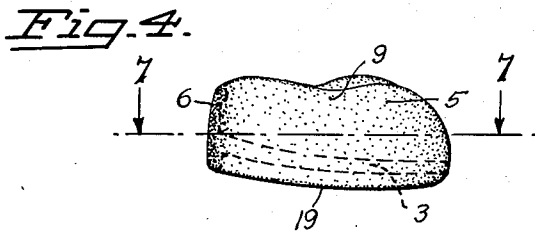
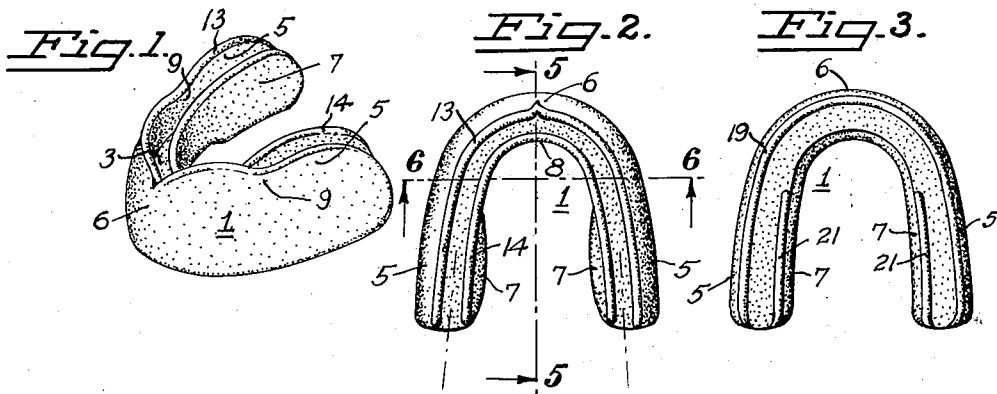
Jan. 3, 1961

J. F. CATHCART ET AL

2,966,908

UNIVERSAL MOUTH PROTECTOR

Filed Jan. 27, 1958



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2,966,908

UNIVERSAL MOUTH PROTECTOR

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Our invention relates to mouth protectors and more particularly to those adapted for use by individuals engaged in contact sports or other pursuits to prevent possible injury to the teeth, lips, or other regions of the mouth, as well as to protect the user against dislocation or injury to the temporo-mandibular joint and its articulating capsule.

This application covers an improvement upon the invention of the patent for Mouth Protector, No. 2,643,652 of June 30, 1953, and while it incorporates many of the features of the patented device, its shape and dimensions represent the result of a different approach to a solution of the same problem.

Among the objects of the present invention are:

- (1) To provide a novel and improved mouth protector;
- (2) To provide a novel and improved mouth protector capable of fitting mouths differing substantially from one another within essentially the entire range of variations, both in size and shape, among individuals;
- (3) To provide a novel and improved mouth protector offering a multiple gripping action to assure against dislodgement under most adverse conditions;
- (4) To provide a novel and improved mouth protector allowing free and easy mouth breathing;
- (5) To provide a novel and improved mouth protector which offers full protection to the lips, cheeks, and the teeth of the wearer;
- (6) To provide a novel and improved mouth protector which will protect the temporo-mandibular joint and its articulating capsule from trauma, dislocation, or fractures thus preventing concussions;
- (7) To provide a novel and improved mouth protector capable of being worn by orthodontic patients having braces or other orthodontic appliances on their teeth;
- (8) To provide a novel and improved mouth protector which may be worn comfortably, despite the fact that it is not initially tailored to one's individual specifications;
- (9) To provide a novel and improved mouth protector which may be applied without the necessity of preliminarily preparing the same for use;
- (10) To provide a novel and improved mouth protector, which when exposed to the body temperature of the wearer, automatically conforms more closely to the individual's requirements as to fit; and
- (11) To provide a novel and improved mouth protector fabricated from material other than rubber and one which offers superior advantages to one made of such material.

