Oct. 9, 1962 F. MORANDI 3,057,067

SPRING HEAD-CLAMPED HOOK HINGE JOINT FOR RELEASABLY SECURING ARTIFICIAL TEETH

Filed July 1, 1959 2 Sheets-Sheet 1

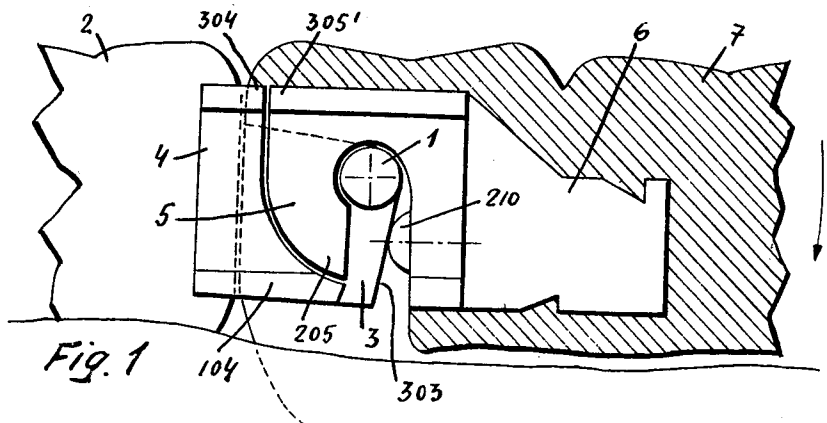


Fig. 1

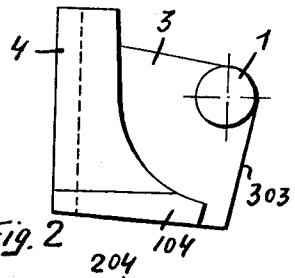


Fig. 2

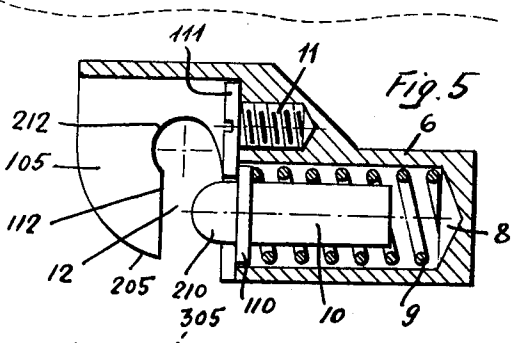


Fig. 5

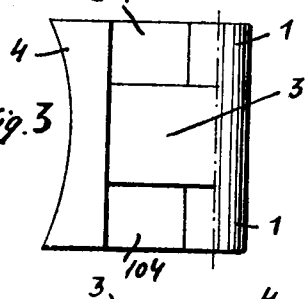


Fig. 3

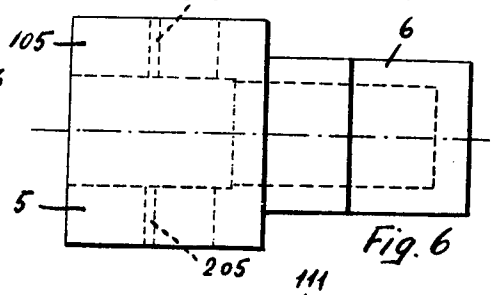


Fig. 6

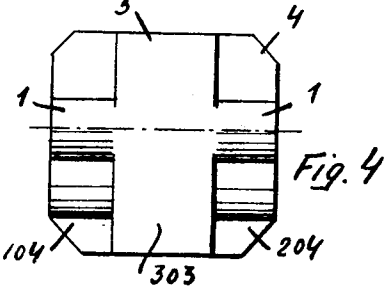


Fig. 4

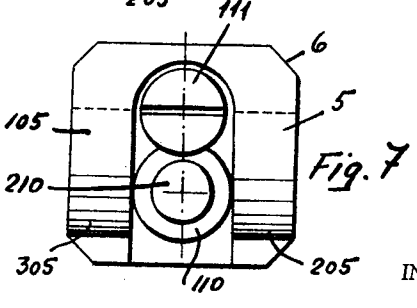


Fig. 7

INVENTOR

FEDERICO MORANDI

BY Imirie & Smiley

ATTORNEYS

Oct. 9, 1962 F. MORANDI 3,057,067

SPRING HEAD-CLAMPED HOOK HINGE JOINT FOR RELEASABLY SECURING ARTIFICIAL TEETH

Filed July 1, 1959 2 Sheets-Sheet 2

