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J. F. CATHCART

3,333,582

CUSTOM FITTABLE MOUTH PROTECTOR

Filed March 23, 1964

2 Sheets-Sheet 1

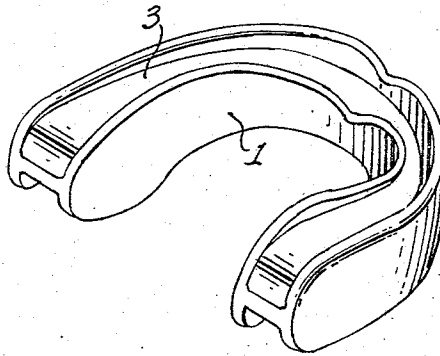


Fig. 1.

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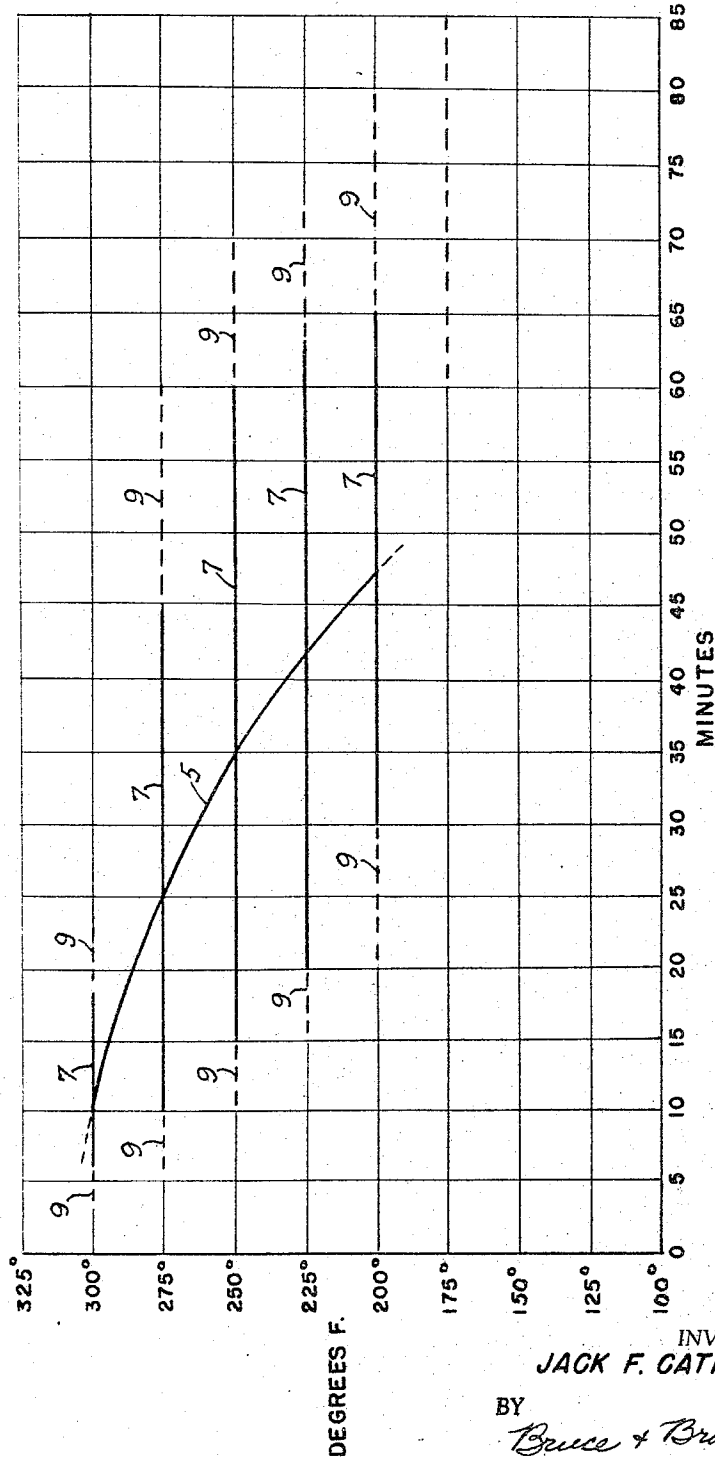
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Fig. 2.



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CUSTOM FITTABLE MOUTH PROTECTOR

Jack F. Cathcart, Berkeley, Calif., assignor to Shur-Fit Corporation, a corporation of California
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3 Claims. (Cl. 128-136)

My invention relates to mouth protectors and more particularly to a mouth protector of the custom fittable type.

A custom fitted mouth protector is one fitted to the teeth of the individual who is to use it, and thus provides for better retention and greater comfort to the wearer. It is therefore to be preferred over one which is not so personalized.

In my patent for mouth protector No. 2,759,041 of June 19, 1956, I disclose specifically, a mouth protector of the custom fittable type in which the hull is of soft vellum or pure rubber, with the fill material for such hull having an ingredient of rubber which makes it compatible with the material of the hull.

However, a hull of resilient plastic is deemed preferable to one of rubber by reason of its being tougher, less porous and therefore more sanitary, besides requiring no vulcanization in the processing thereof, and otherwise presenting greater eye appeal to the user. Mouth protectors of such material are currently being produced but are of the open trough type, such as disclosed in Patent No. 2,966,908 for Universal Mouth Protector, in which I am a joint inventor.

Such type of mouth protectors have not previously been produced with a fill adapted to take and hold an impression of one's teeth so as to custom fit the same to an individual, because of the difficulty of providing a fill material which would be compatible with the hull material, and at the same time possess the qualities and characteristics deemed necessary in a fill material.

