This invention relates in general to dental appliances and more particularly to means for topical treatment of teeth and gums.

There are a number of treatments both rehabilitative and prophylactic which involve topical application of medication to a patient's gums or teeth or both. One important area of such treatment is a mass program for topically applied fluoride to the teeth; for example, in schools, local health departments, and in private dental offices. Topical arch trays of the type to which this invention relates is an improvement upon the old method of painting each individual tooth by means of a cotton tipped applicator dipped in the substance to be applied. These trays provide a means for applying the topical agent to a complete arch of teeth in one application by means of a simple tray which holds the treatment agent in place.

One method of applying medication to an arch of teeth is to cast or otherwise fabricate special arch trays for each patient. This approach is, however, expensive, time-consuming and often uncomfortable for the patient. Other arch trays have been made which are soft, spongy and pliable and which fit a wide variety of mouth sizes and shapes. Although the latter type may be manufactured relatively inexpensively, the product, as shipped must have some type of channel or groove which holds the medication around the patient's teeth. This requirement results in appreciable bulk for storage and shipping and severely limits the number of such units a dentist may have on hand.

It is therefore an object of this invention to provide a topical arch tray capable of applying a medication to all of the teeth in one dental arch simultaneously, which tray can be conformed to a wide variety of arch shapes and sizes.

It is another object of this invention to provide a topical arch tray which may readily be manufactured, shipped and stored in flat form, to be shaped to a patient's mouth only when it is actually used.

It is further object to provide a disposable topical arch tray which may be used equally well with medications in either liquid or gel form.

Broadly speaking, the arch tray of this invention is formed as a flat U-shaped laminate fabricated from a substance which will absorb and retain liquid, such as a super absorbent cotton or a spangleike open-celled material, such as foam rubber or non-toxic foamed polymer, adhered to a similar U-shaped flat, deformable, liquid impermeable backing, such as paraffin. Before application to the patient's mouth, the topical arch tray is pressed into a simple mechanical mold which deforms it into a U-shaped channel of a configuration which will enclose both the inner and outer surfaces of one arch of teeth. The tray has the characteristic that when it is deformed, the paraffin backing maintains it in the new shape. The liquid absorbent element is designed to absorb the medicating agent as applied to it in liquid form, and the impermeable backing prevents this agent from contaminating external surfaces by soaking through the topical arch tray. In using the tray for a treatment, the procedure would normally involve dispensing the medication into the deformed tray, drying the patient's teeth with an air syringe and then fitting the tray into the patient's mouth and pressing it around his teeth. The patient then closes his mouth for a period of time sufficient to accomplish the desired medical result. In contradistinction to many present performed topical arch trays, the tray of this invention is soft, spongy and pliable with no excess bulk or hard corners, so that it is relatively comfortable to the patient. Also, this invention permits a complete arch of the patient's mouth to be treated separately, or both arches simultaneously at the same time. Furthermore, the tray may be made of tasteless, non-toxic substances and is disposable after use by each patient thereby positively preventing cross-contamination between patients.

Other objects and advantages will become apparent from the following detailed description when taken in conjunction with the accompanying drawing in which:

FIG. 1 is a perspective view of the flat laminated tray before use;

FIG. 2 is a perspective view of a mold to be used in conjunction with the tray of FIG. 1;

FIG. 3 is a perspective view of the tray of FIG. 1 after it has been shaped for use; and

FIG. 4 is a cross-sectional view of the topical arch tray of this invention taken along the line 3—3 of FIG. 1.

Referring now to the drawing, FIG. 1 shows the topical arch tray 10 prior to deformation for use. The tray is a laminated device formed in two layers; a relatively thin, liquid absorbent upper layer 11, and a flat lower layer 12 made of a deformable, liquid impermeable substance such as paraffin or deformable plastic. Paraffin is an appropriate substance because it is inexpensive and has the property that once it is formed to any particular shape it tends to maintain that shape. The upper layer may be made of a highly liquid absorbent material such as a super absorbent, lint-free, non-woven pure cotton, or an open-celled structure of sponge rubber or foamed polymer. This liquid absorbent layer is shown as sponge rubber in the drawing. The laminate may be made in large sheets with the paraffin fixed to one surface of the liquid absorbent layer by means of an adhesive or by heat sealing. The tray of this invention may then be stamped out of the sheet laminate by a machine. Alternatively, the liquid absorbent layer may first be stamped out and then have one surface coated with the deformable material.

Mold 13, as shown in FIG. 2, is formed with an indented U-shaped channel 14 so that pressing a tray 10 into channel 14 forms the tray into a general arched channel shape as illustrated in FIG. 3.

Mold 13 may be made of any rigid material such as hard plastic and one or two such devices may be shipped to a user with each package of topical arch trays. The medicating agent may be applied by a medicine dropper or a dispensing tube to the liquid absorbent upper portion of tray 10 while it is still in mold 13 or after it has been removed therefrom. The tray is then placed in the patient's mouth and pressed around both sides of the patient's teeth and gums. The liquid absorbent portion 21 forces the medicating agent between and around the patient's teeth for complete coverage. After the tray has been properly positioned, the patient closes his mouth to insure that the tray remains in position against all of the surfaces of his teeth. The patient's mouth should remain closed for the length of time required for the particular type of topical treatment being given; for example, three to five minutes is generally required to accomplish normal topical fluoride treatment with a conventional strength agent. When the treatment is completed, the topical arch tray is removed and disposed of. Tray 10 should be made somewhat wider at the rearward end, and a front portion 16 to enable it to fully cover the larger rear teeth. Since the exterior surfaces of the front teeth are generally less extensive than those of the rear teeth, the forward portion of the tray need not be as wide as the
rear. Because the tray of this invention fits a wide variety of sizes and shapes of dental arches, only two or three sizes of trays are necessary to fit all sizes, including children.

Although the invention has been generally described in terms of a paraffin and liquid absorbent laminate made to hold a liquid topical agent, it is to be understood that many modifications may be made which are within the spirit and scope of the invention and that solutions such as sodium fluoride, stannous fluoride, phosphate fluoride, hydrogen peroxide, or an antibiotic may be used with such a device. Furthermore, gelatinized or other forms of topical agent can be used with this invention if desired. Accordingly, the invention herein described should be construed as limited only by the spirit and scope of the appended claims.

What is claimed is:

1. A flexible, deformable laminated topical arch tray for topical treatment of teeth and adjacent gum areas, comprising:
   a flat U-shaped liquid absorbent element; and
   a substantially coextensive flat U-shaped deformable liquid impermeable element fixed to one surface of said liquid absorbent element, said liquid impermeable element being capable of retaining said topical

2. A flexible deformable laminated topical arch tray as in claim 1, wherein:
   said liquid absorbent element is an open-celled structure of foamed polymer.

3. A flexible, deformable laminated topical arch tray as in claim 1, wherein:
   said impermeable element is a hydrocarbon of the paraffin series which is solid at room temperature.

4. A flexible, deformable laminated topical arch tray as in claim 1, wherein:
   said liquid absorbent element is formed of non-woven pure cotton.

References Cited

UNITED STATES PATENTS
3,060,935 10/1962 Riddell
3,339,547 9/1967 Drabkowski
ADELE M. EAGER, Primary Examiner.
U.S. Cl. X.R.
128—136