March 11, 1969 N. F. GUICHET 3,431,649

DENTAL FACE BOW

Filed Feb. 28, 1964

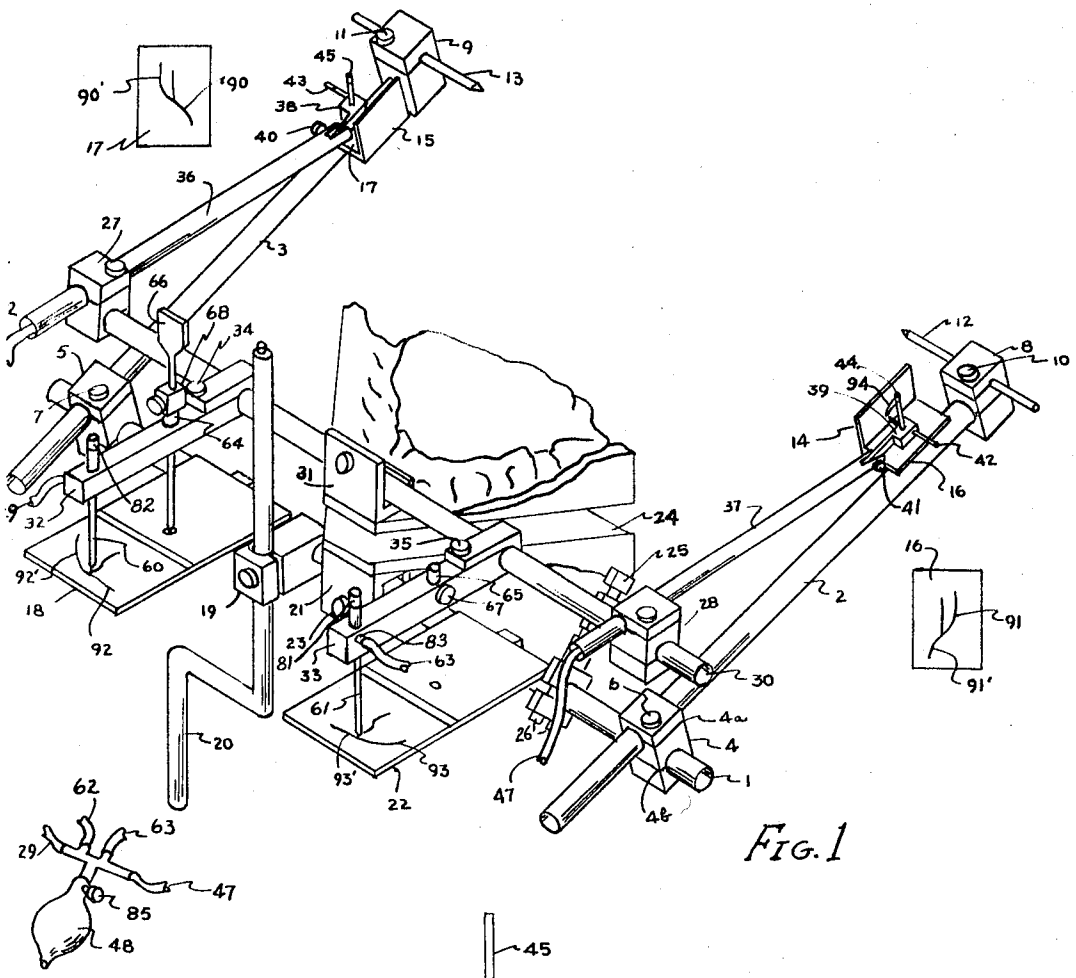


FIG. 1

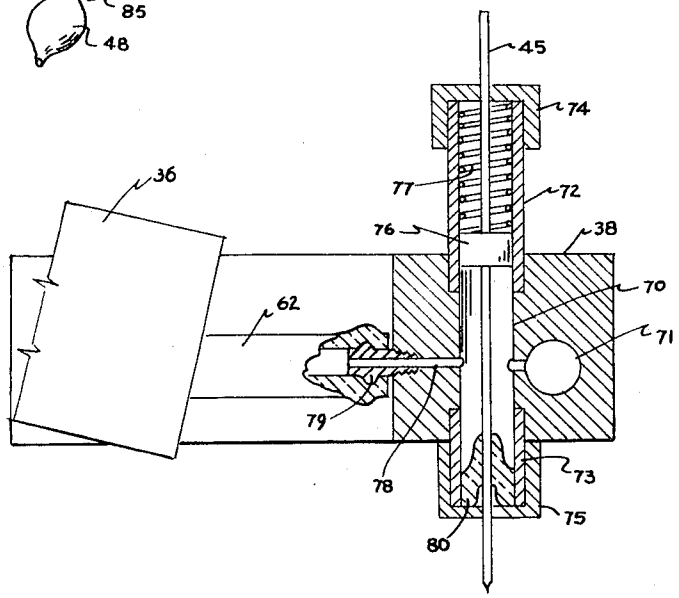


FIG. 2

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DENTAL FACE BOW

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This invention relates to an improved dental face bow for obtaining tracings of jaw movements and for transposing such tracings to a dental articulator.

Heretofore, dental face bows have been derived with micrometer adjustments to precisely locate or orient to the hinge axis. These precise adjustments are often unwieldly and cumbersome. To save weight of the entire assembly, the face bow is made with very light weight arms which are often so flexible that the face bow can not be supported by them. Also, where both anterior and posterior tracings of the jaw movement are recorded, considerable time is expended in positioning the various recording styli into a recording position.

It is an object of this invention to provide a face bow having rigid side arms that are capable of supporting the face bow in a dental articulator.

It is also an object of this invention to provide a face bow wherein the hinge axis centering pins are rotatably mounted on the rigid side arms.

It is a further object of this invention to provide a face bow and tracing assembly wherein the anterior and posterior tracing pads are mounted on the same frame member.

It is also a further object of his invention to provide means for remotely controlling the position of the recording styli of said tracing means in a recording and retracted position.

Other and related objects will be apparent from the following disclosure.

The invention will be described by reference to the figures of which:

FIGURE 1 illustrates the tracing assembly of my invention; and

FIGURE 2 illustrates the detail of the assembly for the remote control of the recording styli.

Referring now to FIGURE 1, there is illustrated a face bow and tracing assembly according to my invention. As illustrated, the face bow is formed by lower tubular cross bar **1** and rigid side rods **2** and **3**. The side rods are clamped to the cross bar **1** by clamping means that provide controllable rotation of the side rods about the axis of the cross bar and also rotation of the side rod about its own axis. The clamping means comprise blocks **4** and **5** that have two traverse bores which receive an end of the side rod and an end of the cross bar, respectively. One side of the block is slit along the axis of each bore; see *4a* and *4b*; to permit the block to be compressed and thereby clamp the rods. An adjustment screw **6** is provided to engage a threaded tap below slit *4b* so the block **4** can be compressed into a clamping relationship on cross bar **1** and side rod **2**. A similar screw **7** is provided in clamp **5**.

