An improved device is disclosed for holding open a person's mouth so as to facilitate medical or dental treatment. The improved device includes two shells which have a trough-shaped cross-section, which are designed to receive the patient's lips and which are interconnected by a U-shaped stirrup that biases the shells outwardly, away from each other. The stirrup includes a centrally disposed, stud-shaped projection which displaces and retains the tongue. Two flanges are disposed at the ends of the stirrup and are curved outwardly so as to hold the patient's cheeks away from the sides of his teeth. The stirrup and the flanges may accommodate means of sucking saliva and other liquids from the mouth cavity and means for illuminating the mouth cavity.

5 Claims, 7 Drawing Figures
This invention relates to a device for facilitating oral and dental treatment, and more particularly, to an improved device for holding open the mouth for treatment of the mouth and teeth.

For treatment of the mouth, and especially in dentistry, it is often necessary for a patient to hold his mouth open absolutely as far as possible for fairly long periods. Such compulsory holding of the mouth open leads to muscular cramps, to increased secretion of saliva and difficulties in breathing. These phenomena have an adverse and impeding effect upon the medical or surgical treatment of the mouth cavity or teeth. In order to provide some alleviation for the discomfort of the patient and to facilitate the holding open of the mouth, it has been a practice to place a large swab between the patient’s teeth during dental treatment. A further disadvantage is that when the mouth is compulsorily held open, the mucous membranes of the cheeks are naturally closely adjacent to the teeth and can easily be injured by an instrument, for example, during dental treatment.

The objective underlying the present invention is, therefore, to propose an improved device for holding open the mouth which overcomes the above mentioned disadvantages. When utilized, this improved device of the present invention completely liberates the patient from compulsion to close his mouth, relaxes the patient’s corresponding muscular system, keeps the mucous membranes of the patient’s mouth, and especially the inner surfaces of the cheeks, as far as possible from the patient’s teeth, and also removes and keeps away the patient’s tongue from the field of oral operation.

This objective is achieved by my invention by providing an improved device that includes arc-shaped shells, having a trough-shaped cross-section, interconnected and held apart by an elastic, substantially U-shaped, curved stirrup. The U-shaped stirrup comprises a web having a stud-shaped projection at its center and flanges that are sharply, outwardly curved in the vicinity of the arc-shaped shells. The shells are connected to the substantially U-shaped stirrup at the ends of the two flanges and are designed to receive the patient’s lips. The U-shaped stirrup is adapted to be seated completely inside the mouth cavity in such a way that the flanges curving outwardly from the web of the stirrup press the patient’s cheeks outwardly away from the teeth. The shape of my improved device is especially important since the improved device is thereby firmly held in the mouth.

On account of the spring-elastic construction, my improved device can be compressed, to a certain extent, for insertion into a patient’s mouth. While compressed, the arc-shaped shells are disposed opposite to the lips. When the compression is released, they are moved outward so as to take the patient’s lips with them. The arc-shaped side components of the shell then lie against the inner surfaces of the cheeks, while the stud-shaped projection on the center of the web of the U-shaped stirrup displaces the tongue backwards and holds it down.

When the mouth is held widely open and when a device, such as my improved device, is introduced into the mouth, an increased flow of saliva occurs. To counter this, a suction tube may be led to a suitable position on the stirrup of my improved device, with this tube being connected by a flexible line to a saliva-suction device. A so-called cold illuminating line, consisting in known manner, of a glass or glass fibre rod, may also be led to the two flange parts of the U-shaped stirrup, especially to the inner side of same, and these can thus serve to illuminate the mouth cavity, teeth, etc. If desired, the entire U-shaped stirrup can be furnished with appropriate cold illuminating lines.

My improved device is preferably made of a suitable transparent plastic, which possesses the aforementioned necessary spring characteristics. It may also be of glass fibre-reinforced plastics. It is, however, possible to make the device of metal, and also for example, to provide the U-shaped stirrup with additional devices for resiliently or springingly urging open the arc-shaped shells.

The invention is now explained in more detail with reference to the preferred embodiment of my present invention which is illustrated in the following drawings.

DESCRIPTION OF THE DRAWINGS

FIG. 1 is a perspective view, from the front, of my improved device.

FIG. 2 is a diagrammatic view of my improved device from above.

FIG. 3 is a view from the front of my improved device, showing tubes for sucking liquid from the mouth cavity and lines for illuminating mouth cavity.

FIG. 4 is a view plan of the device, according to FIG. 3, with a portion of a suction tube or cold illumination line being shown.

