May 23, 1933. J. M. CRAIGO 1,910,592

DENTAL INSTRUMENT

Filed Aug. 22, 1932

Fig. 1

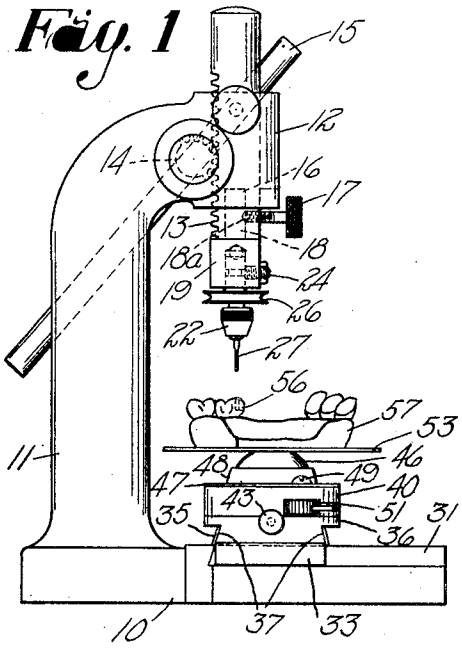


Fig. 2

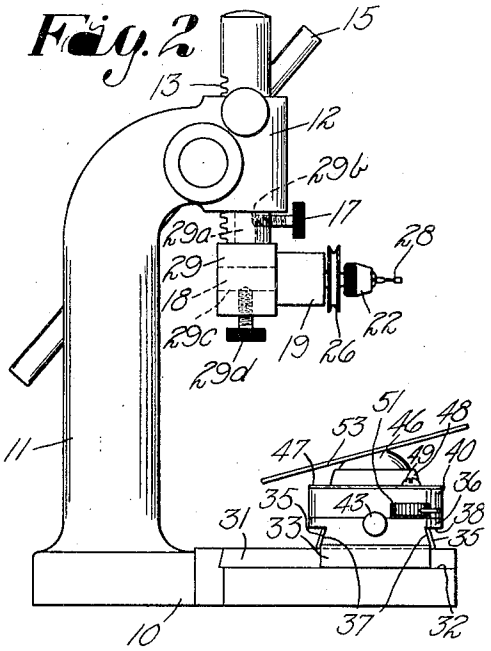


Fig. 3

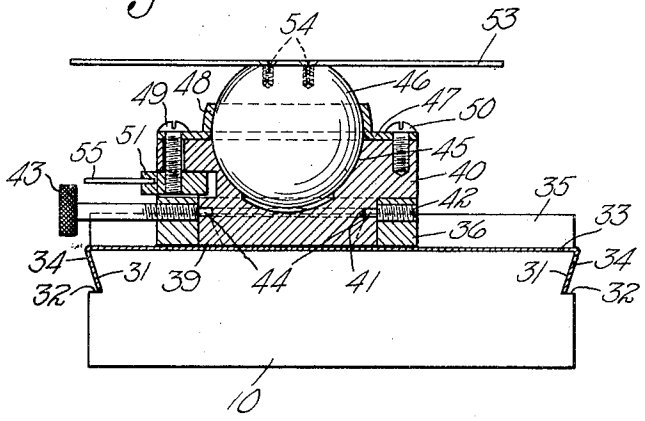
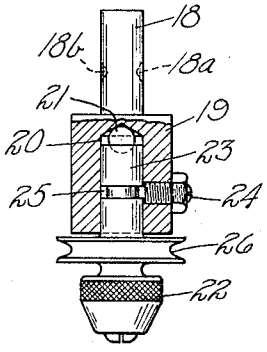


Fig. 4



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UNITED STATES PATENT OFFICE

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DENTAL INSTRUMENT

Application filed August 22, 1932. Serial No. 629,831.

The present invention relates to dental instruments and, more particularly, to a dental instrument for milling and drilling formations in bridge supports, such as inlays and crowns.

An object of the present invention is to provide an improved instrument of this type with which a plurality of apertures or other formations may be drilled in parallelism to one another.

