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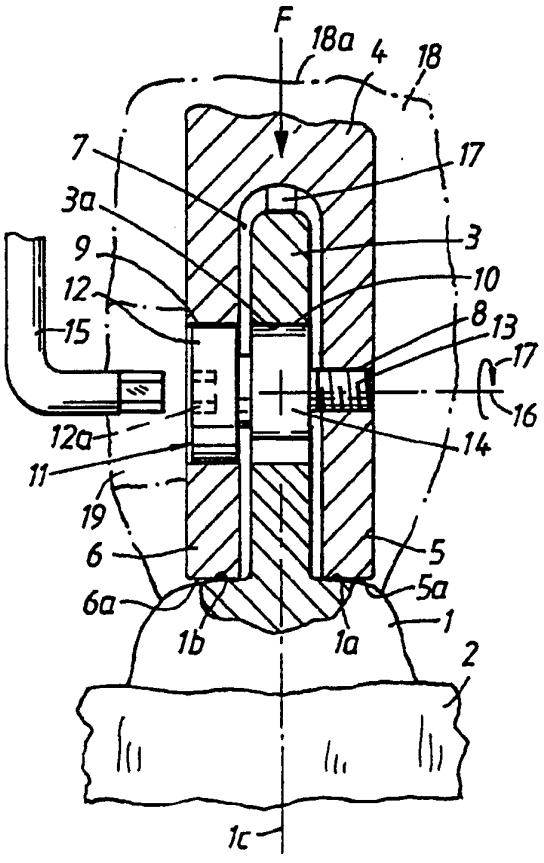
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(57) Abstract

A prosthetic construction unit (4') can be fixed to an implant (1') with the aid of control parts which are arranged, when they are brought together, to impart to the unit a distinct position on the implant. The control parts are provided with recesses which are arranged to receive an element (11') which extends in the essentially transverse directions (T) of the implant and of the unit and which, in the applied position, bears in the one control part of the said control parts and acts on the second control part so that a pressing force (F') acting in the axial directions of the unit and of the implant is obtained for pressing the unit against the implant.



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Arrangement for prosthetic construction unit and implant.

TECHNICAL FIELD

The present invention relates to an arrangement for fixing a prosthetic construction unit to an implant. Examples of implants which may be mentioned are those which are formed in the dentine.

PRIOR ART

It is already known to anchor prosthetic constructions, such as dental caps, dental bridges, dental bridge parts, etc., to one or more implants. The actual anchoring is effected by means of screws which are screwed in essentially in the axial direction of the implant.

DESCRIPTION OF THE INVENTION

TECHNICAL PROBLEM

In the proposed application of the screws, the latter often come to emerge in parts of the construction which are exposed, for example chewing surfaces which are exposed to considerable forces (chewing forces). Even if the respective screw head is covered over with material, there may be problems in obtaining optimal strength in the constructions, and there may be difficulties, from the technical point of view, in achieving an optimal external shape, satisfactory appearance, etc. The invention solves this problem, among others.

There is also a requirement to be able to use anchoring elements of types other than screws, which in some cases can be of critical importance when it comes to establishing a reliable anchoring force, and the material of which screws should last for the long period of use of the prosthesis in question. Thus, for example, the limits of elasticity of the screws may be exceeded, which leads to a deterioration in the quality of the anchoring function, which deterioration has a weakening effect and

is difficult to detect. The invention solves this problem too.

Furthermore, there is a need to establish a simplified technique for anchoring constructions to implants. The invention solves this problem too.

SOLUTION

The feature which can principally be regarded as characterizing an arrangement according to the invention is that the unit and the implants comprise control parts which can cooperate with each other and which are intended, when they are brought together, to impart to the unit a distinct position on the implant. Further characteristics are that the said control parts on the unit and the implant are designed with recesses arranged to receive an element which extends essentially in the transverse directions of the implant and of the unit and which, in the applied position, bears in the one control part of the said control parts and acts on the other control part such that a pressing force, acting in the axial directions of the unit and of the implant, is obtained for pressing the unit against the implant.

In further developments of the inventive concept, the element is designed with an eccentric part which, in a first position of rotation of the element, allows the element to be applied in the recesses of the control parts, and, in one or more other positions of rotation, presses against a cooperating surface on either of the control parts. The element can in this case preferably have a dual bearing in the first control part. Thus, in its dual-bearing suspension, the element cooperates with the other control part via the eccentric part. The control part secured to the implant can preferably have one or more spaces or compartments which extend in the at least essentially longitudinal extent of the implant and in which the control part(s) of the construction unit can be applied. In a corresponding manner, the control part of the construction unit can instead comprise one or more compartments in which the control part(s) of the implant

bear(s).

In one embodiment, the element can comprise a head-shaped part which can be mounted in a recess in a first portion of the one or the first control parts. The element can also comprise a pin-shaped part which can be mounted in a second portion of the said first control part or control parts. The said eccentric portion is arranged between the said head-shaped and pin-shaped parts. The head-shaped portion preferably has a central recess, of square or hexagonal shape, via or with which the element can be rotated about its longitudinal axis using a tool of a type which is known per se.