FIG. 5 is a section along the line V-V of FIG. 4.

FIG. 6 is a perspective view of my improved device, shown inserted into the mouth cavity.

FIG. 7 is a perspective view of a normally opened mouth without my improved device being inserted therein.

DESCRIPTION OF THE PREFERRED EMBODIMENT

Referring now to FIGS. 1–5, the improved device of my present invention includes two arc-shaped shells 10 and 10’ which have a trough shaped cross-section and which receive the lips and push them apart. The two shells correspond, in their curvature, approximately to the shape of the human mouth when "A" is spoken with the mouth wide open. The width of the trough shaped cross-section of the shells is such that the lips are seated completely within the shells and are thus protected against damage or injury by any instruments being introduced into the mouth, to the extent that such instruments may indeed bear on the shells. It can be seen in FIG. 1 that the shells 10 and 10’ are spaced apart at the top by a certain amount "X" and at the bottom by a certain amount "Y". More will be said later about the purpose of this feature.

The rear walls of the shells define flanges 12 and 12’ that are outwardly convex and widened, the surface of these flanges being preferably somewhat domed. These flanges prevent the improved device from springing out from the mouth and makes retention possible. Moreover, the patient’s cheeks are thereby pressed outwardly and at the same time protected by the widened, rear flanges 12 and 12’. The shape of the flanges is of special significance for the correct functioning of the im-
proved device. These extended and widened flanges form or define the ends of a substantially U-shaped stirrup 14, as can be seen from FIG. 2. The stirrup 14 joins together the two troughs 10 and 10' and includes a web 16, which disconnects the flanges 12 and 12'. The web 16 includes, at its inwardly curved center portion 18 and at its lower edge, as seen in FIG. 1, a stud-shaped projection 20 which is provided for protection of the tongue.

From the drawings, it can be seen that the outwardly curved flanges 12 and 12', which project laterally beyond the trough-shaped shells 10 and 10', press the patient's cheeks outwards when my improved device is inserted into the patient's mouth and the patient's lips have been seated in the trough-shaped shells 10 and 10'. The depression produced by the inwardly curved center portion 18 of the web 16 serves for receiving the patient's tongue whereby the stud-shaped projection 20 holds back the tip of the tongue like a shield.

In pursuance of the principles of my invention, my improved device may be furnished with additional equipment assisting medical treatments carried out in the mouth cavity. Thus, for example, small pipe connections can open into the web 16 or into the lower parts of the arc-shaped shells 10 and 10' and these pipe connections can be capable of being joined to flexible tubes enabling the saliva secretions to be sucked out from the mouth. The U-shaped stirrup 14 can, moreover, also be equipped with cold illuminating sources, serving for lighting the mouth cavity. Such additional equipment for promoting and facilitating medical treatment in the mouth cavity is shown on a device in FIGS. 3 to 6.

From FIG. 3, it can be seen that the U-shaped stirrup 14, which joins together the two arc-shaped shells 10 and 10', may be constructed as a hollow tubular body. In the wall of the stirrup facing towards the inner space of the mouth cavity, slits 23 are formed through which saliva and, for example, also cooling liquid for the driving turbine of the instrument can be sucked out. On the stud-shaped projection 26, which as noted above is situated approximately in the center of the U-shaped stirrup, there are formed one or two projections 24, two of which are shown in FIG. 3, and onto which short lengths of tube 25 may be alld. These tubes penetrate into the deepest portions of the space beneath the patient's tongue, that is the sublingual space, thereby enabling additional saliva to be sucked out. The internal space of the tubular stirrup 14 is in communication, in the vicinity of the arc-shaped shells 10 and 10', with an opening 26 in one trough or in both troughs. FIG. 3 shows an opening 26 on one side only while FIG. 4 shows the openings on both sides. The opening 26 may be connected, in an appropriate manner, to a flexible tube leading to the suction side of a pump, and may have an internal thread or a bayonet coupling and is disposed in a thickened part of material, designated by reference 27 of the shells, and is clearly shown again in FIG. 4. The thickened part, or parts, which approximately fill the central internal space of the trough 10 and 10', is situated approximately in the corner of the mouth when the improved device is inserted and thereby does not have a disturbing effect even when flexible tubes are connected with opening 26.

Above each opening 26 is a further opening 28, the purpose of which is moreover apparent from FIG. 4. Into each opening 28, which may widen out towards the inner face 2, as shown at 29, a cold illuminating line or connection (that is a flexible glass rod) is inserted through which the light from a remote light source is introduced so that the internal space of the mouth cavity may be well illuminated. A similar cold illuminating line or connection may also be disposed on the other side in the trough 10 where in FIG. 4 it bears the reference numeral 30.

