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(54) **Expander for table legs**

Expansionsvorrichtung für Tischbeine

Expendeur pour pied de table

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EP 1 208 767 B1

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Description

[0001] The present invention relates to an expander for table legs suitable for attaching a tubular-shaped leg to a table surface.

[0002] Tables preferably consist of several separate pieces, the surface and legs, to allow easier transportation and storage, minimizing their bulk and reducing the risk of damage.

[0003] These single components must allow rapid assembly also on the part of end-users, people who are not expert and who do not generally have specific equipment, also guaranteeing firm and stable attachment over a period of time, and with the possibility of being dismantled. An expander for table legs is described in DE 2 155 234.

[0004] Another possible embodiment, currently used, consists in applying anchor plates to the corners of the table surface, equipped with a cylindrical body, on which the legs are blocked, which expands by tightening a radial grain. These anchor plates, if pre-assembled on table surfaces, are considerably bulky and there is the risk of causing damage to objects or people.

[0005] Alternatively, the function of anchoring to the table surface and of pressure clamping to the internal cylindrical surface of the leg are effected by two separate anchoring devices.

[0006] Metal anchor plates which are equipped with or receive threaded elements, may be previously arranged at the corners of the table surface.

[0007] A second anchoring device therefore joins the plate to the tubular leg. It consists of an expander with truncated cone surfaces, made up of two coaxial hollow elements. An internal truncated cone element has a central threaded hole. On screwing the expander to the threaded element of the plate, the internal truncated cone progressively interacts with an external element, elastically deformable, having an internal truncated cone surface with the same inclination and external cylindrical surface, which, on deforming, creates pressure constraint with the tubular leg.

[0008] The blockage of the legs to the table surface by means of the truncated cone expander, creates the problem of the stability of the connection when the legs are subjected to stress with forces perpendicular to the legs and applied to the base, a common situation for an assembled table.

[0009] The objective of the present invention is to produce an expander for table legs which ensures a stable connection between surface and leg also in the presence of stress.

[0010] A further objective of the present invention is to produce an expander for table legs which joins surface and leg and which can be dismantled.

[0011] Another objective of the present invention is to produce an expander for table legs which is particularly simple and functional, with limited costs.

[0012] These objectives according to the present invention are achieved by the production of an expander for table legs as described in claim 1.

[0013] Further characteristics of the expander for table legs are illustrated in the dependent claims.

[0014] The characteristics and advantages of an expander for table legs according to the present invention are evident from the following, illustrative and nonlimiting description, referring to the enclosed schematic drawings, wherein:

- figure 1 is a plan view of an expander for table legs in which a threaded unit, suitable for interacting with a threaded leg, has been inserted;
- figure 2 is a raised sectional view on different planes of the expander for table legs of figure 1;
- figures 3-5 show the assembly phases of the expander for table legs: the insertion of the tubular leg, the expansion of the leg and connection of the leg to the surface;
- figure 6 schematically shows the distribution of forces in the expander for table legs, object of the present invention;
- figure 7 is a plan view of an expander for table legs in which a threaded unit, suitable for interacting with a threaded hole, has been inserted;
- figure 8 is a raised sectional view on different planes of the expander for table legs of figure 7;
- figures 9 and 10 are two sectional views illustrating the behaviour of known expanders when the table leg is subjected to a lateral load; and
- figures 11 and 12 are two view like figures 9 and 10 but illustrating the different behaviour of the expander according to the present invention.

[0015] With reference to the figures, these show an expander for table legs, indicated as a whole with 10, consisting of two elements, internal and external, joined to each other in a coaxial position with respect to a symmetry axis 11, a threaded unit which also allows the connection of an anchor plate 32 assembled to a table surface 33.

[0016] The internal element is a truncated cone body 12 which has a threaded hole 14. In this embodiment of the present invention the truncated cone body 12 is hollow with the threaded hole 14 consisting of a cylindrical portion 15, internally threaded, applied to the inside of the upper end of said truncated cone body 12.

[0017] Figures 1 and 2, and also 7 and 8, illustrate two embodiments of the threaded unit which utilizes its own threaded shank 16 in the threaded hole 14 of the truncated cone body 12. This consists of a screw-nut 17 or 117 with a widened head 18 or 118, equipped with an internal threaded portion 19 or an external threaded portion 119 for coupling with the anchor plate 32 attached to the table surface 33.

[0018] The external lateral truncated cone wall 20 of said body 12 slopes at an angle α with respect to the symmetry axis 11. On the internal surface of the wall 20

of the truncated cone body 12 there are radial rigidizing ribs 21, which, near the upper part of said truncated cone body 12, extend from the truncated cone wall 20 to the cylindrical portion 15, which forms the threaded hole 14. On the external surface of said truncated cone wall 20 near the upper part of said truncated cone body 12 there are reliefs 22, slightly protruding, radially distributed around the hole 14 and at suitable distances.