The implant or the unit can comprise two parts or plates which are arranged in parallel and which can be pushed over a corresponding part or plate in the implant or the unit, respectively. In one embodiment, the recess in which the said pin-shaped part bears can be provided with an internal thread which preferably has only a small number of turns. At its free end, the pin-shaped element is provided with an external thread which cooperates with the said internal thread. In this case, the thread function will be activated in conjunction with simultaneous activation of the eccentric part of the element against the relevant cooperating surface on either of the control parts. The eccentric part can be designed with ridges of different radii in relation to the axis of rotation of the element in order to establish, in each case of use, an optimal pressing force for pressing the unit against the implant.

The element can also be designed without an eccentric part, i.e. as a straight, pin-shaped part. The control parts are in this case arranged with a first assembly position in which the recesses in the respective control part are located slightly eccentrically in relation to each other. By means of the pressing-in of the pin-shaped element in the transverse direction, the eccentricity is nullified, and at the same time the fastening force is established. The eccentricity is in this case set in relation to the desired pressing force.

In one and the same case of use, different pin-shaped elements with slightly different diameters can be used, a first pin-shaped element giving a first pressing force, a second pin-shaped element giving a second pressing force, and so on. Elastic members, glue, etc. can be used in connection with the above.

ADVANTAGES

By means of what is proposed above, a good function for the clamping force can be guaranteed, and clamping forces of the order of magnitude of 100 - 200 N can be established. The connection surface between the construction unit and the implant can be located at a higher level than before. The transverse positioning of the element can be established so that the head-shaped part emerges at a less sensitive or critical surface, where, for example, the covering material is not exposed in the same way as before. Fastening elements other than screws can be used in this context, which opens the way for less critical fastening methods where the tightening or clamping force can be determined with great accuracy.

DESCRIPTION OF THE FIGURES

A presently proposed embodiment of an arrangement having the features characteristic of the invention will be described below, with reference to the attached drawings, in which:

Figure 1 shows, in vertical section and from the side, the clamping of a construction unit in an implant,

Figure 2 shows, in a vertical view and from the side, another embodiment of the clamping principle in relation to that in Figure 1,

Figure 3 shows, in a vertical view and from the rear, the clamping principle according to Figure 2,

Figure 4 shows, in longitudinal section, the construction of a tightening element,

Figure 5 shows, in an end view, the element according to Figure 4,

Figure 6 shows, in a side view, the design of a

recess in a control element according to Figures 1 or 2,

Figure 7 shows, in an end view, the construction of an eccentric part of a tightening element,

Figure 8 shows, in longitudinal section, parts of a tightening element, and the construction of a control part in which the tightening element can be fastened,

Figure 9 shows, in a vertical section, another fastening principle in relation to Figures 1 to 8,

Figure 10 shows, in a vertical section, a second stage of the fastening principle according to Figure 9, and

Figures 11 - 11c show, in vertical sections and views, a further constructional embodiment, with associated parts.

DETAILED EMBODIMENT

In Figure 1, the upper part of an implant is shown by 1. The implant is designed in a manner known per se and can comprise a spacing member, for example at the said upper parts. In this case, the anchoring is effected in the dentine 2. A first control part 3 is fastened to the implant. The fastening can be effected in a manner known per se, and the implant can, for example, form part of a spacing member belonging to the implant 1. A construction unit is represented by 4 in Figure 1. The construction unit is provided with a second control part which includes a first part 5 and a second part 6. The parts 3, 5 and 6 can consist of plate-shaped parts which protrude into or over each other. The parts 5 and 6 have bottom surfaces 5a and 6a, respectively, which are arranged to bear against corresponding top surfaces 1a and 1b, respectively, on the implant or its spacing member, etc. The parts 5 and 6 can be regarded as forming a compartment or a recess 7 in which the part 3 extends. The compartment 7 surrounds the part 3 on all sides. The parts 5 and 6 include recesses 8 and 9, and the part 3 includes a recess 10. Arranged in the said recesses is an element 11 which has a head 12, which is mounted in the recess 9, a pin-shaped part 13 which is mounted in the

recess 8, and an eccentric part 14 which is mounted in the recess 10. The head is provided with a central, outwardly opening recess 12a via which a key 15 can cooperate for turning the element about its longitudinal axis 16 in the direction of the arrow 17. The recess 8 and the pin-shaped part can be provided with mutually cooperating threads in accordance with what is described below. In one embodiment, the said threads can be omitted.

The recesses 8, 9 and 10 and the element are in this case arranged in such a way that the element can be applied in its position in the recesses and turned using the tool 15. Upon turning, the eccentric part 14 comes into cooperation with a bottom surface 3a on the part 3. A pressing force F arises in this way and presses the construction part against the implant via the said surfaces 5a, 6a and 1a, 1b, respectively. The eccentric formation 14 is designed in this case such that distinct positions of rotation can be obtained for the element 11, providing for a distinct fastening of the construction unit 4 in the implant 1. The pressing force is directed in the axial direction 1c of the implant. In one embodiment, the pressing force can be applied counter to the action of an elastic element 17. Glue or another fastening means can also be applied in the recess 7 in order to ensure that the construction unit is anchored definitively to the implant 1. Any release of the construction unit can subsequently take place via or by means of the spacing member in the implant 1. In the figure, the material added to the tooth, or the outer material which is applied on the construction unit 4, is indicated by 18. The head of the fastening element can be covered with material 19. In Figure 1, the recess 8 has been shown as continuous through the part 5. In one embodiment, the recess need not be continuous.

