

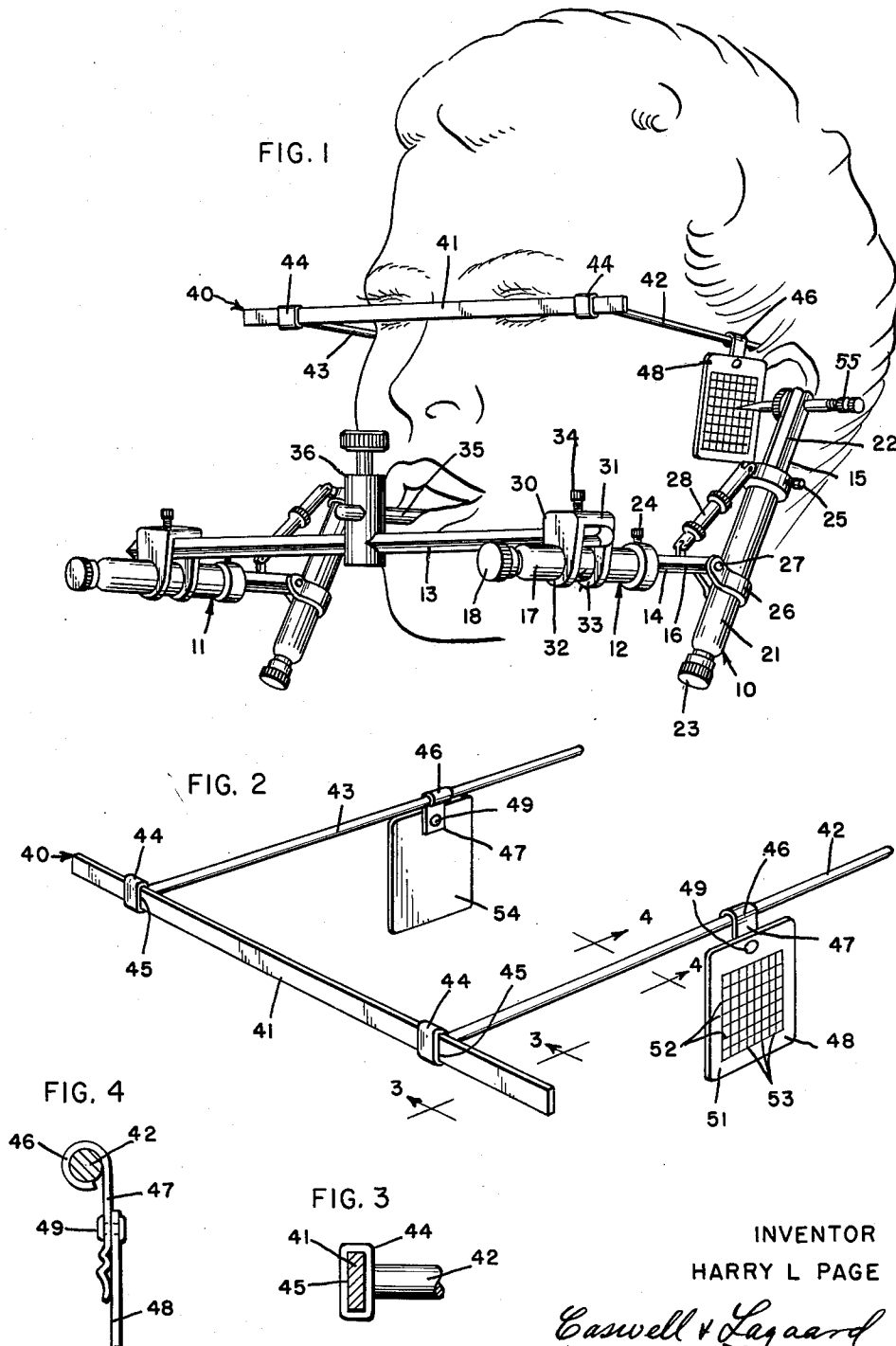
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TEMPOROMANDIBULAR JOINT TRANSVERSE HINGE AXIS LOCATORS

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TEMPOROMANDIBULAR JOINT TRANSVERSE HINGE AXIS LOCATORS

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The herein described invention relates to dental instruments for reproducing and correcting with models, articulation of the human jaws and teeth, both natural and artificial, and to accurately reproduce in three dimensions simultaneously the kinematic and static relationships of the upper and lower jaws and teeth, as disclosed in United States Patent No. 2,701,915, issued to Harry L. Page, February 15, 1955.

In the use of the instrument disclosed in said Letters Patent it becomes necessary to accurately determine when the hinge axis pins of the instrument are coaxially disposed with reference to the temporomandibular joint transverse hinge axes of the patient's mandible. In the patent this is accomplished by attaching an adjustable hinge bow carrying the hinge axis pins to the patient's mandible and adjusting the hinge axis pins until they fail to describe arcs of circles relative to the patient's skin when the patient's mandible is opened and closed in the manner of chewing. Without any fixed reference on the patient's face, this adjustment becomes quite difficult and accurate positioning does not always result. Where the patient has tattoo marks on the skin of the face at locations previously determined to be the projections of the temporomandibular joint transverse hinge axes of his skin, it frequently occurs that when the instrument is adjusted to bring the hinge axis pins into register with the tattoo marks that movement therebetween occurs when the mandible is moved. In such case, the dentist does not know if the instrument is improperly mounted, if the tattoo marks are in the wrong place, or whether the patient's skin is moving when the mandible is moved.