[0019] The external element consists of an accordion wall 13 made of elastically deformable material, such as for example, plastic material, aluminum alloys or the like, and has a structure with radial sectors separated by radial walls 23. Sectors 24 of the accordion wall 13 form an external cylindrical contact surface 26, which interacts with an internal surface of a hollow tubular leg 34. Sectors 25 of the accordion wall 13 form, on the other hand, an internal truncated cone contact surface 27, sloping at the same angle α of the truncated cone wall 20 of the truncated cone body 12 with which it is coupled.

[0020] The external cylindrical contact surface 26 has a greater height than that of the internal truncated cone contact surface 27, the radial walls 23 having a decreasing height towards the symmetry axis 11.

[0021] The accordion wall 13 consequently forms a concave zone 28 in the upper part of the expander 10, at the lowest point of which the sectors 25 define the outlines of a through hole 29 and a ledge-ring 30 for the widened head 18 or 118 of the screw-nut 17 or 117.

[0022] The concave zone 28 allows interventions to be made with a suitable tool on said widened hexagonal head 18 or 118.

[0023] The accordion wall 13 of the expander 10 can have, as in this embodiment, a longitudinal groove 31 on the external cylindrical contact surface 26, which extends for the whole height, providing said accordion wall 13 with additional elasticity.

[0024] Before assembling the expander 10 to a hollow tubular table leg 34, schematized in figures 3-5, the single elements of the expander 10 are pre-assembled. The truncated cone body 12 is inserted in the accordion wall 13 and the threaded shank 16 of the screw-nut 17 or 117 is tightened until initial contact between the truncated cone surfaces 20 and 27 of said elements 12 and 13 of the expander 10, is reached.

[0025] The pre-assembled expander 10 is then inserted into the hollow tubular leg 34. On continuously tightening the screw-nut 17 or 117, the truncated cone body 12 is forced against the internal truncated cone contact surface 27 of the accordion wall 13, and is progressively wedged into said accordion wall 13. As a result of the pressure exerted by said truncated cone body 12 onto the internal truncated cone contact surface 27, the accordion wall 13 expands laterally forcing its external cylindrical contact surface 26, for the whole of its height, inside the hollow tubular leg 34.

[0026] Finally, the assembly of said leg 34 to the table surface 33 on which the anchor plate 32 is attached, can be terminated by means of the internal threaded portion 19 or external threaded portion 119 of the screw-nut 17 or 117.

[0027] As schematically represented in figure 6, the vertical clamping force F2, which the threaded shrank 16 of the screw-nut 17 or 117 exerts on the threads of the hole 14 of the truncated cone body 12, is distributed as a pressure F1 perpendicular to the truncated cone walls 20 and 27 on which contact is made.

[0028] The inclination of said walls 20 and 27 according to an angle α, which is greater than that so far adopted, increases the vertical component of the forces exerted. This has the double effect of increasing the clamping force necessary for elastically deforming the expander 10 and consequently increases the degree of stress which can be applied to the table legs, when assembled, without causing further deformation of the expander 10 with a resulting instability of the connection.

[0029] The value of the angle α, for example proposed as equal to 20°, belongs to an inclination range of 15° to 40° in which there is stability of the connection and the expander 10 can still be deformed for assembly.

[0030] The expander for table legs 10, object of the present invention, has the advantage of well tolerating the application of stress to the legs. When the expander is clamped, in fact, any possible stress applied does not cause further penetration into the accordion wall 13 of the truncated cone body 12.

[0031] This behaviour can be clearly seen in figures 9-12.

[0032] In expanders of the known type, in fact, produced as illustrated in figures 9, 10, when the leg 134 is subjected to lateral stress, according to the arrow F, the internal truncated cone body 112 penetrates the complementary external wall 113 up to a height A1 which is much greater than the original height A when the leg is assembled.

[0033] This creates the evident and undesirable possibility of inclination of the leg 134, with respect to the vertical and to the table surface 33, which consequently becomes unstable.

[0034] This behaviour is not possible in the expander produced according to the invention, which behaves, on the other hand, as illustrated in figures 11, 12. In fact, when the leg 34 is subjected to a lateral stress according to the arrow F, the internal body 12 does not penetrate further into the complementary internal wall 13; consequently the leg 34 cannot be inclined and the table thus remains stable over a period of time.

[0035] Finally the more marked inclination of the truncated cone contact walls facilitates the dismantling of the two elements 12 and 13 forming the expander 10.

[0036] The importance of the threaded shrank 16/screw-nut 17 or 117 complex, should also be noted as, in addition to causing the expansion of the expander 10, it also becomes in itself a connection element between the leg 34 and anchor plate 32 of the leg itself to the table surface 33.