In the embodiment according to Figure 2, the implant 1' has instead been provided with two parts 21, 22 in its control element, and the construction unit 4' has been provided with a part 23, which parts 21, 22 and

23 cooperate in a manner which corresponds to the parts 3, 5, 6 in the embodiment according to Figure 1. The fastening element 11' in this case cooperates, via its eccentric part 14', with a bottom surface 24. During this cooperation, the force F' arises in the axial direction 1c' in a manner corresponding to the case according to Figure 1. The direction of rotation 17' is optional, as in the case according to Figure 1. In the case according to Figure 2, the connection surfaces 1a', 1b' and 5a', 6a', respectively, have been shifted upwards towards the free end 18a' of the tooth. An area 25 at the point where the implant merges with the dentine is thus without any intermediate gap between the construction unit and the implant. In this case too, the recess 7' surrounds the part 23 on all sides.

Figure 3 shows the aforementioned surrounding and design of the actual parts which are evident in Figure 2.

Figures 4, 5 and 6 show examples of designs of the fastening element 11''. The design of the eccentric part 14'' in the embodiment in question is evident from Figure 5. The eccentric part has a number of sides and bends 26, 27, 28, 29, 30 and 31. The axis of rotation of the fastening element is indicated by 32, and it is evident from Figure 5 that the said surfaces and bends are at different distances R1, R2, R3 from the said axis. The said side surfaces can have different angles α, $\alpha 1$, etc. The curved shape of the bend 30 can also vary at different positions. It will be seen that by selecting the distances of the surfaces from the centre, their different inclinations, the bends, etc., it is possible to obtain a clamping force for the units according to Figures 1 to 3 as a function of the position of rotation of the fastening element about the axis of rotation 32. It will also be seen that distinct positions can be obtained for the said clamping forces. Manufacturing irregularities in the control parts can be compensated by different degrees of rotation of the element, and so on. In Figures 1 to 5, surfaces, gaps, angles, etc., have been shown exaggerated in size in order to ensure that

the presentation of the function is clear. It is obvious that, for example, the play between the control parts must be adapted to the accuracy which is required in the case in question.

Figure 6 shows a further embodiment of the element 11'''. It also shows the shape of a recess 9', via which the element is introduced. In order to allow the eccentric part 14''' to take up a first position of rotation for the element about the axis of rotation 32', the recess 9' is of rectangular design. The element can be turned from the position shown in Figure 6 to one or more other positions of rotation in which there is cooperation with the control part or control parts in question. The head-shaped part on the fastening element is guided against inner surfaces 9a, 9b (long sides of the rectangle).

Figure 7 shows another embodiment of the eccentric part 14''''. A rotational movement 33 about the axis 32'' leads to an increased pressing force F'' as a function of the rotation about the axis 32''. The distances or the radii r1, r2, r3 and r4 increase in stages, and a certain length A of the peripheral straight surfaces (ridges) ensures a distinct bearing against the relevant surface 34 of the control part in question.

Figure 8 shows that the pin-shaped part 13' can be provided with an external thread 13a at its free end. This external thread can cooperate with an internal thread 8a on, for example, the part 5'. In this case, the recess 8' is not continuous, but instead has a cover part. A characteristic feature of the thread arrangement is that the internal thread includes only a small number, a pair, of turns, with which the element cooperates in the final stage of its application.

Figures 9 and 10 show another fastening principle. The control parts include, in conformity with what is described above, the parts 35 and 36, 37, respectively. The recesses or the holes 35a and 36a, 37a, respectively, are in this case arranged eccentrically in relation to each other in a first application position,

= the position according to Figure 9, between the parts 35 and 36, 37, respectively. The diameters d and D, respectively, of the recesses are of substantially the same order of size. In the said first position, the said recesses are arranged slightly eccentrically in relation to each other, which eccentricity has been indicated in Figure 9 by the distance a. In this case, use is made of a pin-shaped part 38 which can be inserted into the recesses 36a, 35a and 37a in the direction of the arrow 39.