An object of the invention is to provide a construction whereby the faults in the prior art structure can be avoided.

Another object of the invention resides in providing a temporomandibular joint transverse hinge axis locator for use with an instrument such as disclosed in said patent whereby the axes of the hinge axis pins are more accurately brought into coincidence with the temporomandibular joint transverse hinge axes of the patient's mandible.

A still further object of the invention resides in providing a construction in which a reference area for cooperation with the hinge axis pins is provided which is immobile relative to the patient's cranium and so remains when the patient opens and closes the jaws.

An object of the invention resides in providing an axis locator plate containing the reference area.

Another object of the invention resides in constructing the surface of said plate forming the reference area as a mirror to facilitate tracing the movement of the hinge axis pin relative thereto.

A still further object of the invention resides in providing cross lines on said surface serving as reference lines to assist in tracing the movement of the hinge axis pins.

An object of the invention resides in providing an axis locator plate for each pin.

A still further object of the invention resides in mounting the axis locator plates on a frame carried by the bridge of the nose of the patient and the ears and gripping the sides of the head, said plates being adjustably supported thereon.

An object of the invention resides in constructing the

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frame with a crossbar on which is slidably mounted two elongated side arms and in further providing sliders slidable on said side arms and carrying said axis locator plates, said plates being capable of rotation relative thereto.

Other objects of the invention reside in the novel combination and arrangement of parts and in the details of construction hereinafter illustrated and/or described.

In the drawings:

FIG. 1 is a perspective view of the head of a patient having a dental hinge bow and axis locator illustrating an embodiment of the invention, both mounted thereon.

FIG. 2 is a perspective view of the axis locator removed from the patient.

FIG. 3 is a cross sectional view taken on line 3-3 of FIG. 2.

FIG. 4 is a cross sectional view taken on line 4-4 of FIG. 2.

For the purpose of illustrating the invention, the hinge bow 10 of a dental instrument of the type referred to in said patent has been shown in FIG. 1 as applied to the head of a patient. This hinge bow comprises two frames 11 and 12 which are alike and which are attached to a crossbar 13. Due to the similarity of the frames only the frame 12 will be described. This frame consists of a horizontal arm 14 which is pivotally connected to an upright arm 15. The arm 14 comprises a stem 16 which is slidably mounted in a barrel 17. A screw 18 has a threaded connection with the stem 16 and serves to move said stem longitudinally relative thereto. The arm 15 is similarly constructed with a barrel 21 in which is slidably mounted a stem 22. A screw 23 has a threaded connection with the stem 22 and serves to slide the same longitudinally relative to said barrel. Lock screws 24 and 25 screwed into the barrels 17 and 21 engage stems 16 and 22 and hold the same in adjusted position. The stem 22 receives a transverse hinge axis pin 55 slidable relative thereto.

The barrel 21 of arm 15 has attached to it a clevis 26 which straddles the stem 16 and is pivoted to it by means of a pintle 27. The angle between the arms 14 and 15 is adjusted by means of an elongatable adjustment 28 pivotally connected to the barrel 21 of arm 15 and stem 16 of arm 14.

Side frame 12 is connected to the crossbar 13 by means of a connector 30. This connector consists of a body 31 formed with a bore 32 adapted to receive the barrel 17 of arm 14. A kerf 33 in said body receives the crossbar 13 which rests upon the barrel 17. A screw 34 screwed into said body and engaging said crossbar clamps the parts together.

For a dentulous case, the hinge bow 10 is attached to the patient's mandible by means of a tray which is temporarily attached to the patient's lower teeth by means of a self-hardening plastic material, or similar substance. Where the patient is edentulous, a mandible clamp, such as shown in the patent above referred to, may be used. This tray or clamp has a rod 35 attached to it and which extends outwardly through the patient's mouth and is connected to the crossbar 13 by means of a connector 36. A connector such as disclosed in said patent may be used for the purpose.

The invention proper is indicated by the reference numeral 40 and comprises a crossbar 41 and on which are slidably mounted two arms 42 and 43 which are identical in construction. The crossbar 41 is constructed from flat wire of resilient material and is of a length somewhat greater than the width of the largest head on which the device is to be used. The arm 42 is constructed of a rod circular in cross section and is brazed or silver soldered to a slider 44 which has a transverse slot 45 through it and which snugly receives the crossbar 41. When arm

42 is grasped by the said slider, it may be shifted longitudinally along said crossbar. Any pressure on the arm 42 outwardly of said slider will, however, cock the slider and cause the same to bind on the crossbar 41 thereby locking the arm in adjusted position. Arm 43 is similarly constructed and is adjustable along bar 41 in the same manner.