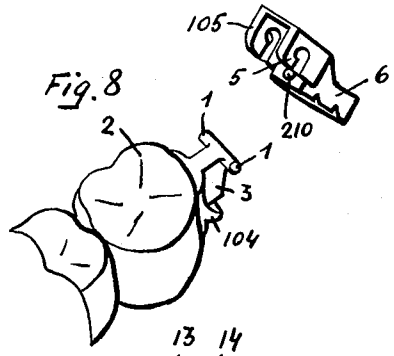
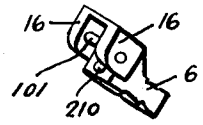


Fig. 8



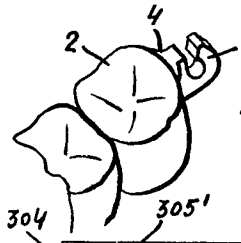


Fig. 9

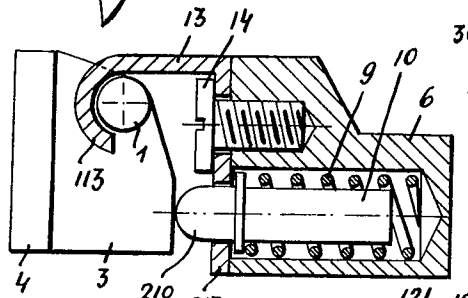


Fig. 10

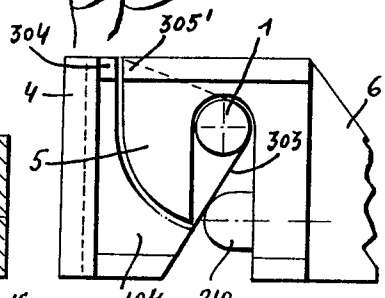


Fig. 11

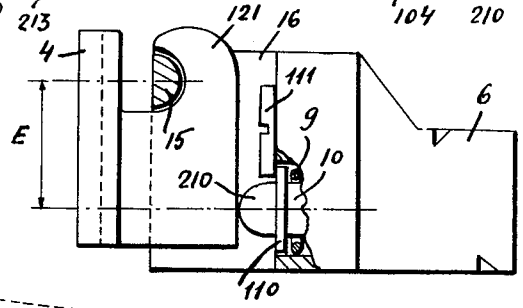


Fig. 12

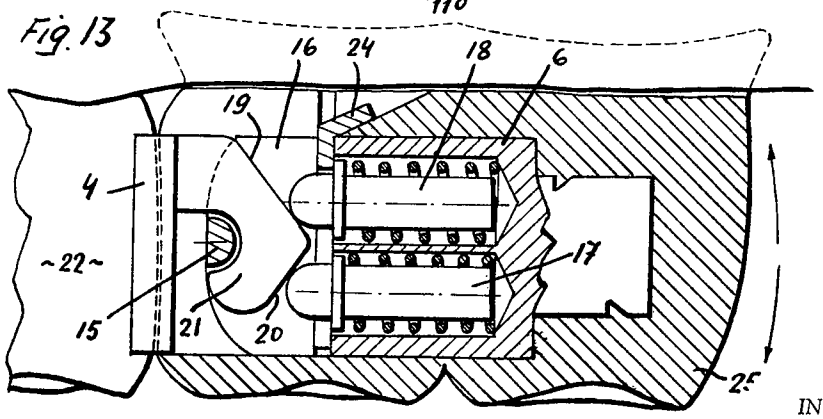


Fig. 13

INVENTOR

FEDERICO MORANDI

BY Imirie & Smiley

ATTORNEYS

United States Patent Office

3,057,067
Patented Oct. 9, 1962

3,057,067

SPRING HEAD-CLAMPED HOOK HINGE JOINT FOR RELEASABLY SECURING ARTIFICIAL TEETH

Federico Morandi, 15 Via Altabella, Bologna, Italy

Filed July 1, 1959, Ser. No. 824,381
Claims priority, application Italy July 1, 1958
14 Claims. (Cl. 32—5)