[0037] From the drawings it can also be clearly seen

how the expander according to the present invention is completely incorporated into the leg, and therefore invisible or disappearing, which is of great importance in the case of transparent surfaces made of glass, crystal or other materials.

Claims

1. An expander for table legs consisting of two elements, internal and external, joined to each other in a coaxial position by a threaded unit, wherein said internal element is a truncated cone body (12), having an external lateral surface (20) in the form of a truncated cone, sloping at an angle (α) with respect to the vertical, and equipped with a threaded hole (14), and wherein said external element, elastically deformable, has contact surfaces (26, 27), which interact internally with the truncated cone wall (20) of the truncated cone body (12) and externally with an internal cylindrical surface of a hollow tubular leg (34), wherein said inclination at an angle (α) of said external truncated cone lateral wall (20) belongs to an inclination range which is such as to optimize the distribution of acting forces in the expander (10), to reach a compromise between a value of said angle (α) which is sufficiently low as to allow the deformation of the expander (10) during assembly and a value of the angle (α) which is sufficiently high as to guarantee stability of the connection, also when a high degree of stress is applied to the leg, consequently without causing further movement of the truncated cone body (12), **characterized in that** the external element consists of an accordion wall (13) with a radial sectored structure, in which outwardly projecting sectors (24) form an external non-continuous cylindrically shaped contact surface (26) which interacts with an internal surface of a hollow tubular leg (34) and in which inwardly projecting sectors (25) form an internal non-continuous truncated cone shaped contact surface (27) sloping at an angle (α), said outwardly projecting sectors (24) and said inwardly projecting sectors (25) being alternated and separated by radial walls (23).

2. The expander for table legs according to claim 1, **characterized in that** said inclination range, which is such as to optimize the distribution of acting forces in the expander (10), is identified by the angle (α) as ranging from 15° to 40°.

3. The expander for table legs according to claim 2, **characterized in that** the inclination angle (α) is preferably equal to 20°.

4. The expander for table legs according to claim 1, **characterized in that** the threaded hole (14) consists of a cylindrical portion (15), internally threaded, applied to the inside of the upper end of the truncated cone body (12).

5. The expander for table legs according to claim 1, **characterized in that** on the internal surface of the lateral wall (20) of the truncated cone body (12) there are radial rigidizing ribs (21).

6. The expander for table legs according to claim 1, **characterized in that** the truncated cone body (12) is equipped on the external surface of the lateral wall (20), near the upper part of said truncated cone body (12), with reliefs (22), radially distributed around the hole (14).

7. The expander for table legs according to claim 1, **characterized in that** on the external contact surface (26) there is a longitudinal groove (31), which extends for the whole height of said wall (26).

8. The expander for table legs according to claim 1, **characterized in that** it forms a combination between a hollow tubular table leg (34) and a table surface (33), which can be dismantled.

9. The expander for table legs according to claim 1, **characterized in that** said threaded unit which utilizes its threaded shrank (16) in the threaded hole (14) of the truncated cone body (12) comprises a screw-nut (17,117) with a widened head (18, 118), equipped with an internal threaded portion (19) or an external threaded portion (119), for coupling with the anchor plate (32) attached to the table surface (33).

Patentansprüche

1. Expansionsvorrichtung für Tischbeine, bestehend aus zwei Elementen, einem inneren und einem äußeren, die miteinander in einer koaxialen Stellung durch eine Gewindeeinheit verbunden sind, wobei das innere Element ein Kegelstumpfkörper (12) ist, der eine äußere Seitenfläche (20) in der Form eines Kegelstumpfs aufweist, in Bezug auf die Vertikale in einem Winkel (α) geneigt und mit einer Gewindebohrung (14) versehen ist, und wobei das elastisch verformbare äußere Element Kontaktflächen (26, 27) aufweist, die nach innen mit der Kegelstumpfwand (20) des Kegelstumpfkörpers (12) zusammenwirken und nach außen mit einer inneren Zylinderfläche eines hohlen rohrförmigen Beins (34), wobei die Neigung in einem Winkel (α) der äußeren kegelstumpfförmigen Seitenwand (20) zu einem Neigungsbereich gehört, der die Verteilung der angreifenden Kräfte in der Expansionsvorrichtung (10) optimiert, um einen Kompromiss zu erreichen zwischen einem Wert des Winkels (α), der ausrei-