Encircling the arm 42 is a spring clip 46 which frictionally engages said arm and which may be slid along said arm or rotated relative thereto. This clip has a hanger 47 depending therefrom and which supports an axis locator plate 48. A rivet 49 passes through said plate and hanger and frictionally engages the same and supports said plate for swinging movement in the plane of said plate. By means of this construction, the plate can be adjusted longitudinally along the arm 42 and also rotated about the rivet 49. Due to the friction between the parts the clip will remain where left and likewise the plate 48. The outer surface 51 of plate 48 is highly polished in the form of a mirror and has scribed on it horizontal crosslines 52 and vertical crosslines 53. A similar plate 54 and corresponding supporting structure is mounted on the arm 43.

The method of using the invention is as follows: The tray or mandible clamp is first mounted in the patient's mouth and attached to the mandible, as previously described, with the rod 35 projecting from the patient's mouth. The hinge bow is then mounted on said rod and the hinge pins 55 located at positions approximately where the patient's temporomandibular joint transverse hinge axis projections should be. The arms 42 and 43 are next mounted on crossbar 41 by sliding said crossbar through the slots 45 in the sliders 44. Clips 46 with the plates 48 and 54 attached are next mounted on the arms 42 and 43 well toward the crossbar 41. The device is then grasped in the manner of a pair of spectacles and applied to the patient's head as shown in FIG. 1. The arms 42 and 43 are preferably placed closer together than required and as the device is applied arms 42 and 43 are slid outwardly to cause the same to engage the sides of the head of the patient with sufficient pressure to hold the device in position. When arms 42 and 43 are properly positioned, sliders 44 grip the bar 41 and hold the parts from movement. Clips 46 are next adjusted until the plates 48 and 54 lie opposite the hinge pins 55. When properly positioned, crossbar 41 rests upon the bridge of the nose of the patient and the arms 42 and 43 rest on the ears of the patient. When so positioned, the plates 48 and 54 are firmly held from movement while the mandible is opened and closed in the customary manner. The patient is then told to open and close the mandible with the condyles in hinge position and the path of movement of the hinge pin is noted with reference to the crosslines on the plate 48. The position of the center of the arc described by the pin is then estimated. The pin 55 is next adjusted toward the estimated center by means of screws 18 and 23 and/or adjustment 28 and the same procedure repeated until the pin does not describe an arc of a circle but merely rotates about its own axis. The procedure is then repeated for the other side of the patient. After the axes have been located, the device can be removed from the patient and the instrument used in the customary manner.

The advantages of the invention are manifest. The dentist can position the hinge pins at the temporoman-

dibular joint transverse axes with greater certainty. Less time is required to reach the desired positions and less strain on the patient results. Tattoo marks need not be made on the patient's face if found undesirable. The device can be constructed at a relatively low cost, is easily and quickly applied and when applied is immobile relative to the patient's cranium and the temporomandibular joint transverse hinge axes. The invention is light in weight and is comfortable to wear.

Changes in the specific form of the invention, as herein described, may be made within the scope of what is claimed without departing from the spirit of the invention.

Having described the invention, what is claimed as new and desired to be protected by Letters Patent is:

1. A temporomandibular joint transverse axis locator comprising a crossbar constructed of resilient material and adapted to bow, side arms, sliders attached to said side arms and having elongated slots therein receiving said crossbar, said sliders at opposite ends engaging said crossbar on opposite sides and said side arms upon being urged outwardly causing the sliders to bind on said crossbar and restrain movement therebetween, and axis locator plates mounted on said side arms.

2. A temporomandibular joint transverse axis locator comprising a frame for mounting on the patient's head and having side arms, spring clips frictionally engaging and slidably mounted on said side arms, hangers depending from said clips, axis locator plates and pivot means between said axis locator plates and said hangers having its axis normal to said plates for supporting said axis locator plates for swinging movement in the planes thereof.

3. In a dental instrument, a hinge bow provided with a crossbar, horizontal arms carried thereby and adjustable for movement in longitudinal and transverse directions relative thereto, vertical arms pivotally connected to said horizontal arms, hinge axis pins adjustably supported thereby for movement in longitudinal and transverse directions relative thereto, means for securing said hinge bow to the mandible of the patient, a temporomandibular joint transverse axis locator comprising an axis locator plate situated adjacent one side of the patient's face in a position to overlie the projection of the patient's temporomandibular joint transverse hinge axis on the patient's skin, means for supporting said plate on the patient's cranial anatomy free from movement relative thereto during masticating movement of the patient's mandible, and spaced cross lines on said plate disposed on the outer surface thereof and to which the hinge axis pin may be referred in the locating of the same in alignment with the patient's temporomandibular joint transverse hinge axis.

4. A temporomandibular joint transverse axis locator comprising a crossbar constructed of resilient material adapted to bow, side arms, sliders tubular in form permanently and rigidly attached to said side arms and slidably receiving said crossbar, said side arms upon being urged outwardly causing the sliders to bind on the crossbar and restrain movement therebetween, and axis locator plates mounted on said side arms.

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