This invention relates to joints for releasably securing artificial teeth in place and aims to provide a joint of the hook hinge type adapted to hold the artificial denture or prosthesis, in pre-determined rest position in the mouth, possibly detached from the alveolar ridge of the underlying gum, while permitting all masticatory movements.

Another object of the invention is to provide a joint of the kind above-referred to, which permits of easily removing the prosthesis even by the user itself and without the use of special tools, while ensuring at the same time a very good connection with the pillar tooth.

Still another object of the invention is to provide a joint which is adapted for use on free-end prostheses of the upper jaw.

Other objects and advantages will appear from the following specification taken with reference to the attached drawings, in which:

FIGURE 1 shown a side view partially in section of a free-end dental prosthesis fastened by means of a hinge joint according to the invention;

FIGURES 2, 3 and 4 are a side view, a plan view and a front view of the part of the joint carrying the hinge pin;

FIGURES 5, 6 and 7 are respectively a side view with parts in section, a plan and a front view of the part of the joint carrying the hook-shaped hinge element;

FIGURE 8 is a perspective view of a dismounted joint of the kind in which the hinge pin is fastened to the pillar tooth;

FIGURE 9 is a perspective view of a dismounted joint, of the kind in which the hook-carrying member is fastened to the pillar tooth;

FIGURE 10 is a side view with parts in section of another embodiment of the hinge-joint according to the invention;

FIGURE 11 shows in side view still another embodiment of the joint; and

FIGURES 12 and 13 show in side view with parts in section two further embodiments of the invention, the latter being particularly adapted for upper prostheses having a free end.

Referring particularly to FIGURE 1 and 2, the joint comprises, as usual, a fixed plate **4** having an elongated shape and adapted to be welded or otherwise secured vertically to a cap of a pillar tooth **2** and a removable part **6** to be fastened into the prosthesis **7**.

In the example as shown in FIGURES 1, 2, 3 and 4 the plate **4** carries a projecting rib **3** to which a pin **1** is fastened intermediate its ends, which thus project on both sides of said rib **3**. The plate **4** carries also at its base a pair of abutment wings **104—204** which present arcuate sections formed by arcs of circles concentrical to the axis of pin **1**.

The removable part of the joint to be fastened to the prosthesis comprises the hinge members which are complementary to those carried by plate **4** and in the case as shown comprises an elongated shell **6** to be encased in a known manner into the prosthesis **7** and which carries a pair of horizontally spaced parallel hooks **5—105** so arranged as to be hooked, whenever desired, to said projecting parts of the pin **1** carried by the fixed joint part. The hooks are provided with shaped ends **205—305** having straight hook edges **112** and with an arcuate bottom part **212** which forms hinge eye. Between the inside hook edges and the end of the shell **6** in front of them there exists a gap **12**.

In the shell **6** a substantially cylindrical blind bore **8** is drilled in which a helical spring **9** is inserted on whose outer end an abutment member or collar **110** bears which is fastened to a bolt shank **10** inserted in said spring **9** and provided with a preferably rounded clamp head **210** projecting on the side of said collar **110** lying opposite to spring **9**. The parts **9**, **10**, **110** are held within said shell bore **8** by a screw **11** screwed in a tapped bore formed in said shell **6** parallel to bore **8** and whose large head **111** abuts against the adjoining part of said collar **110**, while leaving said clamp head **210** to project freely in the gap **12** between the two hooks **5—105** (cfr. FIGURES 5 and 7), in a position vertically spaced from the said bottom part **212**.