Another object of the present invention is to provide an improved instrument of this type in which the work may be positioned at any desired angle to the tool.

A further object of the present invention is to provide an instrument of this type by means of which the dentist may accurately and with precision drill and mill formations in the work at any desired angle.

In the dental art, it is to be understood that the natural teeth are frequently disposed at various angles to one another, and it is an aim of the present invention to provide an improved instrument of this type with which the dentist may drill holes or mill grooves having parallel walls in inlays or crowns made to fit teeth disposed to one another at various angles when these crowns or inlays are mounted upon a cast which reproduces the teeth in their actual relative positions. Heretofore, the procedure for creating parallelism between the walls of the holes or grooves in the inlays or crowns has been to first roughly excavate cavities in the inlays or crowns and then to seat tubes or sheaths having parallel sides within these roughly excavated cavities, aligning them in parallelism to each other by means of a suitable mechanism. These tubes or sheaths are then attached to the crowns or inlays by soldering or similar means. The advantage of this invention over the procedure heretofore employed is that the holes or grooves are initially drilled or milled in the inlays or crowns in parallelism to each other obviating the plurality of steps with the attendant chances of error inherent in the procedure hitherto employed.

A still further object of the present invention is to provide an instrument of this type in which the tool is vertically adjustable, the work supporting table has a ball and socket mounting, may be moved in two directions at right angles to one another in a horizontal plane, and has a rotative movement in a horizontal plane.

The present invention also aims to provide an instrument of this type which is few in parts, of simple construction, relatively cheap to manufacture, and will not easily get out of order.

Other objects will be in part obvious, and in part pointed out more in detail hereinafter.

The invention accordingly consists in the features of construction, combination of elements and arrangement of parts which will be exemplified in the construction hereinafter set forth and the scope of the application of which will be indicated in the appended claims.

In the accompanying drawing, wherein is shown, for illustrative purposes, one embodiment which the present invention may take,

Fig. 1 is a side elevation of my improved dental instrument with the work support in one position;

Fig. 2 is a similar view but showing the work support in another position;

Fig. 3 is a front view, partly in elevation and partly in section, of the lower portion of my improved dental instrument; and

Fig. 4 is a detail view, partly in elevation and partly in section, of the carrier and the tool holder.

Referring more particularly to the drawing, 10 designates the base of my improved apparatus, 11 represents a standard arising from the base, and 12 designates a head carried by the upper end of the standard and overhanging the base. Mounted for vertical sliding movement in the head is a rack bar 13 which may be raised or lowered by means of a pinion 14 carried by the head 12 and meshing with the rack bar 13. The pinion 14 may be rotated by means of a handle 15. The lower end of the rack bar is provided with a downwardly opening recess 16. An opening is provided in one side wall of

the rack bar 13, and the inner end of this opening communicates with the recess 16 of the rack bar. The opening is interiorly screw threaded and is adapted to receive therein a binding screw 17.

The recess 16 of the rack bar 13 is adapted to receive therein the shank 18 of a carrier member 19 which comprises a body portion having a substantially centrally disposed recess 20. The shank 18 is provided with a depression 18*a* adapted to receive the inner end of screw 17 when the shank 18 is disposed in the recess 16 of the bar 13. A tool holder 22 is provided with a shank 23 adapted to be received by the recess 20 in the carrier 19. To retain the tool holder 22 in the carrier, the latter is provided with a screw threaded aperture which opens into the recess 20 and which is adapted to receive a set screw 24, the inner end of which seats in a groove 25 in the shank 23 of the tool holder 22. The tool holder 22 has fixed thereto a pulley 26 adapted to receive a belt, not shown, which, in turn, is driven by an electric motor or other suitable means, not shown. The tool holder is adapted to selectively and removably carry a plurality of tools of various kinds, one of which is shown at 27 in Fig. 1, and another at 28 in Fig. 2. A ball bearing 21 is disposed between the bottom of the recess 20 and the inner end of the shank 23 and is received in a semi-spherical depression in the latter.

