US 20090286194A1

(19) **United States**

(12) **Patent Application Publication**

Kohani et al.

(10) **Pub. No.: US 2009/0286194 A1**

(43) **Pub. Date: Nov. 19, 2009**

(54) **TOOL FOR USE WITH A TOOTH REPOSITIONING MECHANISM**

(76) Inventors: **Kambiz Kohani**, Carlsbad, CA (US); **Don Millerd**, San Diego, CA (US)

Correspondence Address:
NYDEGGER & ASSOCIATES
348 OLIVE STREET
SAN DIEGO, CA 92103 (US)

(21) Appl. No.: **12/119,933**

(22) Filed: **May 13, 2008**

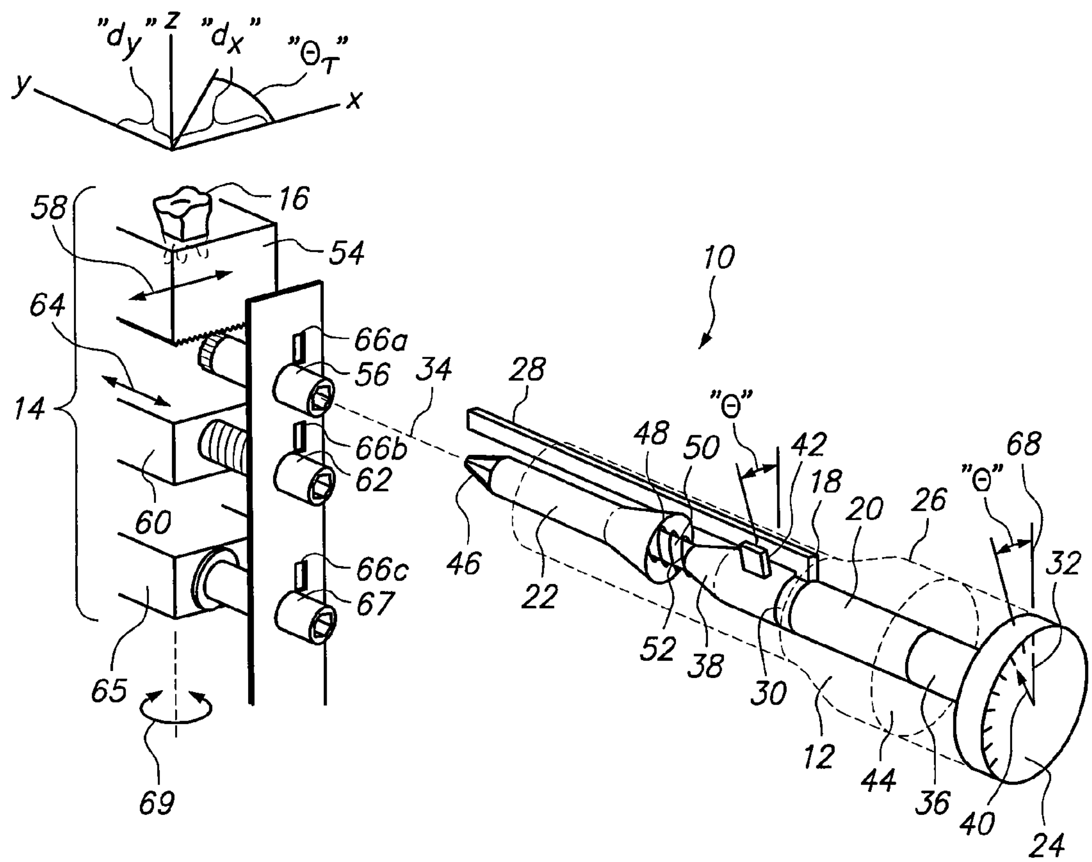
Publication Classification

(51) **Int. Cl.**
A61C 7/00 (2006.01)
A61C 7/02 (2006.01)

(52) **U.S. Cl.** **433/3**; 433/24

(57) **ABSTRACT**

A tool for rotating a component on a mechanism, to achieve linear and rotational movement of an element on the mechanism, involves three subassemblies mounted on the tool. Firstly, a reference unit that can engage with the mechanism to establish a stationary datum. Secondly, a drive assembly that can be rotated relative to the datum. Thirdly, an engagement member, selectively engaged between the component and the drive assembly for rotation of the component.