From FIG. 4, it is easy to recognize the openings 23, at least those of the upper row, in the stirrup 14. These openings 23 could, of course, equally well be vertical slits or round holes. The only important requirement is that the maximum possible quantity of liquid occurring in the mouth cavity can be sucked away with sufficient rapidity.

In FIG. 5, a section is shown through the portion 16 of the stirrup 14, where the hollow internal space 31 and the slit-shaped openings 32 are clearly recognizable. In FIG. 4 a flexible tube 32 is shown and may be utilized for sucking away liquid or a cold illuminating line or indeed may be both, since the two lines may be arranged coaxially in such a way that the cold illuminating line constitutes the core, while the suction line surrounds this core concentrically. FIG. 4 also shows the outward bulges of the flanges 12 and 12', which are important for correct functioning of my improved device. The flanges can also be more massively constructed, as shown, so that here again lines for light and/or liquid suction can be connected. However, the proportions and dimensions of my improved device will depend upon whether it is intended for the mouth of a child, a young person or an adult.

FIG. 6 illustrates my improved device in use. Clearly visible here are the arc-shaped troughs 10 and 10', which receive the lateral lips, and also the greater opening of the mouth cavity and good access to the jaw, as compared with the hitherto usual arrangement of the mouth achieved by the muscular effort of the patient, as illustrated in FIG. 7. It can be seen in FIG. 7 that, in the upper jaw, only the two front incisors are visible, and these only in part. With a mouth open in this manner, the dentist himself still has to pry open the mouth further so that often he had only one hand left for actual work.

My improved device is made of a sterilizable material, either of a heat-resistant plastic or of a metal which provides the required flexibility. The suction devices for the saliva, which collects in the mouth cavity, and also the cold light, which can be conducted through a glass rod, are both well known in the art and do not, per se, constitute a part of my invention.

Because of the spaces X and Y between the ends of the arc-shaped shells 10 and 10', it is possible for these shells, and thus for the flanges 12 and 12' of the U-shaped stirrup 14, to be compressed together so that the distance between them diminishes and insertion into a patient's mouth is facilitated. Moreover, the web 16 may also be provided, at a suitable position, with additional resilient devices, which exert a light outwards springing or resilient bias pressure upon the arc-shaped shells 10 and 10'. Thus, for example, it will be possible to arrange, at each of the positions 22 and 22', a hinge to exert an outward biasing action upon the arc-shaped shells 10 and 10' and thereby also upon the parts 12 and 12'.

Since the invention disclosed herein may be embodied in other specific forms without departing from the
spirit or general characteristics thereof, the embodiment described herein is, therefore, to be considered in all respects as illustrative and not restrictive, the scope of the invention being indicated by the appended claims, rather than by the foregoing description; and all changes which come within the meaning and range of equivalency of the claims are therefore intended to be embraced therein.

I claim:

1. An improved device adapted for holding open a person's mouth so as to facilitate medical and dental treatments, the improved device comprising:
   first and second arc-shaped shells, with each of the arc-shaped shells having a trough-shaped cross-section;
   a substantially U-shaped stirrup which includes a central web portion and first and second ends and which extend between and interconnects the first and second arc-shaped shells so that the arc-shaped shells are disposed at a distance from each other, the U-shaped stirrup also including means for elastically biasing the arc-shaped shells apart;
   first and second flanges disposed between the first and second ends of the U-shaped stirrup and the first and second arc-shaped shells, respectively, the flanges being shaped so as to bulge sharply outwardly beyond the arc-shaped shells; and a stud-shaped projection extending from the center of the web portion of the stirrup, the projection being adapted to displace and retain the patient's tongue.

2. The improved device, according to claim 1, characterized in that the U-shaped stirrup is tubular and includes openings for sucking out liquid, whereby a liquid suction line may be disposed approximately in the center of at least one of the arc-shaped shells and may communicate with the interior of the U-shaped stirrup.

3. The improved device, according to claim 2, characterized in that the device includes, in the region of the center of the internal spaces of the arc-shaped shells, portions which provide points of connection for suction lines and for cold illuminating line.

4. The improved device, according to claim 3, characterized in that the device is made of a transparent plastic material.

5. The improved device, according to claim 3, characterized in that additional connections for suction lines and cold illuminating lines are formed on the stud-shaped projection of the U-shaped stirrup.

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