In order to dispose the tool holder in the position shown in Fig. 2, an adapter 29 is provided. This adapter has a shank 29*a* adapted to be received by the recess 16 of the bar 13. The shank 29*a* is provided with a notch 29*b* which receives the inner end of the screw 17 when the shank 29*a* is disposed in the recess 16. The adapter 29 also has a through bore 29*c* which receives the shank 18 of the retainer 19. A set screw 29*d* is carried by the adapter 29 and engages a notch 18*b* on the shank 18 of the member 19 when the shank 18 is disposed in the bore 29*c* of the adapter.

The upper portions of the side walls of the base 10 extend downwardly and inwardly, as at 31, to provide shoulders 32. Mounted upon the base 10 for sliding movement towards and from the standard 11 is a platform 33 having a width substantially equal to that of the base 10. The platform 33 is provided at each side with a flange 34 which extends downwardly and inwardly to correspond to, and have a sliding fit with, the respective portions 31 of the base 10. The lower edges of the flanges 34 will engage and slide upon the respective shoulders 32, and the bottom of the platform 33 will slide upon the upper surface of the base.

The platform 33 is provided at each end with an upwardly and inwardly extending flange 35. A ring 36 is mounted upon the platform 33 for sliding movement thereon at right angles to the line of movement of the platform 33 on the base 10. At diametrically opposite points, the lower portion of the outer wall of the ring 36 slopes upwardly and inwardly, as at 37, to correspond to, and have a sliding fit with, the respective flanges 35 of the platform 33. The provision of the sloping portions 37 on the ring 36 form shoulders 38 which rest and slide upon the upper edges of the flanges 35 of the platform 33.

The ring 36 is provided with a substantially circular opening adapted to receive the circular shank 39 of a cup member 40 the bottom of which rests upon the upper surface of the ring 36. The cup member 40 is adapted to have rotative movement in a horizontal plane. In order to retain the cup member 40 upon the ring 36, the shank 39 of the cup member 40 is provided with a circular groove 41, and the ring 36 is provided with screw threaded openings adapted to receive screws 42 and 43 having reduced portions 44 engaging in said groove 41 of the shank 39. To lock the cup member 40 in any desired angular position, the screw 43 is screwed home until its reduced portion 44 binds against the bottom of the groove 41 of the shank 39. It will be noted that, when the screw 42 is screwed completely home, its reduced portion 44 is spaced from the bottom of the groove 41 so that the screw 42 does not prevent rotation of the member 40.

The cup member 40 is provided with a cup-shaped socket 45 adapted to receive a ball 46. A collar 47 having a flange 48 is provided for retaining the ball 46 in its socket 45. The flange 48 extends upwardly and inwardly from the collar 47 and has a diameter less than the diameter of the ball 46. The collar 47 is held in position by means of screws 49 and 50 which pass through the collar 47, the screw 50 being received by a screw threaded recess in the cup member 40 but the screw 49 passes through an opening in the cup member 40 and is received by a nut 51 disposed in a recess 52 of the cup member 40. The nut 51 is provided with an operating lever 55 by which the nut is rotated back and forth. The shank of the screw 49 adjacent its head is provided with a squared portion adapted to fit into a corresponding squared opening in the collar 47 when the screw 49 is screwed home to prevent further rotation of the screw 49 when the nut 51 is rotated. There is normally a loose fit between the ball 46 and flange 48 of the collar 47 to permit movement of the ball in the socket but when the nut 51 is rotated in an anti-clockwise direction, the screw 49 is pulled down and the collar 47 and flange 48 are also pulled down and the flange 48 will bind the ball between itself and the sides of the socket 45 to lock the ball against further movement. A work

supporting plate or table 53 is secured to the ball 46 as by means of screws 54 or the like.