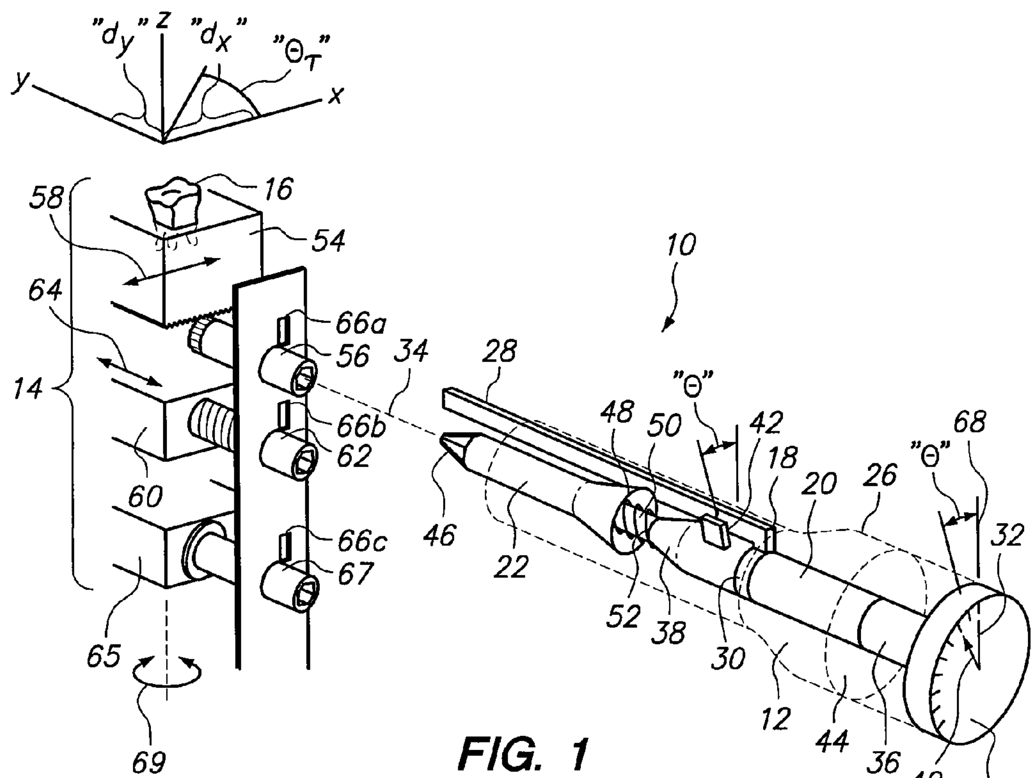

"dy"
z
"dx"
"ΘT"
y
x
58
16
54
64
10
66a
56
34
28
14
66b
62
"Θ"
48
50
42
18
20
26
"Θ"
68
60
46
22
66c
67
52
38
30
32
65
12
44
36
40
24
69