Figure 10 shows complete insertion into the said recesses, and it can also be seen that the said eccentricity has been reduced or eliminated, and at the same time a pressing force F''' has been obtained, for example in the part 35, in a direction 39 which coincides with the said axial direction in accordance with the above. A relative movement between the parts 35 and 36, 37 thus occurs upon insertion of the element 38 into the recesses. The magnitude of the movement and the magnitude of the clamping force F''' are determined by the eccentricity and the diameter D' of the pin-shaped element. Different clamping forces F''' can be obtained by using different pin-shaped elements 38 with different diameters D', and so on. In this case, the element 38 need not be designed as a cylindrical pin, but instead can have different shapes, for example a wedge shape, which is shown, in Figure 10, by the broken line 38a, and so on. The above can be used in combination with snap arrangements, material deformations in the element and/or the control parts, all for the purpose of defining a longitudinal displacement position for the element in the recesses. When the element has a wedge shape, the surfaces cooperating with the element can be inclined to an extent corresponding to the angle of the wedge, and so on. In this case there can be, with an essentially transverse direction T, an angle deviation of, for example, ± 10° in relation to the line perpendicular to the axial direction. Likewise, the element can be angled slightly in relation to the front-to-back direction of the

respective tooth/tooth replacement, with a corresponding value.

A synonym for each control part mentioned above is bypass part. In Figure 11, the implant is shown by 40, and the control part or bypass part belonging to the implant is shown by 41. The part 41 consists in this case of two mutually lockable parts 42 and 43. The part 42 is secured in the implant 40 by a part 44 which can consist of a screw-shaped part which has a thread 44a, which can cooperate with a corresponding thread in the implant. The part 42 has a preferably spherical portion 42a. The part 43 includes a recess 43a which corresponds to the spherical portion and via which the part 43 can be fitted on the spherical portion.

The parts 42 and 43 can thus assume mutually different positions of rotation about their longitudinal axes 45 before they are locked to each other. The part 43 has the transverse recess for the transverse element 47 which is passed via the transverse recess 48 in the construction unit 49. By means of this arrangement, the part 43 can be adapted in terms of its angle position (about the longitudinal axis 45) to the recess 48 and the recess 50 in the construction unit 49 independently of the angle of rotation of the implant and the part 42, before the parts are locked to each other. In this way, the positions of the recesses 48, 50 on the tooth/tooth replacement can be given a desired direction, and thus, for example, the mouth 48 can be directed towards the inside of the respective tooth.

In order to facilitate the entry of the element 47 into the recesses 46, 48 and 50, the recess 46' in the part 43' is widened/oval in the transverse direction for the purpose of obtaining a guide-in function for the element 47, in which guide-in function the part 43' can turn upon insertion of the element, before the parts are locked to each other. Both the mouths 51 and 52 of the recess 46' have these oval, widened shapes. The recess 43a' is open at the bottom and engages with an inner surface part 53 about the ball or the spherical portion

42a. The part 43' thus has two downwardly projecting legs 54, 55 which present the said inner surface part 53. The recess 43a' exhibits a mouth 56 which extends sidewards and via which the part 43' can be fitted over the portion 42a. The legs 54 and 55 are thus each provided with a widened part 57 and 58, respectively. The element 47 has an eccentric part 59 of the "Archimedes type". In order to ensure that the said legs 54, 55 will not be spaced apart during connection and lose their grip on the spherical portion or the ball, they are held together at one end of the recess 43a' by a gable portion 60 which has an inner wall 61 of the recess 43a'.

The application of the construction unit proceeds as follows. The part 42 is secured in (screwed into) the implant 40. The part 42 has a downwardly projecting edge 42a which closes tightly against the top surface of the implant. The implant can be provided with a central guide part 40a. The part 43 is then fitted on the part 42 via the said portion 42a and the recess 43a, 43a'. The construction unit is then fitted over the part 43 via its recess 49a. The application of the parts to each other is in this case carried out such that the mouth 48 is given the correct direction in the oral cavity/on the tooth or the tooth replacement, and such that the recesses 46, 48 and 50 are placed in an essentially straight line in relation to each other. The element 47 is then introduced into the recesses via the recess 48 with the cam 59 in a first angle of rotation, in which there is no cooperation with the inner wall of the recess 46. The construction unit has inner guide edges 49b which come into cooperation with corresponding guide surfaces on the part 42. The part 43 is matched in shape to the recess 49a and, as a result of this, is guided in terms of its angle of rotation in relation to the unit 49. The construction unit 49 and the implant 45 are adapted to each other, in terms of angle of rotation about the longitudinal axes 45, by means of the adjustment of the angle of rotation about the axes 45 between the parts 42 and 43.

The element 47, 47' is then turned through an

angle so that the cam 59 comes into cooperation with the inner wall of the recess 46. A final adjustment is thus made between the unit 49 and the parts 42 and 43. The securing between the unit 49, the parts 42, 43 and the implant is determined by the torsional force on the element 47 (cf. above).

The invention is not limited to the embodiment shown above by way of example, but can instead be modified within the scope of the attached patent claims and the inventive concept.

PATENT CLAIMS

1. Arrangement for fixing a prosthetic construction unit (4') to an implant (1), characterized in that the unit (4') and the implant comprise control parts (23 and 21, 22, respectively) which can cooperate with each other and which are intended, when they are brought together, to impart to the unit a distinct position on the implant, and in that the said control parts on the unit and the implant are designed with recesses (8, 9, 10) arranged to receive an element (11, 11') which extends in the essentially transverse directions (T) of the implant and of the unit and which, in the applied position, bears in the one control part of the said control parts and acts on the other control part such that a pressing force (F), acting in the axial directions of the unit and of the implant, is obtained for pressing the unit against the implant.