The operation of the thus described joint is apparent, particularly by an examination of FIGURE 1 from which it may be seen that by hooking the hook pair **5—105** on the pin **1**, the projecting head **210** is resiliently pushed against the edge of the pin-carrying rib **3** in front of it, thus retaining the part **6** and the prothesis **7** attached thereto in correct position while avoiding any accidental unhooking. It may be mentioned also that, even in case of bending or breakage of the pin **1**, the outer edges **205** of the hooks find a convenient seat on the curved edges of the abutment wings **104—204**.

As may be seen from FIGURES 8 and 9, instead of attaching a transversal pin **1** to a part fastened to a pillar tooth **2**, and providing a pair of hooks **5** on the shell **6** to be fastened to the prosthesis (FIG. 8), it is also possible to attach a hook **221** to the pillar tooth **2** (FIG. 9) and mount a pin **101** between two lugs **16** fitted to the said shell **6** to be fastened to the prosthesis.

In FIGURE 10 another constructive form of removable hook-carrying part is shown: According to this form the hooks **113** are formed at the end of a part **13** projecting out of a plate **213** adapted to be attached as by screw **14** to the part **6** and provided with an aperture through which the spring clamp head **210** projects.

FIGURE 11 shows another constructive form of a hook-hinge joint, in which the hook **5** may have even straight walls, provided the hooked part of the joint be pulled in a direction opposite to the gum by co-action of spring clamp head **210** with an inclined surface of the edge **303** of the pin-carrying rib.

FIGURE 12 shows a further constructive form of hook-hinge joint, in which a single hook **121** formed at the upper part of an extended rib is fastened to the plate **4** to be attached to the pillar tooth (not shown) and the hinge pin **15** to which the hook may be hooked is attached between a pair of horizontally spaced lugs **16** (only one of which is shown). The clamping head **210** abuts in this case against a part of the hook-carrying rib well spaced by a distance E from the axis of the pin **15**, thus giving great stability to the joint.

In the above embodiment the part **4** is welded to the cap of a tooth with the mouth or concave part of the hook directed towards the base or open end of the said cap.

In all the above embodiments the prosthesis, while it is compressed against the gum during the mastication, is immediately brought to its rest position, in which it is detached from or adherent without substantial pressure to the underlying gum, by the action of the described spring clamp means carried by the shell embedded in the prosthesis and reaching against the part of the joint carried by the pillar tooth.

FIGURE 13 shows another variation of the embodiment shown in FIGURE 12: Here the hook **21** which is also attached to the pillar tooth **22** has its mouth or con-

cave part directed towards the crown or top end of the pillar tooth cap **22** and is so arranged as to permit hooking a complementary joint part comprising a horizontal hinge pin **15** fastened to a pair of lugs **16** projecting out of a shell **6** inserted in a prosthesis **25**, preferably of the free-end upper-jaw type, as shown.

The rear edges **19** and **20** of the hook **21** are equally inclined with respect to the horizontal plane passing through the axis of the pin **15** and at right angles to the hook-fastening plate **4** and in the said shell **6** a pair of parallel spring-pressed clamping members **17—18** are mounted and retained as by a forked plate provided with a grip **24**, and through which the heads of said clamping members project so as to abut against the inclined back edges **19** and **20** of said hook **21** and resiliently hold the prosthesis **25** in correct position and bring same to this position each time the mastication pressure has ceased.

Many variations are possible to the constructions as described and shown, though remaining within the limits of the invention. Thus, instead of the spring-pressed bolts provided with a projecting clamping head, spring-pressed balls or other clamping members may be provided, it being also possible to employ blade springs or even resilient blocks instead of helical springs.

In any case however, due to the presence of the spring clamp means reacting against the joint part carried by the pillar tooth, the joint never adheres with substantial pressure against the gum, except during the mastication, and thus avoids that the gum remain always under compression, which is a grave inconvenience of other conventional joints, which thus favorize the atrophization of the edentulous gums.