One feature of my invention comprises adjustable means to permit the hinge axis centering pins free rotation about the axis of their respective side rods. This is provided at the ends of side rods **2** and **3** that are opposite clamps **4** and **5** by similarly constructed block clamps **8** and **9**, respectively. These clamps have adjustment screws **10** and **11** to secure centering pins **12** and **13** which are used to orient to the hinge axis reference points and to mount the tracing device on the articulator by locking into recesses that are provided along the hinge axis of the articulator.

From the preceding, it can readily be seen that the

hinge axis centering pins **12** and **13** can be locked into any desired angular position about their respective side rods **2** and **3**, thereby permitting a large measure of flexibility in orienting the tracing device on the patient and in transferring the tracings to the articulator.

The posterior sagittal tracing pads **14** and **15** and the posterior horizontal tracing pads **16** and **17** are attached to the side rods **2** and **3** near their posterior ends so as to be adjacent the hinge axis of the patient and thus obtain accurate tracings of the jaw movement.

Disposed along lower rod **1** are: the right anterior tracing pad **18**, an axis-orbital plane support rod clamp **19** that secures a suitable support rod **20** to cross bar **1** at a predetermined setting, a mandibular clutch mounting clamp **21** and the left anterior tracing pad **22**. Clamp **21** engages a pin or key permanently attached to cross bar **1** at its midpoint and a screw **23** is used to secure clamp **21** to the cross bar. Mandibular clutch **23** supports the conventional intaglio impression of the lower teeth of the patient cast in plastic. A vise grip of a conventional design such as **25** is locked to cross bar **1** by screws **26**. Similar vise grips, not shown, are attached in the same position on the opposite end of cross bar **1** and to each end of the upper bar **30** opposite the vice grips on bar **1**. These vise grips are employed in accordance with the conventional manner to lock the upper and lower cross bars together, as hereafter described, when plastering the case in the articulator.