Additional objects of our invention will be brought out in the following description of a preferred embodiment of the same, taken in conjunction with the accompanying drawings, wherein:

Fig. 1 is a three dimensional view of a mouth protector embodying the features of the present invention;

Fig. 2 is a plan view looking down on the same;

Fig. 3 is a plan looking at the under side of the mouth protector of Fig. 1;

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Fig. 4 is a side view in elevation of the mouth protector of Fig. 1;

Fig. 5 is a view in section taken in the plane 5—5 of the mouth protector of Fig. 2;

Fig. 6 is a view in section taken in the plane 6—6 of Fig. 2;

Fig. 7 is a view in section taken in the plane 7—7 of Fig. 4;

Fig. 8 is a frontal view in elevation of the mouth protector of Fig. 1; and

Fig. 9 is a rear view in elevation of the mouth protector of Fig. 1.

Referring to the drawings for details of our improved mouth protector in its preferred form, the same is for application to the upper teeth and is formed to provide a U-shaped trough 1 involving a floor 3 which lies in the surface of a sphere of substantially 8 inch diameter, such floor being bordered along its outer or buccal-labial edge by a smooth continuous buccal-labial wall, which includes buccal wall sections 5 and an intermediate labial wall section 6. The floor along its inner or lingual edge is bordered by a smooth continuous wall made up of side sections 7 and an intermediate palatal wall section 8.

The floor gradually increases in thickness from the end portions to be occupied by the molars, to the anterior portion which will be occupied by the front or incisor teeth, the gradual increase in thickness being such as to conform to a normally existing angle of approach of the upper and lower jaws in the act of closing the mouth, thus to assure engagement of the floor of the mouth protector by the incisors of the lower jaw simultaneously with the molars thereof. A gradual increase in such thickness from a matter of 3 mm. at the ends to approximately a thickness of 5 mm. at the position of the incisors is most satisfactory for average conditions.

The outer or buccal-labial wall is carried up to a point above the height of contour of the teeth supporting bony tissue, and it preferably reduced in height at an intermediate location 9 along the buccal wall sections 5, corresponding to the location of the buccal muscle attachments in the mouth, while the notch 10 centrally of the labial portion 6 allows clearance for the labial frenum of the mouth and thus avoids impingement thereon. This outer wall terminates along its upper free edge in a bead 13 directed inwardly of the trough.

The inner or lingual wall rises only to a point just below the junction line of the crest of the gingival gum tissue attachment in the mouth, but like the outer wall, is preferably bordered by a bead 14 directly inwardly of the trough.

Depending from the floor along its outer edge and forming a depending continuation of the buccal-labial wall of the trough, is a continuous rib 19, which in the installed position of the mouth protector, is adapted to overhang the teeth of the lower jaw when the two jaws are brought together into biting relationship against the mouth protector. As such, it offers protection to the teeth of the lower jaw and minimizes any possibility of biting the cheeks or lips. In addition to such protection, said rib will serve as a buffer in resisting lateral displacement of the lower jaw in response to a shock or blow directed against such jaw.

Depending from the inner edge of the trough floor, along each side of the trough, is another rib 21. Each such rib extends from the distal of the position which will be occupied by the second molar to the distal of the cuspids, when installed in the mouth of the user, at which point it tapers off sharply and merges into the floor of the trough, leaving a free space along the front lingual edge.

Such ribs 21 are so disposed with respect to the teeth of the lower jaw when installed in the mouth, as to be in

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alignment with the line dividing the buccal and lingual cusps of molars and bicusps of the lower jaw, whereby in the act of bringing the two jaws together, the molars and the bicusps will mesh with and strike these ribs, just prior to engaging the under surface of the trough floor.

The significance of this lies in the fact that by making these ribs of proper height and cross-section, they may be relied on to absorb light blows to the chin, and to further function as preliminary buffers in the matter of blows of sufficient force to bring both jaws into biting relationship against the floor of the trough portion. In cooperation with the outer rib 19 the inner ribs 21 will also aid in resisting lateral displacements of the lower jaw to prevent dislocation.

By terminating these preliminary shock absorbing ribs at the distal of the cusps, as previously indicated, the tongue is free to reach the lingual surfaces of the lower incisors and approach the upper incisors within the thickness of the lingual wall of the trough portion, thereby permitting substantially normal articulation in the matter of speech, besides adding to the comfort of the wearer in providing greater latitude for tongue movements.