I claim:

1. A connection assembly for connecting a prosthesis to a pillar tooth comprising a first member for permanent connection to a pillar tooth, a second member for permanent connection to a prosthesis, complemental means on said members disengageably connecting said members together and including at least one pin on one member, at least one hook on the other member engaged over said pin, a centrally disposed rib on said first member supporting the complemented connecting means thereof, said second member having spaced supports carrying the complemental connecting means thereof and straddling said rib in assembly, said rib having an abutment surface facing said second member, said hook having a curved outer surface to enable pivotal movement about said pin, and resilient means on said second member and engaging said abutment surface for urging the prosthesis pivotally about said pin to a position slightly spaced from the gums of a wearer.

2. A connection assembly for connecting a prosthesis to a pillar tooth comprising a first member for permanent connection to a pillar tooth, a second member for permanent connection to a prosthesis, complemental means on said members disengageably connecting said members together and including at least one pin on one member, at least one hook on the other member engaged over said pin, and resilient means on said second member for urging the prosthesis to a position slightly spaced from the gums of a wearer, the pin-carrying member of the assembly including a plate adapted to be secured to a tooth cap and the hook-carrying member including an elongated shell adapted to be fastened into one end of a dental prosthesis.

3. An assembly according to claim 2, in which said pin is fastened between its ends to a rib protruding from said plate and said complemental means including a pair of horizontally spaced hooks and a spring clamp member protruding from said elongated shell in a position vertically spaced from the hooking centre of said hooks, the whole being so arranged that when the said hooks are hooked to the ends of said pin the spring clamp member resiliently abuts against a corresponding edge of the said rib.

4. A connection assembly for connecting a prosthesis to a pillar tooth comprising a first member for permanent connection to a pillar tooth, a second member for permanent connection to a prosthesis, complemental means on said members disengageably connecting said members together and including at least one pin on one member, at least one hook on the other member engaged over said pin, and resilient means on said second member for urging the prosthesis to a position slightly spaced from the gums of a wearer, the hook-carrying member of the assembly being fastened to a plate adapted to be secured to a tooth cap the hook of said member being provided with a rib-like extension; and the other member of the assembly comprises an elongated shell adapted to be inserted in one end of a dental prosthesis; a pair of horizontally spaced lugs protruding from the free end of said other member and supporting the pin, and a spring clamp member vertically spaced from said pin and protruding from the free end of said pin-carrying member; the whole being so arranged that when the said hook is hooked to the said pin, the said spring-clamp member resiliently abuts against said rib-like extension of said hook.

5. A connection assembly for connecting a prosthesis to a pillar tooth comprising a first member for permanent connection to a pillar tooth, a second member for permanent connection to a prosthesis, complemental means on said members connecting said members together and including means urging the prosthesis to a normal position slightly spaced from the gums of a wearer, said complemental means including a hook carried by one member which includes a plate adapted to be secured to a tooth cap, the hook of the said member being provided with a back edge divergingly sloping on both sides from a position intermediate its ends, a shell defining the other member of the assembly and having an elongated form adapted to be inserted in one end of a dental prostheses; a pair of horizontally spaced lugs protruding from a part of the free end of said other member, a horizontal pin bridging said pair of lugs, and a pair of symetrically arranged spring clamp members protruding from said shell, the whole being so arranged that when the said hook is hooked to said pin, each of the said spring clamp members of the pair resiliently abuts against one of the said divergingly sloping back sides of said hook.

6. A hook hinge joint comprising in combination an elongated plate adapted to be welded vertically and in longitudinal direction to the cap of a pillar tooth; a rib extending at right angles to said plate and longitudinally thereof; a pin fastened intermediate its ends transversally in proximity of one of the ends of said rib so as to form a pair of opposite pivots having free ends; an elongated shell adapted to be inserted in one end of a prosthesis and having a longitudinal blind hole; and a bolt provided with a clamp head slidably mounted in said blind hole; a spring urging said bolt out of said hole; means for retaining said bolt so as to allow only the said clamp head to project outside of said shell; a pair of horizontally spaced hooks on said shell arranged with their bottom parts in a plane vertically spaced from said clamp head; said clamp head and pin-carrying rib being so arranged that the said hooks are hooked to the said opposite pivots and the said clamp head resiliently abuts against the said rib in a position which is vertically spaced from the horizontal plane passing through the said pivots.