2. Arrangement according to Patent Claim 1, characterized in that the element is designed with an eccentric part (14) which, in a first position of rotation of the element, allows the element to be applied in the recesses (8, 9, 10) of the control parts, and, in one or more other positions of rotation, presses against a cooperating surface (3a, 24) on either of the control parts.

3. Arrangement according to Patent Claim 1 or 2, characterized in that the element has a dual bearing in the first control part and can cooperate, in its dual-bearing suspension, with the other control part via the eccentric part (14, 14').

4. Arrangement according to Patent Claim 1, 2 or 3, characterized in that the control part secured to the implant has one or more spaces (7, 7') or compartments which extend in the at least essentially longitudinal direction of the implant and in which the control part(s) of the construction unit can be applied.

5. Arrangement according to any one of the preceding patent claims, characterized in that the element

(11, 11') comprises a head-shaped part (12) which can be mounted in a recess (9) in a first portion of the one or the first control parts, and a pin-shaped part (13) which can be mounted in a second portion of the said first control part(s), and an eccentric part (14) arranged between the said head-shaped and pin-shaped parts.

6. Arrangement according to Patent Claim 5, characterized in that the head-shaped part has a central recess (12a), a hexagonal recess for example, via which the element can be rotated about its longitudinal axis (16) from the said first position of rotation to the said second position of rotation.

7. Arrangement according to any one of the preceding patent claims, characterized in that the control part which can be assigned or anchored to the implant (1) has two parts which are arranged in parallel and which can be pushed over a part which can be assigned to or is included in the unit (4) and which forms the control part of the unit.

8. Arrangement according to any one of Patent Claims 1 to 6, characterized in that the control part which can be assigned to or is included in the unit has two parts which are arranged in parallel and which can be pushed over a part which can be assigned or secured to the implant and which forms the control part of the implant.

9. Arrangement according to any one of the preceding patent claims, characterized in that both the control parts have two parts which are arranged in parallel, and in that when the unit is in its position applied on the implant, the respective pairs of the parallel parts are displaced parallel to one another upon their applications to each other.

10. Arrangement according to any one of the preceding patent claims, characterized in that the element is provided, at its free end (the end remote from the head-shaped end), with an external thread (13a) which can cooperate with an internal thread (8a) in the control part or control part portion in question, and in that the internal thread preferably has only a small number of

turns.

11. Arrangement according to any one of the preceding patent claims, characterized in that the eccentric part is designed with ridges/surfaces with different radii calculated from the axis of rotation of the element, and in that one ridge with a greater radius than a preceding ridge increases the pressing force (F', F'', F''') of the unit against the implant.

12. Arrangement according to Patent Claim 1, characterized in that the recesses (35a, 36a, 37a) for the element are arranged such that the element, when it is introduced/pressed-in in the transverse direction (T) to a dual-bearing position in the one control part, at the same time acts on the second control part for pressing the unit (4) against the implant.

13. Arrangement according to Patent Claim 1 or 12, characterized in that the control part is arranged to assume a first assembly position in which the recesses in the first and second control parts are arranged slightly eccentrically in relation to each other, and a second assembly position in which the recesses are, by means of the element, essentially concentric, or less eccentric than in the first position, in relation to each other, and in that the eccentricity is chosen in order to ensure the necessary or desired pressing force for the unit against the implant.

14. Arrangement according to any one of the preceding patent claims, characterized in that one or more elastic elements are arranged between the control parts, the said pressing force being effected counter to the action of these elastic elements.

15. Arrangement according to any one of the preceding patent claims, characterized in that, in conjunction with the anchoring of the unit to the implant by means of the element, glue or a corresponding securing means can be applied between the control parts for their distinct anchoring relative to each other and/or for distinct anchoring of the element.

16. Arrangement according to any one of the preceding

patent claims, characterized in that the control part or bypass part (41), which can be anchored, or is anchored, in the implant, is arranged to make available its recess (46) to the element (47) extending in the transverse direction, independently of the angle of rotation of the implant about its longitudinal axis (45).

17. Arrangement according to any one of the preceding patent claims, characterized in that the control part or bypass part of the implant comprises two parts (42, 43) which are coupled to each other, and in that the first part (42) of the said parts comprises or forms a first locking part (42a), and the second part of the said parts comprises a second locking part (43a, 54, 55).

18. Arrangement according to any one of the preceding patent claims, characterized in that the control part or bypass part which is anchored or can be assigned to the implant (40) has first and second parts which can be coupled or are coupled to the implant and to each other, in that the first part of the said parts has a spherical portion (42a), and the second part has a corresponding spherical recess, the spherical portion and the recess being arranged such that the second part (43) can be fitted on, and locked to, the first part (42) independently of the mutual angle of rotation about the longitudinal axis (45) of the first and second parts, and in that the second part has a recess (46) which extends in the essentially transverse direction of the parts and serves as the said recess for the transverse element (47).