The foregoing features of the mouth protector of the present invention are for the most part, quite similar to those of the aforementioned patent. The present mouth-protector, however, differs in many respects from that of the earlier patent, both as to dimensions and structure.

In accordance with the disclosure of the aforementioned patent, the contour and size of the mouth protector was determined by the maximum departures both inwardly and outwardly from the average, within each of three different size ranges and consequently required a minimum of three sizes, with each size designed to accommodate wide variations from the average within its particular range. The width of the trough being designed to accommodate the greatest variations within a particular size range, the palatal membrane was relied on to provide the greater portion of the holding power of the device.

In accordance with the present invention, a new and different approach enables the creation of a single size mouth protector which can satisfy practically all requirements covered by the three size ranges of the previously referred to patented device. In lieu of trying to contour the mouth protector to a composite mouth as previously done and incorporating therein a palatal membrane for retention purposes, the protector of the present invention is made without a palatal membrane, and to a size intermediate the small mouth and the large mouth. Such size may be represented by a distance of 39 mm. between the ends of the median line of the trough.

In conjunction with this, the trough walls are formed to approach each other to the extent of bringing their upper edges to a spacing of 3 mm., or less than the width of a molar of small size, which would be of the order of 4 mm.; and to accommodate the mouth protector to mouths of different depth, that is as measured from the front teeth to the rear molars, the trough is open at its free ends. In other words, the mouth protector of the present invention has no bridging wall of the extremities of the trough, as in the mouth protector of the aforementioned patent.

With the mouth protector thus dimensioned, it is adapted to snap on to the teeth of a medium sized mouth. For a small mouth, the device must be contracted by bringing the ends of the trough toward each other slightly, before the same can be applied, and when released following its application, the tendency for the device to spread to its original dimension, will cause it to exert lateral pressure against the inner surfaces of the teeth, while the original narrow spacing between the upper edges of the trough walls will still permit holding power from this source.

In applying the mouth protector to the teeth of a large

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mouth, the device must be expanded slightly by spreading the ends of the trough away from each other, whereby upon releasing the device following application to the teeth, the tendency of the same to return to normalcy will cause the outer wall and its bead to bear with increased pressure against the outer surfaces of the teeth and gums, to supplement the holding power attributable to the original narrow spacing between the upper edges of the walls.

The ability to contract and expand the trough in the manner indicated and to the extent necessary to apply the same to the smaller and the larger mouths, is made possible by the elimination of the palatal membrane.

To enable most effective utilization of holding power from the aforementioned sources, certain additional dimensions must be met. All walls should be of a thickness of 2 mm., such thickness dimension being applicable also to the ribs 19 and 21 which are essentially downward extensions of the trough walls. The inwardly directed bead 13 on the outer wall should be of an effective diameter of 3 mm. while the bead 14 on the inner wall should preferably be 2½ mm. in thickness.

The trough floor at its frontal portion lying between the labial wall section 6 and the palatal wall section 8, should have a width of 2 mm., whereas the same floor in the regions to be occupied by the cusps and molars, should have a width of 7 mm. between the outer and inner walls of the trough.

The labial wall section 6 as measured upwardly to the low point in the V-notch, measures 18 mm. This increases to a dimension of 22 mm. as the labial wall section 6 merges into the buccal wall sections 5, each of which then drops to a dimension of 18 mm. in the region 9 occupied by the corresponding buccal muscle, and then gradually rises to a dimension of 20 mm., as the buccal wall section approaches a free end of the trough.

As to the dimensions of the lingual wall, this wall drops from a height of 22 mm. at each side, such dimensions including the inner rib 21, and reaches a minimum of 10 mm. midway of the palatal wall section 8.

The foregoing dimensions are quite critical for the realization of maximum holding power, but the device can tolerate slight plus or minus variations in these dimensions without completely losing the holding power that retains the mouth protector in place, with the mouth open.