7. A hook hinge joint according to claim 6, in which the said hooks and shell are integral.

8. A hook hinge joint according to claim 6, in which the said slidable bolt is inserted in said spring mounted in said blind hole; a protruding abutment member for said spring carried by the bolt in a position under the clamp head of said bolt, said clamp head being rounded, and said bolt retaining means including a screw provided with a large head screwed into said shell in proximity of said abutment member and retaining said bolt in said blind hole with only its head projecting thereout.

9. A hook hinge joint according to claim 6, in which a plate is secured to said shell, the said hooks projecting out of and being affixed to said plate, said plate having approximately the same outline as the outer end of said shell and being provided with a through hole in alignment with said blind hole of said shell; said bolt retaining means including a projecting abutment member on said bolt in a position spaced from the end of said head, said abutment member abutting against the parts of said plate defining said through hole and permitting the clamp head only of the bolt to project out of said through hole.

10. A hook hinge joint according to claim 6 in which the plate to be fastened to the pillar tooth has at both sides of its pin-carrying rib a pair of wings with concave edges, said hooks attached to the sleeve having outer convex edges rotatably seated on said concave edges.

11. A hook hinge joint comprising in combination an elongated plate adapted to be welded vertically and in a longitudinal direction to the cap of a pillar tooth; a rib extending at right angles to said plate and longitudinally thereof; a hook formed at one end of said rib; an elongated shell adapted to be inserted in one end of a prosthesis and having a longitudinal blind hole; a bolt provided with a clamping head and an abutment member under said head slidably mounted in said blind hole; a spring urging said bolt out of said hole and means co-acting with said abutment member for retaining said bolt so as to allow to project outside of said shell only said clamping head; a pair of horizontally spaced lugs and a horizontal pin attached by its ends to said spaced lugs in a position vertically spaced from said projecting clamping heads; the said clamping head and hook-carrying rib being so arranged that said hook is hooked to said pin and the said head resiliently abuts against the edge of said hook-carrying rib, in a position which is vertically spaced from the horizontal plane passing through said pin.

12. A hook hinge joint according to claim 11, in which said hook has a mouth opening in one of opposite vertical directions.

13. A hook hinge joint comprising in combination an elongated plate adapted to be welded vertically and in a longitudinal direction to the cap of a pillar tooth; a hook protruding from an end position of said plate towards its opposite end, the centre of the hook lying approximately between the ends of said elongated plate; said hook being provided with a back edge divergingly sloping on both sides from its centre portion; an elongated shell adapted to be inserted in one end of a prosthesis and having a pair of vertically spaced parallel blind holes; a pair of bolts each bolt of the pair being provided with a clamping head and an abutment member under said head and being slidably mounted in one of said blind holes, a spring urging each of said bolts out of its hole and means co-acting with said abutment member of each of said bolts for retaining both said bolts and springs in the blind holes allowing only the bolt clamp heads to project outside of said shell; a pair of horizontally spaced lugs and a horizontal pin attached by its ends to said spaced lugs in a position between the horizontal planes passing through the axes of said bolts; the said bolts and back edge of the said hook being so arranged that when the said hook is hooked to said pin each of said clamping heads resiliently abut against one of said diverging back edges of said hook.

14. A hook hinge joint according to claim 13, in which the said hook has a mouth opening vertically towards the crown end of said plate.

References Cited in the file of this patent

UNITED STATES PATENTS

2,593,287	Fiorentini	Apr. 15, 1952
2,688,799	Fluchiger et al.	Sept. 14, 1954

FOREIGN PATENTS

533,113	Italy	Sept. 19, 1955
540,628	Italy	Mar. 12, 1956