The upper frame of the tracing device comprises an upper cross bar **30** and maxillary clutch mounting clamp **31** similar in construction to clamp **21**, attached thereto. Tracing arms **32** and **33** are positioned on cross bar **30** and are vertically centered over the right and left anterior tracing pads **18** and **22**. Screws **34** and **35** are used to securely lock arms **32** and **33** to bar **30**. Although not shown, a similar construction is used to secure the anterior tracing pads **18** and **22** to lower cross bar **1**.

At opposite ends of crossbar **30** are disposed clamps **27** and **28**, similar in construction and operation to clamps **4** and **5**, previously described. These clamps are used to secure upper side tracing rods **36** and **37** to the upper cross bar **30**. The posterior ends of side rods **36** and **37** are slotted to receive a lip extension of tracing blocks **38** and **39**. Screws such as **40** are used to compress the slots against the lips and thereby secure the tracing blocks to the side rods at any desired inclination. These tracing blocks are described in greater detail in FIGURE 2; however, briefly the blocks support tracing style **42**, **43**, **44** and **45** and preferably contain means to permit the remote control of the styli into and out of registration against their respective tracing pads **14**, **15**, **16** and **17**. Means to transmit an impulse to the styli and thereby move them into and out of recording are provided. Such means can be passed through the hollow side rods **36** and **37**. The transmission means can comprise flexible tubing as shown by **62** and **47** which is attached to a controllable supply of fluid pressure, e.g., a squeeze bulb **48**, shown to the lower left of FIGURE 1. It is of course obvious that other means such as electromagnets can be used to position the styli into and out of registration and when such means are employed, the transmission means comprises electrical wiring to transmit an electrical impulse to the styli actuating means in the tracing blocks.

Tracing arms **32** and **33** support tracing styli **60** and **61** which preferably are also remotely controllable into and out of a recording position by the actuating means. Again, suitable impulse transmission means such as the flexible tubing **29** and **63** is furnished to transmit an impulse to the recording styli and thereby control their position. Each of the tracing arms also has means to support suitable

check bite registration pins such as 66. These means comprise a sleeve, 64 and 65, that can receive a check bite pin such as 66 shown in the right tracing arm 32. Suitable clamping means, such as screw 67 shown in the left tracing arm 33, are provided to secure the check bite pins in the tracing arms. As illustrated, pin 66 has a stop 68 adjustably attached thereto that can be set to record the vertical spacing between the upper tracing assembly and the lower face bow.

Referring now to FIGURE 2, the means for remotely controlling the position of the recording styli will now be described. This means is illustrated in reference to tracing block 38 on the right posterior tracing arm 36; however, it is of course apparent that the same construction is employed for tracing block 39 and that a similar construction is provided for remotely controlling the anterior tracing styli 60 and 61.

As illustrated, block 38 supports recording styli 45 and 43. The styli are mounted in block 38 which is bored at 70 and 71. Cylinders such as 72 and 73 are fitted into each end of the bore and are capped with tightly fitting caps 74 and 75 that have a center hole for the recording stylus. A piston such as 76 is mounted on each recording stylus and this piston fits within the cylinder 72. A spring 77 is positioned betwen the cap and piston 76 so as to bias the recording stylus into a recording position. Block 38 is bored at 78 to permit fluid communication with the chambers in bores 70 and 71 on the opposite sides of the stylus pistons from the springs. A suitable hose attachment fixture such as 79 is fitted into block 38 to permit attachment of the flexible tubing 62. Preferably, a suitable sealing means 80 that is formed of flexible gasket material is provided about the lower end of the stylus to prevent fluid leakage from the chamber. The springs such as 77 are sized to exert a suitable force to firmly hold the styli against their tracing pads; however, the springs can be compressed by application of between about 0.1 and about 5.0 pounds per square inch of fluid pressure to chambers 70 and 71, thereby retracting the styli from their recording position.