FIG. 1

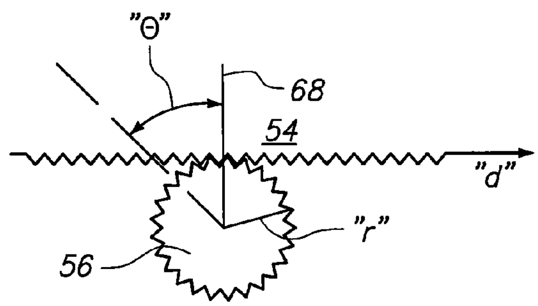

"Θ"
68
54
"d"
"r"
56

FIG. 3

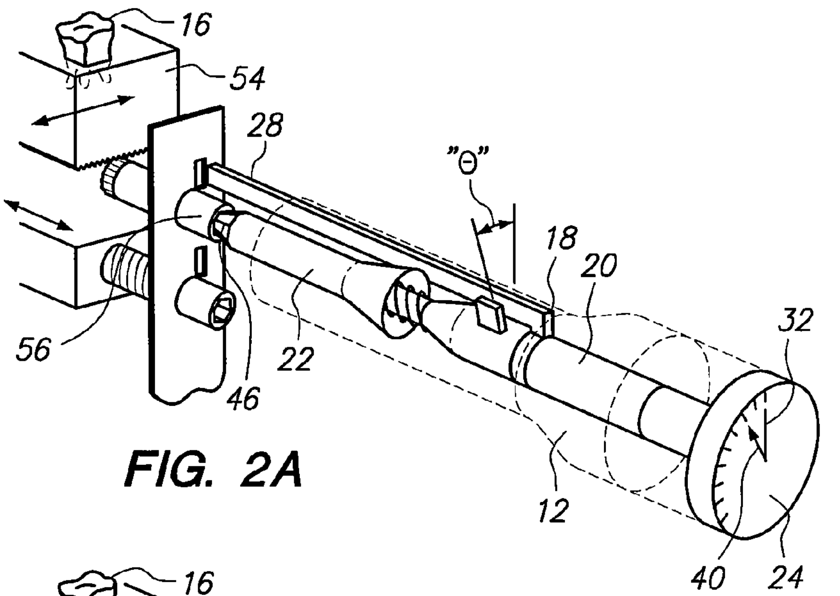


FIG. 2A

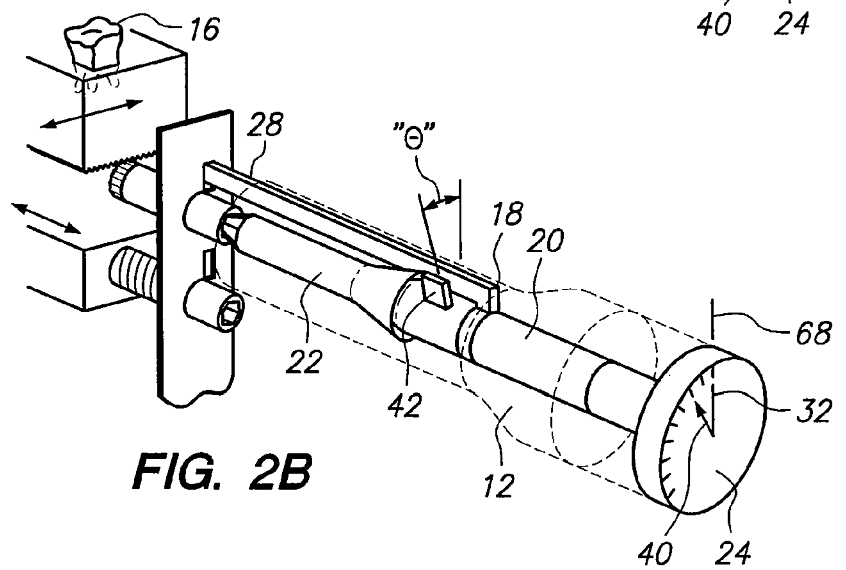


FIG. 2B

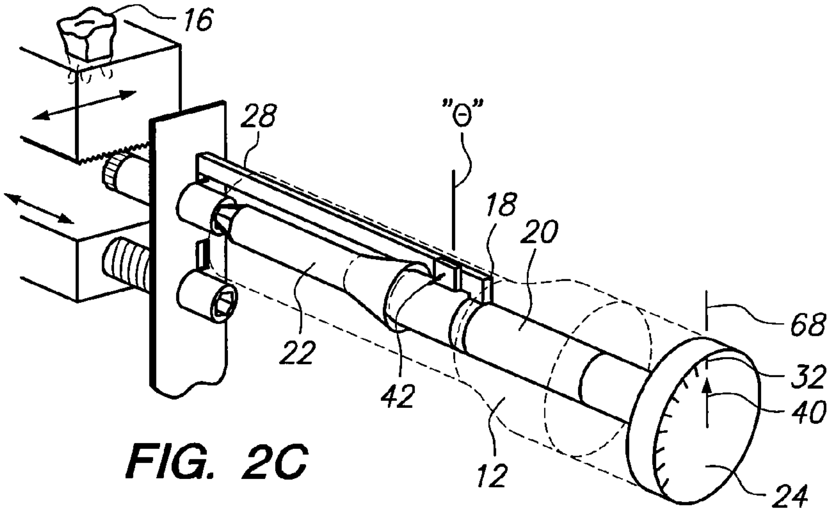


FIG. 2C

TOOL FOR USE WITH A TOOTH REPOSITIONING MECHANISM

FIELD OF THE INVENTION

[0001] The present invention pertains generally to adjusting tools. More particularly, the present invention pertains to tools that can be configured to cause a predetermined movement of a work object. The present invention is particularly, but not exclusively, useful as a tool for repositioning teeth in a dentition for subsequent use in the manufacture of a dental appliance.

BACKGROUND OF THE INVENTION

[0002] In general, orthodontia is the branch of dentistry that is concerned with correcting and preventing irregularities of the teeth. In each case, the purpose is to have the upper and lower teeth meet with their respective cusps fitting close together. Stated differently, orthodontia involves the straightening of teeth in a dentition. As is well known, this process has heretofore most often required the use of wire braces. More recently, however, new systems for aligning teeth have been proposed. For example, U.S. patent application Ser. No. 11/230,323 for an invention entitled "Method and Apparatus for Repositioning Teeth", which was filed by Kohani on Sep. 19, 2005, and assigned to the same assignee as the present invention (hereinafter the Kohani Application), discloses an orthodontic system in which a number of appliances are manufactured for sequential use. Importantly, successive appliances are manufactured with each one having a different predetermined configuration that will gradually reposition teeth of the dentition.

[0003] To manufacture a series of orthodontic appliances, as suggested above, it is necessary to successively reposition several, or all, teeth in a dentition. In this endeavor, each tooth in the dentition needs to be considered for each appliance, and repositioned accordingly. In any event, the repositioning of each tooth must be done in accordance with a procedure that is prescribed by a trained orthodontist, and it must be done subject to his/her supervision. Despite the high level of knowledge and oversight that is required from the orthodontist, the actual manufacture of an orthodontic appliance is straight forward and, with proper instructions, can be accomplished by a trained laboratory technician. This, of course, requires the instructions be easily understood and the proper tool be provided for following the instructions.