The mere ability to retain fill material in the trough of the hull is not, in and of itself, a solution to the problem. The material for one thing, must be non-toxic to humans, and this is of the utmost importance. The material, furthermore, must not only be able to take an impression of one's teeth at temperatures within the ability of a human being to stand, but must also be such as to retain such impression within such range of lower temperatures in which it will be exposed in use.

Also, quite desirable from the viewpoint of fabricating the device, is the ability and convenience with which one can assemble and fix the fill material into the hull of the mouth protector, and under conditions which may be deemed reasonable from an economic and manufacturing standpoint.

Accordingly, among the objects of my invention are:

- (1) To provide a novel and improved mouth protector;
- (2) To provide a novel and improved mouth protector of the custom fittable type, formed throughout of resilient plastic material;
- (3) To provide a novel and improved mouth protector of resilient plastic material capable of being custom fitted to an individual;
- (4) To provide a novel and improved method of fabricating a mouth protector of resilient plastic;
- (5) To provide a novel and improved method of fabricating a mouth protector of resilient plastic, and capable of taking an impression of one's teeth.

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

FIGURE 1 is a three-dimensional view depicting the mouth protector of the present invention;

FIGURE 2 is a graph depicting temperature-time rela-

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tionships applicable in the fabrication of the mouth protector of the present invention.

Referring to the drawings for details of my invention in its preferred form, I provide a hull 1 of trough shape, the physical characteristics of which are not critical to the present invention. In its preferred form, however, the hull preferably takes on the physical characteristics and features of that depicted in the aforementioned patent for Universal Mouth Protector, No. 2,966,908. The hull will, furthermore, be preferably formed of material similar to the vinyl resin plastic specified in such patent and which may be generically referred to as a vinyl polymer, the specific polymer employed in the preferred form, being poly-vinyl chloride.

The fill material 3 may be one of the group generically referable to as a vinyl co-polymer, and in the preferred form of the invention, such fill material will be ethylene-vinyl acetate. This material is available on the market under the Du Pont trademark Elvax, the particular grade preferred, having a vinyl-acetate content of 27 to 34 percent.

Such material is not only non-toxic to humans, but I have found through extensive experimentation, that this material may be bonded to material such as that employed in the molding of the hull, and at temperatures above body temperature, but yet, which are sufficiently low to be readily obtainable through use of apparatus readily available on the market.

A study of the graph of FIGURE 2 will show that within a range of temperature of the order of 200° F. to 400° F., the two materials are capable of being chemically fused or bonded, the time of exposure to such temperatures varying with the temperature in accordance with the curve 5 depicted in the graph.

Points along this curve are not critical as to time interval of exposure to the temperature related thereto, and this has been depicted at selected points along the curve by horizontal solid lines 7 terminating at each end in a dash line extension 9. The solid line indicates that good bonding may be realized at the related temperature, within a period of time spanned by the line in question, while the dash line extensions indicate possibility of realizing bonding for the additional time periods but the situation is not ideal. The points at which the curve intersects these horizontal solid lines represent ideal processing times or periods for the particular temperatures indicated by such lines.

In fabricating a mouth protector in accordance with the present invention, the fill material is extruded or otherwise formed into a strip adapted to fit into the trough or channel of the hull, following which, the hull, with the fill material therein, is then placed into an oven or equivalent which has been pre-heated at a dry heat, to the selected temperature, and is maintained in such dry heated atmosphere for a time interval required to effect proper bonding of the fill material to the hull, which values may be obtainable from the chart.

No adhesive or bonding cement is required in the process. It is believed that bonding is realized by a penetration of molecules of one material into those of the other material, which upon cooling, results in the bond between the two materials.

The mouth protector when removed from the oven and cooled, is ready for application in the custom fitting of the same to the individual who is to use the device. The protector is placed into a small bowl or pan, and boiling water poured thereover until it is completely immersed. After remaining immersed in the water for two to three minutes, the fill material is in a softened condition and ready to take an impression.

The device is then removed from the water, and after shaking off all excess water, the intended user inserts it

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into his mouth with his upper or lower teeth in alignment with the trough, and then brings his jaws together in a normal closing manner, keeping them clenched for approximately two minutes. The mouth protector may then be removed and chilled under cold tap water. It is then ready for use by the individual.

If a perfect impression of the individual's teeth has not been realized, attributable possibly to inaccurate positioning of the protector while making the impression in the first instance, the mouth protector can be reheated in the manner previously described above and another impression taken.

From the foregoing description of my invention in its preferred form, both as an article of manufacture and the method of fabricating the same, it will be apparent that the same fulfills all the objects of my invention, and while I have illustrated and described the same in its preferred form, and in considerable detail, I do not desire to be limited in my protection to the specific details illustrated and described, except as may be necessitated by the appended claims.

I claim:

1. The method of fabricating a mouth protector comprising:

placing into a trough shaped hull formed of a vinyl polymer, a fill of a vinyl co-polymer, which is non-toxic to humans and has a fusion temperature with the hull material above that of body temperature,

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and heating said hull with said fill therein, to a temperature at which fusion takes place.

2. The method of fabricating a mouth protector comprising:

placing into a trough shaped hull formed of a vinyl polymer, such as poly-vinyl chloride, a fill of vinyl co-polymer, which is non-toxic to humans and has a fusion temperature with the hull material above that of body temperature, and dry heating said hull with said fill therein, to a temperature at which fusion takes place.

3. The method of fabricating a mouth protector comprising:

placing into a trough shaped hull formed of a vinyl polymer, such as poly-vinyl chloride, a fill of a vinyl co-polymer, such as ethylene-vinyl acetate, which is non-toxic to humans and has a fusion temperature with the hull material above that of body temperature, and dry heating said hull with said fill therein, to a temperature at which fusion takes place.

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ADELE M. EAGER, *Primary Examiner*.