The same construction of the positioning means is used in arms 32 and 33, i.e., the arm is bored as in 70 and fitted with upper and lower cylinders which are capped with elements such as 81 and 82 identified on the left anterior tracing arm. The arm is bored and a flexible hose attachment fitting 83 is threaded into the bore for attachment of hose 63. A spring is used to bias the styli into a recording position in the manner described in regard to stylus 45 of FIGURE 2.

The operation of my face bow and tracing device is fairly apparent from the preceding description. The mandibular and maxillary clutches are prepared in the conventional manner from models of the lower and upper teeth. The lower and upper face bows are then clamped to the clutches using clamps 21 and 31, respectively.

The mandibular clutch is mounted on the patient and screws 6 and 7 are loosened and the side rods 2 and 3 are moved to orient the hinge axis centering pins 12 and 13 to the approximate hinge axis of the patient. The side rods are then locked into position by screws 6 and 7.

Thereafter, the maxillary clutch and tracing assembly is mounted on the patient and tracing rods 36 and 37 are adjusted to orient the styli opposite their tracing pads. The patient is instructed to move his jaw and the assembly is set to avoid any interference upon such movement.

The tracing pads are then coated with a suspension of talcum in a volatile solvent which evaporates, leaving a talcum coating on the pads. The styli are held in a retracted position by application of air pressure through tubing 29, 62, 63 and 47 applied by squeezing bulb 48 and closing clamp 85. When the patient has adjusted to the face bow, the air pressure is reduced in the line by opening the clamp, permitting the springs in the styli cylinders to force the styli into registration against their tracing pads. When the patient moves to a right lateral excursion, tracings such as 90 and 91 are recorded on the horizontal posterior pads (see inserts of FIGURE 1) and the conventional Gothic arch segments 92 and 93 are obtained on the anterior tracing pads. The left lateral excursion makes the opposite segments of these tracings, 90', 91', 92', and 93'. The protrusive movement is recorded as arc 94 shown on the left posterior sagittal recording pad; as relatively straight lines intercepting the Gothic arch tracings of the anterior tracing pads; and as relatively straight lines intercepting the S arc of the pisterior horizontal tracings. Because the posterior and anterior tracing pads are all mounted on the same member, the tracings are directly comparable, e.g., arcs 91 and 91' on the left sagittal pad have the same relationship to each other as arches 93 and 93' on the left anterior pad.

The tracings of the jaw movement are then covered with transparent tape. The patient is instructed to return to centric position and the centric checkbite pins, such as 66, are warmed and then placed in their support sleeves 64 and 65 in the anterior tracing arms. The warm point of these pins melts an impression in a wax coating on pads 18 and 22. The stop on each checkbite pin; see 68; is moved down to rest on the upper edge of the sleeve and secured at this position. After their removal from the patient, the tracing assembly can thereafter be rested on the face bow in the proper centric relationship by replacing the centric checkbite pins in their sleeves with their stops resting on the upper edges of these sleeves. The pins are secured to the tracing assembly by lock screws such as 67. The tracing assembly can then be placed on the face bow with the checkbite pins seated in their wax impressions. These pins and the central bearing screw between the clutches thus form a tripod upon which the tracing assembly rests.

To complete the setting of the instrument on the patient, the axis-orbital plane support rod 20 is then clamped to the lower cross bar 1 and adjusted on this bar by resting an axis-orbital plane indicator of conventional design, e.g., the Ney Axis indicator, on centering pins 12 and 13 and the upper end of rod 20. The vertical position of the rod is then adjusted so that the orbital pointer of the plane indicator is oriented to a reference point on the patient which thereby locates the upper end of rod 20 in a reference plane that passes through the ends of pins 12 and 13.

The face bow and clutch assemblies are then removed from the patient and the distance between the points of the hinge axis reference pins 12 and 13 is measured to determine the correct lateral spacing of the condyle centers on the articulator.

As previously mentioned, the articulator (not shown) has recesses for engagement by ends of the centering pins 12 and 13 and these mounting recesses can be positioned on the hinge axis of the articulator so that the face bow assembly can be accurately mounted in the articulator by springing the posterior ends of the side rods 2 and 3 slightly apart to permit centering pins 12 and 13 to seat in the recesses. The cross bar 1 is then supported above the working surface in the articulator by rod 20 which rests on the work table. Preferably, the length of rod 20 equals the height of the articulator hinge axis above the work table so that the aforementioned reference or axis-orbital plane is approximately horizontal. The mandibular clutch can thereafter be plastered to the clutch mounting plate of the articulator in a conventional manner. When the tracing assembly is used to set the dental articulator, the styli are spring biased against their tracings, thus avoiding repeated adjustment.