[0004] For the vast majority of orthodontic procedures, at least one tooth in the dentition needs to be moved fore or aft, left or right (i.e. in orthogonal directions) and/or rotationally about an axis defined by the tooth for each appliance in the series. Typically, the magnitude of tooth movements that are required between successive appliances will be small (e.g. <1 mm or <1°). Further, each tooth movement must have a known start point (i.e. the tooth location in the immediately preceding appliance). The Kohani Application recognizes these requirements and specifically provides for a model dentition in which individual teeth can be moved by external manipulation.

[0005] In light of the above, it is an object of the present invention to provide a system for manufacturing a dental appliance wherein each prosthetic tooth in a model dentition can be individually repositioned without requiring the taking of a new impression each time the dentition is to be corrected. Another object of the present invention is to provide a tool for manufacturing a dental appliance wherein a simple rotation of the tool through an angle "θ" will result in a desired linear or rotational movement of a prosthetic tooth in a model dentition. Still another object of the present invention is to provide a system for manufacturing a dental appliance which is simple to use, relatively easy to manufacture and comparatively cost effective.

SUMMARY OF THE INVENTION

[0006] In accordance with the present invention, a tool is provided for rotating an adjustment component (e.g. a lead screw or a pinion) through a predetermined angle (θ). As intended for the present invention, this rotational movement results in the linear movement of a positioning element on an adjustment mechanism. The purpose here is to reposition a prosthetic tooth that is mounted on the element for subsequent use in the manufacture of a dental appliance.

[0007] As envisioned for the present invention, the mechanism has two interactive elements that move in orthogonal directions. In this combination, each element is moved independently by its own adjustment component. For example, one component may be a rack and pinion type device, and the other may be a lead screw type device. Thus, in response to the rotation of a lead screw (or pinion), one orthogonal element of the mechanism will move the prosthetic tooth in an x-direction. A rotation of the pinion (or lead screw) of the other orthogonal element will then move it in a y-direction. These independent linear movements in the 'x' and 'y' directions are accomplished separately by directly engaging the tool with the respective adjustment component (pinion or lead screw).

[0008] Mechanically, the rotation of the pinion (lead screw) through an angle "θ", will result in a linear movement of the prosthetic tooth through a distance "d". As mentioned above, depending on the element that is rotated, movement of the tooth may be in either the x-direction or the y-direction. In either case, the mathematical relationship is represented by the expression: "$r\theta=d$"; wherein "r" is the radius of the rotated component (pinion or lead screw) measured in radians. As envisioned for the present invention, the desired tooth movement, "d", is clinically predetermined. The angle of rotation "θ" required to achieve this movement can then be quantified by the mathematical expression.

[0009] As envisioned for the present invention, the mechanism has an interactive element that provides for rotation of the tooth about the tooth's axis. Similar to the orthogonal elements, the rotation element is moved independently by its own adjustment component. For example, the rotational component may include a rotation arm (similar to a pinion) that is provided with a translating joint for connection to the rotation element. Thus, in response to the rotation of the rotation arm, the element of the mechanism will rotate the prosthetic tooth about its axis. This independent rotational movement about the tooth's axis is accomplished separately from the orthogonal movements by directly engaging the tool with the rotational adjustment component. Mechanically, the rotation of the arm through an angle "θ", will result in a rotational movement of the prosthetic tooth through the same angle "θ".

[0010] For the present invention, the tool defines an axis, and it has essentially three interactive sub-assemblies. These are: a reference unit, a drive assembly and an engagement member. Functionally, the reference unit of the tool is engaged with the adjustment mechanism to thereby establish a stationary datum. The drive assembly, which is attached to the reference unit, can then be positioned relative to the reference unit as desired (e.g. positioned to establish the predetermined angle "θ"). Once the datum is established and the drive assembly has been properly positioned relative thereto, the engagement member is used to interconnect the drive assembly with the adjustment component that is to be rotated (pinion or lead screw). The drive assembly can then rotate the engagement member, together with the adjustment component (pinion or lead screw). This rotation continues, until the adjustment component has been rotated through the predetermined angle (θ).

[0011] For rotational control, the tool includes a dial that is located at its proximal end. In detail, this dial identifies a fixed reference line and it has a moveable indicator. Specifically, when viewed together, the reference line and the indicator identify the angular relationship between the reference unit and the drive assembly. Importantly, the reference line and the indicator on the dial are, respectively, integral parts of the reference assembly and the drive assembly.