In the use of my improved instrument, an inlay 56 or other piece of work, mounted on a cast 57, is placed upon the table 53 and, assuming that the tool holder carrying a suitable tool is placed in the carrier 19, the ball 46 is moved in its socket 45 until the inlay is positioned at the desired angle with respect to the tool. The lever 55 is then swung in an anti-clockwise direction to draw down the screw 49 and flange 48 to lock the ball against accidental movement. The cup member 40 may now be rotated, if desired, and locked in any adjusted position by screwing home the screw 43. The ring 36 may be slid on the platform 33 and the platform 33 may be moved on the base 10 until the inlay is properly positioned beneath the tool. The handle 15 is then operated to bring down the rack 13 and move the tool into engagement with the work. The tool is then operated by means of a motor and belt, not shown, and a hole or other formation made in the work. The tool is then raised and the ring 36 may then be slid on the platform 33, the platform 33 slid on the base 10, the cup member 40 rotated on the ring 36, or any desired combination of these movements may be effected to position another portion of the work in line with the tool so that, when the tool is again lowered and a second hole formed in the work, the two holes will be parallel.

To position the tool 28, as shown in Fig. 2, the carrier 19 is removed from the rack bar 10 and the adapter 29 substituted therefor. The carrier 19 is then inserted in the adapter, as shown in Fig. 2. The adapter 29 is used so as to make sure that when the rack bar is lowered the tool will be lowered to a position in which it will engage the work. During the milling operation, the platform 33 or the ring 36 may be slid, or the member 40 rotated, while the tool is rotating to effect milling of the work.

As many changes could be made in the above construction and many apparently widely different embodiments of this invention could be made without departing from the scope thereof, it is intended that all matter contained in the above description or shown in the accompanying drawing shall be interpreted as illustrative and not in a limiting sense.

It is also to be understood that the language used in the following claims is intended to cover all of the generic and specific features of the invention herein described and all statements of the scope of the invention which, as a matter of language, might be said to fall therebetween.

I claim as my invention:

1. A dental drilling and milling instrument, comprising a base having a standard with an overhanging head, a tool support mounted on the head for carrying a tool, a socket member, a sliding coupling connected to the base for sliding adjustment lengthwise of the base, the socket member being connected to said coupling for sliding movement thereon transversely of the base, a ball seated in the socket member, a work supporting table secured on the ball for universal movement therewith, and clamping means for holding the ball and table in adjusted position on the socket member.

2. A dental drilling and milling instrument, comprising a base having a standard toward one end thereof and provided with a head overhanging the base, a tool supporting member movably mounted on the head for movement toward and from the base and adapted to carry a drilling or milling tool, a ring, a sliding clamp interlocked with the base for adjustment lengthwise thereon, the ring being interlocked with the clamp for adjustment thereon transversely of the base, a cup member mounted for rotation on the ring, locking means for securing the cup member in position of rotative adjustment, a ball seated in the cup member, a table secured to the upper side of the ball, a collar engaging about the upper portion of the ball and seated on the cup member, and clamping means for the collar to bind the latter against the ball and hold the latter in the cup member.

3. A dental drilling and milling instrument, comprising a base having a standard with an overhanging head and having longitudinal spaced apart bearing walls, a tool support mounted on the head for carrying clined walls, a plate slidably seated on the base and having depending flanges engaging the bearing walls of the base to guide the plate for sliding adjustment lengthwise of the base, said plate having upturned flanges extending at right angles to the depending flanges and engaging the inclined walls of the socket member to guide the same for sliding movement on the plate transversely of the base, a ball seated in the socket member, a work supporting table secured on the ball for universal movement therewith, and clamping means for holding the ball and a tool, a socket member having spaced intable in adjusted position on the socket member.

4. A dental drilling and milling instrument, comprising a base having a standard toward one end thereof and provided with a head overhanging the base, a tool supporting member movably mounted on the head for movement toward and from the base and adapted to carry a drilling or milling tool, a ring, a sliding clamp interlocked with the base for adjustment lengthwise thereon, the ring being interlocked with the clamp for adjustment thereon transversely of the base, a cup member mounted for rotation on the ring, locking means for securing the cup mem-

ber in position of rotative adjustment, a ball seated in the cup member, a table secured to the upper side of the ball, a collar loosely engaging about the upper portion of the ball and loosely seated on the cup member, a clamping bolt engaging the cup member and the collar, a nut on said bolt, and a lever on the nut projecting outwardly from the cup member for turning the nut on the bolt and drawing the collar toward the cup member and in engagement about the ball.

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