The preceding description of my invention is intended only to illustrate my invention and set forth its use. The preceding is not intended to be unduly limiting of my invention which is intended to be defined by the elements and their equivalents set forth in the following claims.

I claim:

1. A dental face bow comprising a clutch for receiving

an intaglio mold of a patient's teeth centrally mounted on a cross bar; first and second side rods attached at one of their ends to opposite ends of said cross bar by clamping means that permit rotation of said side rods about their own longitudinal axis and about the axis of said cross bar; lock means to rigidly secure said side rods to said cross bar; hinge axis centering pins attached to each of said side rods at the other of their said ends by clamping means that permit rotation of each of said pins about the axis of its side rod and that permit lateral movement of said pins; lock means to rigidly secure said pins to said side rods; anterior tracing pads attached to the right and left of said cross bar and posterior tracing pads on each of said side rods near said opposite ends.

2. The face bow of claim 1 in combination with a tracing assembly having a second clutch mounted on a second cross bar and side tracing arms attached at one of their ends to the opposite ends of said second cross bar; posterior tracing styli attached to said side tracing rods at the other of their said ends; and anterior tracing styli mounted on said second cross bar by anterior tracing support arms; said tracing assembly being positioned on said face bow with said tracing styli opposite their respective tracing pads.

3. The combination of claim 2 also comprising anterior checkbite pins removably mounted on each end of said second anterior cross bar; reference surfaces mounted on said first cross bar beneath said pins; and adjustable stop means on said pins to record the vertical distance between said first and second cross bars.

4. The combination of claim 2 wherein said styli are movable between a recording position against said pads and a retracted position away from said pads; resilient means urging said styli into one of said positions; means responsive to a remotely applied impulse to move said styli into the other of said positions; and impulse transmission means to apply said impulse to said styli.

5. A tracing assembly for recording jaw movements that comprises a clutch for mounting onto a patient's teeth centrally positioned on an anterior cross bar; side tracing arms attached at one of their ends to opposite ends of said anterior cross bar; posterior tracing styli attached at the other of the ends of said side tracing arms; anterior tracing styli supported by arms on said anterior cross bar; said styli being movable between a recording position and a retracted position; resilient means urging said styli into one of said positions; means responsive to a remotely applied impulse to move said styli into the other of said positions and impulse transmission means communicating with said styli to apply said impulse thereto.

6. The combination of a dental face bow and a tracing assembly that comprises:

(1) a dental face bow comprising a first cross bar; first and second side rods attached at one of their ends to opposite ends of said cross bar by clamping means that permit rotation of said side rods about their own longitudinal axis and about the axis of said cross bar; lock means to rigidly secure said side rods to said cross bar; hinge axis centering pins attached to each of said side rods at the other of their said ends by clamping means that permit rotation of each of said pins about the axis of its side rod and that permit lateral movement of said pins; and lock means to rigidly secure said pins to said rods;

(2) a tracing assembly having a second cross bar with first and second side tracing rods attached at one of their ends to opposite ends of said second cross bar;

(3) sagittal and horizontal tracing pads mounted at the posterior end of one of said side rods and said side tracing rods; recording styli mounted on the other of said side rods and said side tracing rods opposite each of said sagittal and horizontal pads;

(4) anterior tracing pads mounted on the right and left sides of one of said first and second cross bars and recording styli mounted on the other of said first and second cross bars opposite said pads;

(5) said styli mounted on said bar and said rods with styli mount means that permit said styli to move between a recording position against said pads and a retracted position away from said pads; and

(6) fluid pressure means communicating with said styli mount means to move said styli between said recording and said retracted positions.

7. The combination of claim 6 with resilient means attached to said styli to move said styli between said retracted and recording positions.

8. The combination of claim 6 wherein said sagittal and said horizontal tracing pads are mounted on said side rods and said anterior tracing pads are mounted on said first cross bar.

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ROBERT PESHOCK, *Primary Examiner.*