[0012] Structurally, the drive assembly includes a base member. And, as implied above, the indicator on the dial is integrally connected to this base member. Further, the base member is formed with a tapered probe at its distal end, and it has a flange extending outwardly from the body of the base member. More specifically, the flange is distal the tapered probe. Structurally, the reference unit includes a key that extends from the tool in a distal direction. Importantly, the fixed reference line on the dial has an integrally fixed relationship with this key. On the other hand, as noted above, the indicator rotates on the dial together with the base member of the drive assembly. Consequently, when the indicator has been rotated through an angle "θ", the flange will be positioned relative to the key, at the same angle "θ".

[0013] The engagement member of the tool is intended to simultaneously engage with the adjustment component (pinion or lead screw) on the adjustment mechanism, and with the drive assembly of the tool. Structurally, the engagement member is elongated and, preferably has a hex-head formed at its distal end. Its proximal end, on the other hand, is flared to establish a tapered cone. The engagement member also has a stem that extends axially in a proximal direction. As envisioned for the present invention, the stem is connected to the base member of the drive assembly in a manner that will allow the engagement member to freely rotate about the axis. It is also envisioned this connection will allow the engagement member to move axially through a limited distance, relative to the base member. Further, a spring is positioned on the stem to bias the engagement member and its hex-head in a distal direction from the base member.

[0014] In the operation of the present invention, the key on the tool (i.e. reference assembly) is engaged with a keyway on the repositioning mechanism to establish the stationary datum. At the same time, the hex-head of the engagement member is engaged with the pinion (lead screw). During these engagements, the tool is in a first configuration wherein the engagement member and the drive assembly are disconnected. Next, while the tool is still in its first configuration, the indicator is positioned at the predetermined angle "θ" from the reference line. Note: this also positions the drive member at the angle "θ" from the reference line. The base member is then advanced farther in a distal direction, against the spring bias. This advancement establishes a friction engagement between the tapered probe on the base member and the tapered cone of the engagement member. It also places the tool in its second configuration. Once this friction engagement has been established (i.e. the second configuration for the tool), the drive assembly and hex-head can be rotated through the angle "θ". Consequently, the adjustment component moves the prosthetic tooth through a distance "d" (recall: $r\theta=d$), or rotates the prosthetic tooth about its axis by the angle "θ". Note: rotation of the drive assembly can be done either manually, or electronically (if an internal battery is provided).

BRIEF DESCRIPTION OF THE DRAWINGS

[0015] The novel features of this invention, as well as the invention itself, both as to its structure and its operation, will be best understood from the accompanying drawings, taken in conjunction with the accompanying description, in which similar reference characters refer to similar parts, and in which:

[0016] FIG. **1** is a perspective view of the system according to the present invention with portions shown in phantom for clarity;

[0017] FIG. **2**A is a perspective view of the tool for the present invention positioned for engagement with a mechanism to move a work piece on the mechanism through a predetermined distance for purposes of the present invention;

[0018] FIG. **2**B is a view of the tool shown in FIG. **2**A when the tool is engaged with the mechanism for rotation of the tool through a predetermined angle;

[0019] FIG. **2**C is a view of the tool shown in FIG. **2**B after the tool has been rotated through the predetermined angle; and

[0020] FIG. **3** is a schematic view of an adjustment component for use with the present invention.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

[0021] Referring initially to FIG. **1**, a system for repositioning a work piece in accordance with the present invention is shown, and is generally designated **10**. As shown, the system **10** includes a tool **12** and a mechanism **14**. More specifically, the tool **12** is selectively engageable with the mechanism **14** to manipulate the mechanism **14** for movement of the work piece (e.g. a prosthetic tooth **16**).

[0022] In detail, the tool **12** includes several essential subassemblies. These are: a reference unit **18**, a drive assembly **20**, an engagement member **22** and a dial **24**. As shown in FIG. **1**, these various subassemblies are housed together in a casing **26** (shown in phantom).

[0023] With specific attention to the reference unit **18** it will be seen in FIG. **1** that this subassembly includes a key **28**. Importantly, the key **28** is affixed to a band **30** and, in turn, the band **30** is fixedly oriented relative to a reference line **32** on dial **24**. Further, it is seen that the key **28** extends from the tool **12** in a distal direction, and it is oriented substantially parallel to an axis **34** that is defined by the tool **12**. As intended for the present invention, the reference line **32** is an integral part of the reference unit **18** and is indicative of a stationary datum that is useable for monitoring and evaluating the operation of the tool **12**.