Another and quite important feature of the present invention, in its preferred form, lies in the specific material from which the mouth protector is made. While the device lends itself to being molded from materials conventionally utilized heretofore, such as rubber for example, we have discovered that novel and remarkably improved results can be realized by utilizing as a material from which to mold the mouth protector, a vinyl resin plastic, the same being defined and identified as a synthetic resin formed by the polymerization of chemical compounds containing the group $\text{CH}_2=\text{CH}-$.

Such material can be made to have the resilient characteristics of rubber, and like rubber, can be flavored to neutralize the taste of the base material. Over and above these desired characteristics, it will not dry out, deteriorate, oxidize or discolor.

Further, such material will not tear, nor can it be chewed, and thus, when employed in a mouth protector, it will withstand all of the abuse to which a mouth protector is expected to be exposed to when in use.

A mouth protector made from this material, will also be more dense and less porous than rubber, thus enabling it to be readily cleanable and maintainable in a sanitary condition.

From the viewpoint of manufacture, a mouth protector of vinyl resin plastic, can be molded more economically and in considerable less time than when utilizing rubber, in that vinyl resin plastic material does not require vulcanization like rubber, and no flashing exists to be

trimmed following removal of the mouth protector from the mold. The process cycle for molding a mouth protector from the vinyl resin plastic requires but 20 seconds to complete, as compared with the required cycle of 360 seconds and more when molding such device from rubber. Thus a very considerable saving in time, labor and cost of materials is realized.

In addition to the foregoing advantages and of prime importance in connection with the use of vinyl resin plastic as the material from which to fabricate a mouth protector, is the fact that the material, through control of polymerization, may be made to soften slightly when exposed to body temperature, as when worn in the mouth, such slight softening being sufficient to enable the mouth protector to adjust itself and conform more closely to the specific requirements of the wearer while being worn. This not only increases its holding power, but renders the same more comfortable to the wearer.

It will be apparent that the invention as illustrated and described fulfills all the objects thereof. Certain features, however, may be utilized to the exclusion of others and we accordingly do not desire to be limited in our protection to the specific details as illustrated and described except as may be necessitated by the appended claims.

We claim:

1. A mouth protector for application to the upper teeth of one engaged in contact sports, comprising a U-shape open ended trough of resilient water-insoluble material and involving a floor, a wall along the outer edge of said floor and terminating along its upper free edge in an inwardly directed bead, a wall along the inner edge of said floor and terminating in a free upper edge, the distance between the ends of the median line of said trough being approximately 39 mm., and said material having sufficient resiliency to permit the protector to change its shape readily to conform to differently shaped dentures when pressed into engagement therewith, by pressure of the teeth against either wall of the trough, to hold the protector thereon.

2. A mouth protector for application to the upper teeth of one engaged in contact sports, comprising a U-shape open ended trough of resilient water-insoluble material, and involving a floor, a wall along the outer edge of said floor and terminating along its upper free edge in an inwardly directed bead, a wall along the inner edge of said floor and terminating in a free upper edge, the distance between the ends of the median line of said trough being approximately 39 mm. and the spacing between upper edges of the opposing outer and inner walls being approximately 3 mm., and said material having sufficient resiliency to permit the protector to change its shape readily to conform to differently shaped dentures when pressed into engagement therewith, by pressure of the teeth against either wall of the trough, to hold the protector thereon.

3. A mouth protector for application to the upper teeth of one engaged in contact sports, comprising a U-shape trough of a resilient water-insoluble vinyl resin plastic, and involving a floor, a wall along the outer edge of said floor and terminating along its upper free edge in an inwardly directed bead, a wall along the inner edge of said floor and terminating in a free upper edge, the distance between the ends of the median line of said trough being approximately 39 mm. and the spacing between upper edges of the opposing outer and inner walls being approximately 3 mm., and said plastic having sufficient resiliency to permit the protector to change its shape readily to conform to differently shaped dentures when pressed into engagement therewith, by pressure of the teeth against either wall of the trough, to hold the protector thereon.