19. Arrangement according to Patent Claim 18, characterized in that the transverse recess of the second part is designed with oval mouths (51, 52) which make the second part more independent of the angle of rotation upon entry of the element (47) into the recesses (46, 48 and 50).

20. Arrangement according to any one of the preceding patent claims, characterized in that the element (47) is assigned a continuously rising curve shape or cam (of the Archimedes type).

21. Arrangement according to any one of the preceding patent claims, characterized in that the spherical recess in the second part has an end wall (60) which counteracts stretching movements in the parts (54, 55), presenting the spherical recess (43a), when the second part (43) is clamped against the first part and its associated spherical portion (42a).

Fig. 3

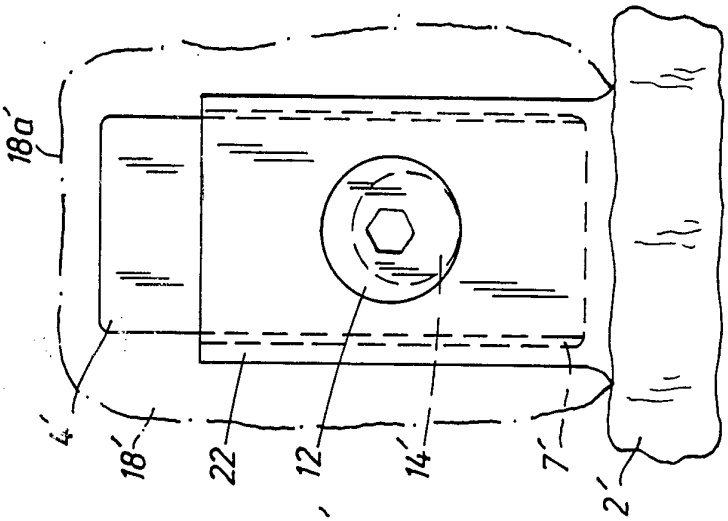


Fig. 2

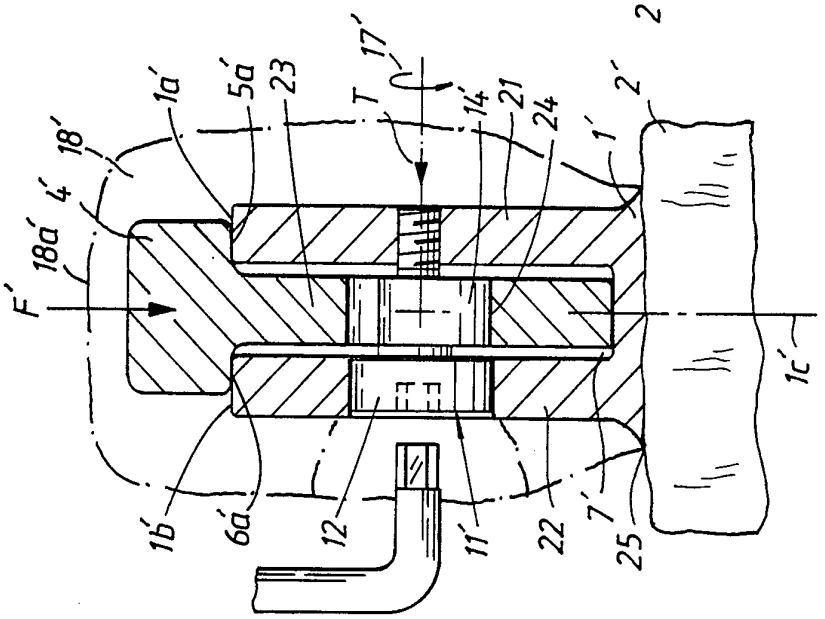


Fig. 1

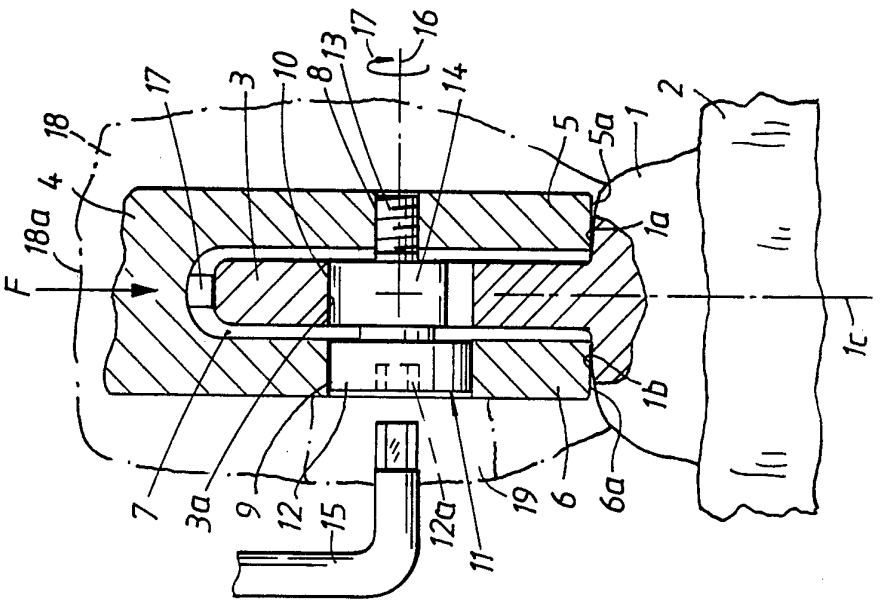


Fig. 4

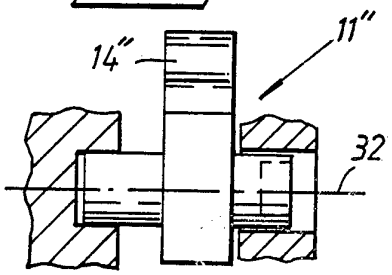


Fig. 5

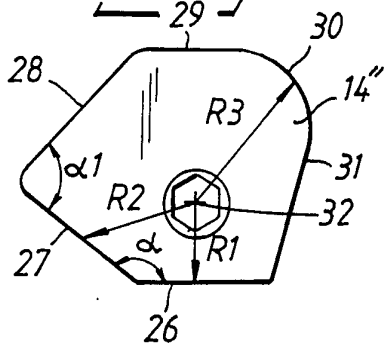
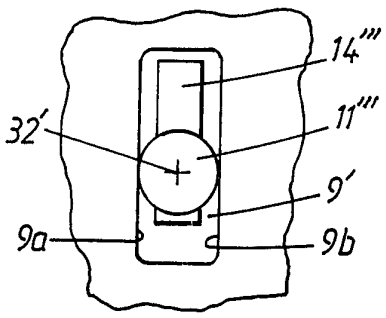


Fig. 7

Fig. 6



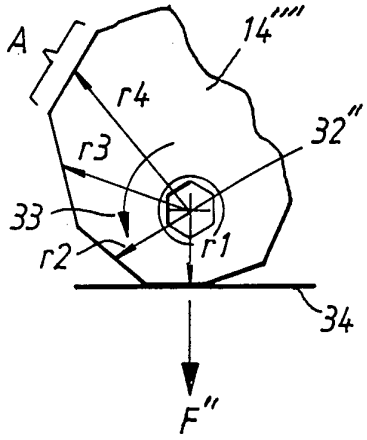


Fig. 8

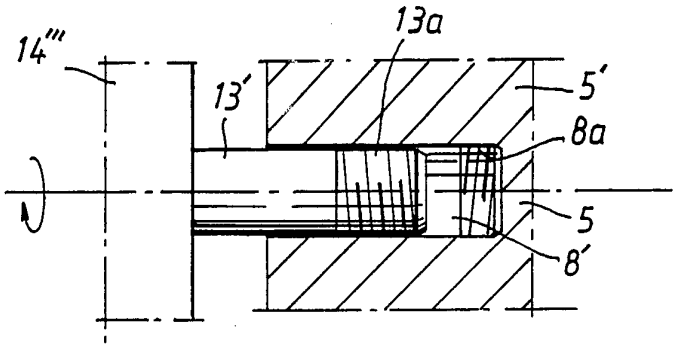


Fig. 9

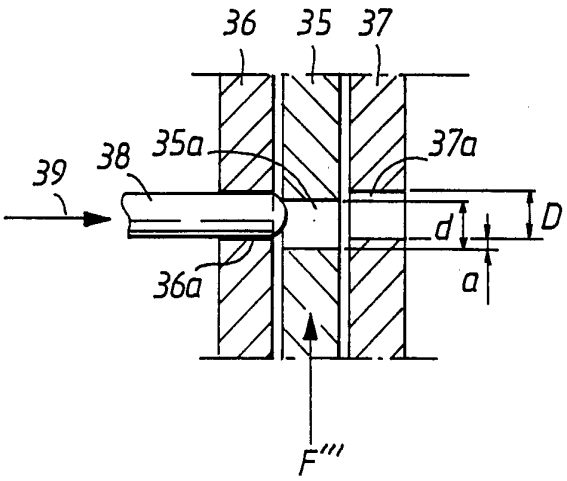
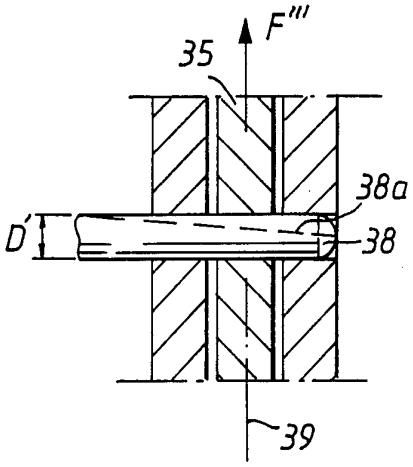