[0024] In FIG. **1**, the drive assembly **20** of tool **12** is shown to include an elongated base member **36** that defines the axis **34**. This base member **36** is formed with a tapered probe **38** at its distal end, and it is integrally attached to an indicator **40** that is moveable on the dial **24** relative to the reference line **32**. Accordingly, for purposes of the present invention, the drive assembly **20** (indicator **40**) is able to rotate about the axis **34**, relative to the reference unit **18** (reference line **32**). Thus, an observation of the relative positions of indicator **40** and reference line **32** on the dial **24** gives a visual indication of the angular relationship between the drive assembly **20** and the reference unit **18**. This angular relationship is indicated in the Figures by the angle "θ". It will also be noted in FIG. **1**, that the drive assembly **20** includes a flange **42**. Specifically, the flange **42** is mounted to extend outwardly in a radial direction from the base member **36**, and is located proximal the tapered probe **38**. Additionally, the drive assembly **20** is shown to include a connector **44** that joins the casing **26** with the base member **36**. Thus, the connector **44** can transfer a rotational force applied on the casing **26** to the base member **36** for rotation of the base member **36**.

[0025] The engagement member **22** of tool **12** is shown, in FIG. **1**, to be formed with a hex-head **46** at its distal end. As will be appreciated by the skilled artisan, however, the hex-head **46** is only exemplary, as various other engagement configurations could be used. In any event, the proximal end of the engagement member **22** is shown formed as a hollow tapered cone **48**. Specifically, the tapered cone **48** is dimensioned to receive the tapered probe **38** of the drive assembly **20** in a mating engagement. Specifically, the intention of the present invention is that the tapered probe **38** of the drive assembly **20** can be joined with the tapered cone **48** of the engagement member **22** for joint rotation, together. For this purpose, a friction engagement is envisioned, and textured mating surfaces on the cone **48** and probe **38** may enhance such an engagement. Other structural components that will accomplish this same purpose are envisioned for the present invention.

[0026] Still referring to FIG. **1**, the engagement member **22** is shown to have a stem **50** that extends along the axis **34** in a distal direction from the engagement member **22**. For purposes of the present invention, this stem **50** orients the engagement member **22** with the drive assembly **20**. When the engagement member **22** is not engaged with the drive assembly **20**, however, the stem **50** also allows the engagement member **22** to rotate independently about the axis **34**. Further, FIG. **1** also shows that a spring **52** is positioned on the stem **50** to bias the engagement member **22** in a distal direction from the drive assembly **20**.

[0027] As shown in FIG. **1**, the mechanism **14** includes an element **54** that engages with an adjustment component **56** for movement of the element **54** back and forth in an x-direction, as indicated by the arrows **58**. Similarly, the mechanism **14** includes an element **60** that engages with an adjustment component **62** for movement of the element **60** back and forth in a y-direction, as indicated by the arrows **64**. Also, the mechanism **14** includes an element **65** that engages with an adjustment component **67** for rotational movement of the element **65** about the z-axis (i.e., the axis of the tooth **16**), as indicated by the arrows **69**. While FIG. **1** illustrates that the element **65** rotates about the z-axis, the element **65** may be designed for rotation about the x-axis or y-axis, if desired. Further, the mechanism **14** is formed with a keyway **66*a*** adjacent the adjustment component **56**, a keyway **66*b*** adjacent the adjustment component **62**, and a keyway **66*c*** adjacent the adjustment component **67**. As envisioned for the system **10** of the present invention, the elements **54**, **60** and **65** interconnect with each other in such a manner that causes the elements **54**, **60**, and **65** to move together in the y-direction, while the element **54** can be moved independently of the elements **60**, **65** in the x-direction, and the element **65** can be rotated independently of the elements **54**, **60**. For this particular arrangement, the combination of element **54** and component **56** would preferably be a rack-and-pinion assembly of a type well known in the pertinent art (i.e. the rack is element **54**, and the pinion is component **56**). On the other hand, the combination of element **60** and component **62** would preferably be a lead screw assembly, also of a type well known in the pertinent art. Further, the combination of element **65** and component **67** would preferably be a rotation-translating joint, also of a type well known in the pertinent art.

[0028] For the operation of the system **10**, reference is collectively made to FIGS. **2**A, **2**B and **2**C. For purposes of clarity in the illustration, element **65** and component **67** are not shown in the figures subsequent to FIG. **1**. To begin, FIG. **2**A shows an initial contact between the tool **12** and the mechanism **14**. Specifically, this contact occurs when the hex-head **46** of the engagement member **22** is positioned in contact with the adjustment component **56**. Also, at this point, the key **28** of reference unit **18** can be aligned with the keyway **66*a*** on the mechanism **14**. Further, the indicator **40** can be rotated to position the drive assembly **20** at a proper angle "θ".