4. A mouth protector for application to the upper teeth of one engaged in contact sports, comprising a U-shape open ended trough of a resilient water-insoluble vinyl

resin plastic, and involving a floor, a wall along the outer edge of said floor and terminating along its upper free edge in an inwardly directed bead, a wall along the inner edge of said floor and terminating in a free upper edge, the distance between the ends of the median line of said trough being approximately 39 mm. and the spacing between upper edges of the opposing outer and inner walls being approximately 3 mm., said plastic having sufficient resiliency to permit the protector to change its shape readily to conform to differently shaped dentures when pressed into engagement therewith, by pressure of the teeth against either wall of the trough, to hold the protector thereon.

5. A mouth protector for application to the upper teeth of one engaged in contact sports, comprising a U-shaped open ended trough of resilient water-insoluble material, said trough having a spread of substantially 39 mm. between the ends of the median line thereof and involving a floor; a buccal-labial wall of substantially 2 mm. thickness along the outer edge of said floor and terminating along its upper edge in an inwardly directed bead of substantially 3 mm. thickness; an inner wall of substantially 2 mm. thickness along the inner edge of said floor and terminating in a free upper edge, said inner wall including an intermediate or palatal section having a height at its center of approximately 10 mm., and said material having sufficient resiliency to permit the protector to change its shape readily to conform to differently shaped dentures when pressed into engagement therewith, by pressure of the teeth against either wall of the trough, to hold the protector thereon.

6. A mouth protector for application to the upper teeth of one engaged in contact sports, comprising a U-shaped open ended trough of resilient water-insoluble material, said trough having a spread of substantially 39 mm. between the ends of the median line thereof and involving a floor; a buccal-labial wall of substantially 2 mm. thickness along the outer edge of said floor and terminating along its upper edge in an inwardly directed bead of substantially 3 mm. thickness; an inner wall of substantially 2 mm. thickness along the inner edge of said floor and terminating in a free upper edge, said inner wall including an intermediate or palatal section having a height at its center of approximately 10 mm.; said buccal-labial wall and said inner wall approaching each other to a spacing of approximately 3 mm. between them as measured at their upper edges, and said material having sufficient resiliency to permit the protector to change its shape readily to conform to the differently shaped dentures when pressed into engagement therewith, by pressure of the teeth against either wall of the trough, to hold the protector thereon.

7. A mouth protector for application to the upper teeth of one engaged in contact sports, comprising a U-shaped open ended trough of a resilient water-insoluble vinyl resin plastic, said trough having a spread of substantially 39 mm. between the ends of the median line thereof and involving a floor; a buccal-labial wall of substantially 2 mm. thickness, along the outer edge of said floor and terminating along its upper edge in an inwardly directed bead of substantially 3 mm. thickness; an inner wall of substantially 2 mm. thickness along the inner edge of said floor, said inner wall including an intermediate or palatal section having a height at its center of approximately 10 mm.; said buccal-labial wall and said inner wall approaching each other to a spacing of approximately 3 mm. between them as measured at their upper edges, and said plastic having sufficient resiliency to permit the protector to change its shape readily to conform to differently shaped dentures when pressed into engagement therewith, by pressure of the teeth against either wall of the trough, to hold the protector thereon.

8. A mouth protector for application to the upper teeth of one engaged in contact sports, comprising a U-shaped open ended trough of a resilient water-insoluble vinyl

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resin plastic, said trough having a spread of substantially 39 mm. between the ends of the median line thereof and involving a floor arced on a diameter of approximately eight inches and having a thickness of substantially 3 mm. at its free ends and increasing to a thickness of substantially 5 mm. at its front intermediate section; a buccal-labial wall of substantially 2 mm. thickness, along the outer edge of said floor and terminating along its upper free edge in an inwardly directed bead of substantially 3 mm. thickness; an inner wall of substantially 2 mm. thickness, along the inner edge of said floor, said inner wall including an intermediate or palatal section having a height at its center of approximately 10 mm.; said buccal-labial wall and said inner wall approaching each other to a spacing of approximately 3 mm. between them as measured at their upper edges, and said plastic having sufficient resiliency to permit the protector to change its shape readily to conform to differently shaped dentures when pressed into engagement therewith, by pressure of

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the teeth against either wall of the trough, to hold the protector thereon.

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