Fig. 10



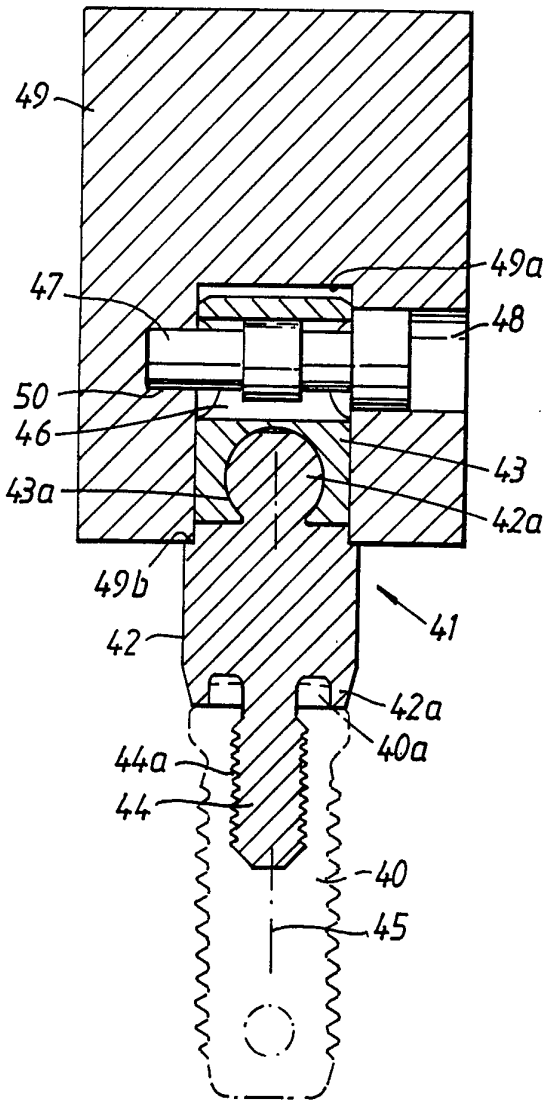


Fig. 11

Fig. 11c

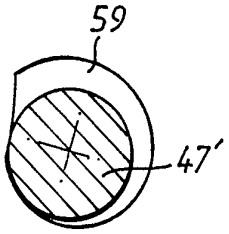


Fig. 11a

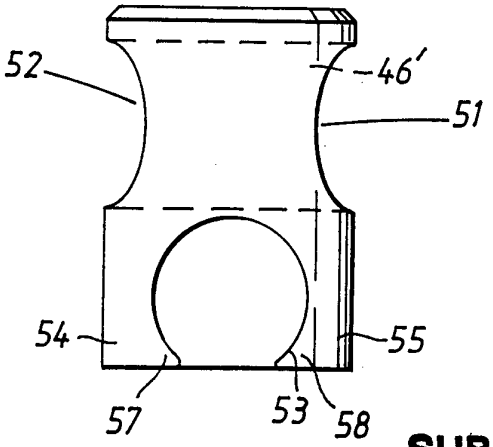
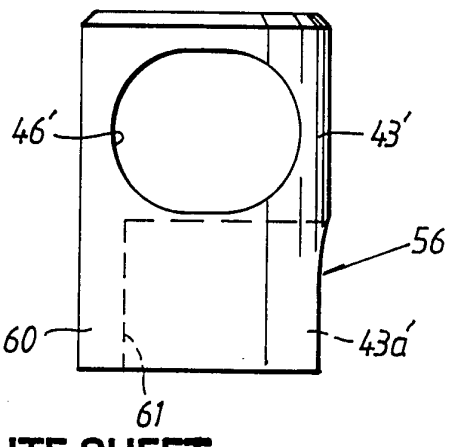


Fig. 11b



INTERNATIONAL SEARCH REPORT

International application No.
PCT/SE 95/00148

A. CLASSIFICATION OF SUBJECT MATTER

IPC6: A61C 8/00
According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC6: A61C

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

SE,DK,FI,NO classes as above

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	US, A3, 4713003 (JOHN M. SYMINGTON ET AL), 15 December 1987 (15.12.87) --	1-21
A	EP, A2, 0370522 (LAUKS, NIKOLA), 30 May 1990 (30.05.90) --	1-21
A	EP, A1, 0423798 (DAFTARY, FEREIDOUN), 24 April 1991 (24.04.91) -- --------	1-21

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"O" document referring to an oral disclosure, use, exhibition or other means
"P" document published prior to the international filing date but later than the priority date claimed
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"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
8 June 1995	14 -06- 1995
Name and mailing address of the ISA/ Swedish Patent Office Box 5055, S-102 42 STOCKHOLM Facsimile No. +46 8 666 02 86	Authorized officer Dagmar Järvman Telephone No. +46 8 782 25 00

INTERNATIONAL SEARCH REPORT

03/05/95

International application No.
PCT/SE 95/00148

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		DE-A- 3839837	31/05/90
		DE-D- 58907094	00/00/00
		ES-T- 2050764	01/06/94
		US-A- 5049073	17/09/91
EP-A1- 0423798	24/04/91	AT-T- 118328	15/03/95
		CA-A- 2028078	21/04/91
		DE-D- 69016916	00/00/00
		US-A- 5035619	30/07/91
		US-A- 5073111	17/12/91
		US-A- 5145372	08/09/92