[0029] After contact has been established between the tool **12** and the adjustment component **56**, the casing **26** is advanced in a distal direction toward the mechanism **14**. This places the tool **12** in a first configuration (see FIG. **2**B), and engages the tool **12** with the mechanism **14** for rotation of the adjustment component **56**. More specifically, as shown in FIG. **2**B, when the tool **12** is in its first configuration, the tapered probe **38** of the drive assembly **20** is engaged with the tapered cone **48** of the engagement member **22**. Also, the key **28** of reference unit **18** is engaged with the keyway **66*a***. Importantly, with the engagement of key **28** with keyway **66*a***, a reference datum **68** is established for the tool **12**. The tool **12** can then be rotated toward the reference datum **68**, and through the angle "θ", to change the tool **12** from its first configuration (see FIG. **2**B) into a second configuration (see FIG. **2**C).

[0030] In FIG. **2**C, it will be seen that several aspects of the tool **12** have changed. For one, the flange **42** has been rotated through the angle "θ". Specifically, with this rotation, the flange **42** is brought into contact with the key **28** (i.e. reference datum **68**). Indeed, this contact ensures the tool **12** has rotated through the angle "θ", and only through the angle "θ". At the same time, the dial **24** gives a visual indication that the drive assembly **20** has rotated through the angle "θ". The import of all this is, of course, that the adjustment component **56** has also been rotated by the engagement member **22** through the angle "θ". The consequence of this will be best appreciated with reference to FIG. **3**.

[0031] In FIG. **3**, the element **54** and the adjustment component **56** are taken as being exemplary of a mechanical movement for the prosthetic tooth **16**, as envisioned by the present invention. In this example, the element **54** is considered as being a rack, and the component **56** is considered as being a pinion, in a rack-and-pinion assembly. Then, if the pinion **56** has a radius "r" (as shown), and the angle "θ" is expressed in radians, the distance "d" that the element **54** will be moved by a rotation of the component **56** can be calculated from the expression $d=r\theta$. A similar statement can be made for the consequence of rotating the component **62** through an angle "θ". The overall result is that by using the tool **12** to selectively rotate the components **56**, **62**, and **67**, the elements **54**, **60**, and **65** can be moved, linearly, in the directions of arrows **58** and **64**. Further, rotation of the component **67** through an angle "θ" results in rotation of the element **65** through a substantially equal angle. The overall result is that by using the tool **12** to selectively rotate the components **56**, **62**, the elements **54**, **60** can be moved, linearly, in the directions of arrows **58** and **64**. Further, the tool **12** can be used to selectively rotate the component **67** to rotate the element **65** in the direction of arrows **69**. This respectively achieves predetermined movements of the elements **54**, **60** through linear distances d_x and d_y and predetermined rotation of the element **65** through angle θ_T, wherein angle θ is substantially equal to angle θ_T (see FIG. **1**).

[0032] While the particular Tool for Use With a Tooth Repositioning Mechanism as herein shown and disclosed in detail is fully capable of obtaining the objects and providing the advantages herein before stated, it is to be understood that it is merely illustrative of the presently preferred embodiments of the invention and that no limitations are intended to the details of construction or design herein shown other than as described in the appended claims.

What is claimed is:

1. A system for use in the manufacture of a dental appliance which comprises:
- a mechanism for holding a prosthetic tooth;
- an adjustment component mounted on the mechanism for rotation through a predetermined angle to reposition the prosthetic tooth on the mechanism;
- a reference unit for engagement with the mechanism to establish a stationary datum for measuring the predetermined angle;
- an elongated drive assembly defining an axis, the drive assembly being attached to the reference unit for movement relative to the datum during a rotation of the drive assembly about the axis; and
- an engagement member mounted on the drive assembly for axial movement thereon between a first position wherein the engagement member is independently free to rotate about the axis, and a second position wherein the engagement member is engaged with the drive assembly for joint rotation therewith about the axis to rotate the adjustment component through the predetermined angle.

2. A system as recited in claim **1** wherein the reference unit, the drive assembly and the engagement member, in combination, define a tool.

3. A system as recited in claim **2** wherein the prosthetic tooth is moved by the tool from a start point through a predetermined linear distance "d", and wherein the tool has a first engagement configuration when the work piece is at the start point, and the tool has a second engagement configuration when the work piece has moved through the distance "d".

4. A system as recited in claim **3** wherein the mechanism is formed with a keyway adjacent the adjustment component, and the reference unit comprises:
- a key extending substantially parallel to the axis of the drive assembly for engagement with the keyway; and
- a dial with a reference line presented thereon, wherein the reference line is fixedly oriented relative to the key and is indicative of the stationary datum.

5. A system as recited in claim **4** wherein the drive assembly is formed with a tapered distal end and the engagement member is formed with a tapered cone at its proximal end for receiving the tapered distal end of the drive assembly therein, and further wherein the drive assembly comprises:
- a flange extending radially outward from the drive assembly, with the flange located proximal to the tapered distal end; and
- an indicator connected to a proximal end of the drive assembly and positioned on the dial for movement thereon relative to the reference line to identify an angular relationship between the drive assembly and the stationary datum.

6. A system as recited in claim **5** wherein the tool has a first engagement configuration when the prosthetic tooth is at the start point and it has a second engagement configuration after the work piece has been moved through the distance "d", and further wherein a rotation of the tool through the predetermined angle changes the tool from its first configuration into its second configuration.

7. A system as recited in claim **6** wherein the adjustment component includes a rotation member having a radius "r", and the adjustment component interconnects the tool with the prosthetic tooth for converting a rotation of the tool through an angle "θ" into a linear movement of the prosthetic tooth through the distance "d", wherein the angle "θ" has a known dimensional relationship with the distance "d" ($r\theta=d$).

8. A system as recited in claim **1** further comprising a pair of adjustment components respectively oriented on the mechanism to selectively move the prosthetic tooth in substantially orthogonal directions.

9. A system as recited in claim **2** wherein the prosthetic tooth is rotated by the tool from a start point through a predetermined angle "θ", and wherein the tool has a first engagement configuration when the work piece is at the start point, and the tool has a second engagement configuration when the work piece has rotated through the angle "θ".

10. A device for moving a work piece from a start point through a predetermined linear distance "d" which comprises:
- a mechanism for holding the work piece;
- a tool for engagement with the work piece, wherein the tool has a first engagement configuration when the work piece is at the start point, and the tool has a second engagement configuration after the work piece has been moved through the distance "d";
- a means for rotating the tool through an angle "θ" to change the tool from its first engagement configuration into its second engagement configuration; and
- a mechanical means mounted on the mechanism to interconnect the tool with the work piece during the engagement for converting a rotation of the tool through the angle "θ" into a linear movement of the work piece through the distance "d".

11. A device as recited in claim **10** wherein the tool comprises:
- a reference unit for engagement with the mechanism to establish a stationary datum for measuring the predetermined angle "θ";
- an elongated drive assembly defining an axis, the drive assembly being attached to the reference unit for movement relative to the datum during a rotation of the drive assembly about the axis; and
- an engagement member mounted on the drive assembly for axial movement thereon between a first position wherein the engagement member is independently free to rotate about the axis, and a second position wherein the engagement member is engaged with the drive assembly

for joint rotation therewith about the axis to rotate the adjustment component through the predetermined angle "θ".

12. A device as recited in claim **11** wherein the mechanical means includes a rotation member having a radius "r", and the mechanical means establishes a known dimensional relationship with the distance "d" ($r\theta=d$).

13. A device as recited in claim **12** further comprising a pair of mechanical means respectively oriented on the mechanism to selectively move the prosthetic tooth in substantially orthogonal directions.

14. A device as recited in claim **13** wherein one mechanical means is a rack and pinion, and the other mechanical means is a lead screw.

15. A device as recited in claim **11** wherein the rotating means is a casing connected to the drive assembly.

16. A method for positioning a prosthetic tooth for the manufacture of a dental appliance which comprises the steps of:

holding the prosthetic tooth on a mechanism;

mounting an adjustment component on the mechanism for rotation through a predetermined angle to reposition the prosthetic tooth on the mechanism;

engaging a reference unit with the mechanism to establish a stationary datum for measuring the predetermined angle;

attaching an elongated drive assembly defining an axis to the reference unit for movement relative to the datum during a rotation of the drive assembly about the axis; and

moving an engagement member mounted on the drive assembly between a first position wherein the engagement member is independently free to rotate about the axis, and a second position wherein the engagement member is engaged with the drive assembly for joint rotation therewith about the axis to rotate the adjustment component through the predetermined angle.

17. A method as recited in claim **16** wherein the reference unit, the drive assembly and the engagement member, in combination, define a tool, and wherein the prosthetic tooth is moved by the tool from a start point through a predetermined linear distance "d", and wherein the tool has a first engagement configuration when the work piece is at the start point, and the tool has a second engagement configuration when the work piece has moved through the distance "d".

18. A method as recited in claim **17** wherein the adjustment component includes a rotation member having a radius "r", and the adjustment component interconnects the tool with the prosthetic tooth for converting a rotation of the tool through an angle "θ" into a linear movement of the prosthetic tooth through the distance "d", wherein the angle "θ" has a known dimensional relationship with the distance "d" ($r\theta=d$).

19. A method as recited in claim **16** further comprising a pair of adjustment components respectively oriented on the mechanism to selectively move the prosthetic tooth in substantially orthogonal directions.

20. A method as recited in claim **16** wherein the reference unit, the drive assembly and the engagement member, in combination, define a tool, and wherein the prosthetic tooth is rotated by the tool from a start point through a predetermined angle "θ", and wherein the tool has a first engagement configuration when the work piece is at the start point, and the tool has a second engagement configuration when the work piece has rotated through the angle "θ".

* * * * *