chend klein ist, um die Verformung der Expansionsvorrichtung (10) während des Zusammenbaus zu erlauben, und einem Wert des Winkels (α), der ausreichend groß ist, um die Stabilität der Verbindung auch dann zu gewährleisten, wenn das Bein einem hohen Beanspruchungsgrad unterliegt, und folglich keine weitere Bewegung des Kegelstumpfkörpers (12) hervorruft, **dadurch gekennzeichnet, dass** das äußere Element aus einer Ziehharmonikawand (13) mit einer radial unterteilten Struktur besteht, bei der nach außen vorspringende Segmente (24) eine äußere, nicht durchgehende, zylindrisch geformte Kontaktfläche (26) bilden, die mit einer Innenfläche eines hohlen rohrförmigen Beins (34) zusammenwirken, und bei der nach innen vorspringende Segmente (25) eine innere, nicht durchgehende, kegelstumpfförmige Kontaktfläche (27) bilden, die um einen Winkel (α) geneigt ist, wobei die nach außen vorspringenden Segmente (24) und die nach innen vorspringenden Segmente (25) abwechseln und durch radiale Wände (23) getrennt sind.

2. Expansionsvorrichtung für Tischbeine nach Anspruch 1, **dadurch gekennzeichnet, dass** der Neigungsbereich, durch den die Verteilung der angreifenden Kräfte in der Expansionsvorrichtung (10) optimiert wird, durch einen Winkel (α) charakterisiert ist, der von 15° bis 40° reicht.

3. Expansionsvorrichtung für Tischbeine nach Anspruch 2, **dadurch gekennzeichnet, dass** der Neigungswinkel (α) vorzugsweise 20° beträgt.

4. Expansionsvorrichtung für Tischbeine nach Anspruch 1, **dadurch gekennzeichnet, dass** die Gewindebohrung (14) aus einem mit einem Innengewinde versehenen zylindrischen Teil (15) besteht, der auf der Innenseite des oberen Endes des Kegelstumpfkörpers (12) angebracht ist.

5. Expansionsvorrichtung für Tischbeine nach Anspruch 1, **dadurch gekennzeichnet. dass** sich auf der Innenseite der Seitenwand (20) des Kegelstumpfkörpers (12) radiale Versteifungsrippen (21) befinden.

6. Expansionsvorrichtung für Tischbeine nach Anspruch 1, **dadurch gekennzeichnet, dass** der Kegelstumpfkörper (12) auf der Außenseite der Seitenwand (20), in der Nähe des oberen Teils des Kegelstumpfkörpers (12), mit Erhebungen (22) versehen ist, die radial um die Bohrung (14) herum verteilt sind.

7. Expansionsvorrichtung für Tischbeine nach Anspruch 1, **dadurch gekennzeichnet, dass** sich auf der äußeren Kontaktfläche (26) eine längliche Nut (31) befindet, die sich über die gesamte Höhe der Wand (26) erstreckt.

8. Expansionsvorrichtung for Tischbeine nach Anspruch 1, **dadurch gekennzeichnet, dass** sie eine demontierbare Verbindung zwischen einem hohlen rohrförmigen Tischbein (34) und einer Tischplatte (33) bildet.

9. Expansionsvorrichtung für Tischbeine nach Anspruch 1, **dadurch gekennzeichnet, dass** die Gewindeeinheit, die ihren Gewindeschaft (16) in der Gewindebohrung (14) des Kegelstumpfkörpers (12) verwendet, eine Schraubenmutter (17, 117) mit einem aufgeweiteten Kopf (18, 118) umfasst, der zur Verbindung mit der an der Tischplatte (33) angebrachten Ankerplatte (32) mit einem inneren Gewindeabschnitt (19) oder einem äußeren Gewindeabschnitt (119) versehen ist.

Revendications

1. Extenseur pour des pieds de table consistant en deux éléments, un interne et l'autre externe, joints dans une position coaxiale par une unité à filetage, dans lequel ledit élément interne est un corps en tronc de cône (12) possédant une surface latérale externe (20) sous la forme d'un tronc de cône, inclinée selon un angle (α) par rapport à la verticale et munie d'un trou taraudé (14), et dans lequel ledit élément externe déformable, de façon élastique, possède des surfaces de contact (26, 27) qui interagissent, de façon interne, avec la paroi en tronc de cône (20) du corps en tronc de cône (12) et de façon externe avec une surface cylindrique interne d'un pied tubulaire creux (34), dans lequel ladite inclinaison d'un angle (α) de ladite paroi latérale externe en tronc de cône (20) entre dans un intervalle d'inclinaison tel qu'il optimise la répartition des forces agissant dans l'extenseur (10) pour obtenir un compromis entre une valeur dudit angle (α) qui est suffisamment faible pour autoriser une déformation de l'extenseur (10) lors de l'assemblage et une valeur de l'angle (α) qui est suffisamment élevée pour garantir la stabilité de la connexion, de même lorsqu'un haut degré de contrainte est appliqué au pied, par conséquent sans provoquer de déplacement ultérieur du corps en tronc de cône (12), **caractérisé en ce que** l'élément externe consiste en une paroi en accordéon (13) avec une structure radiale par secteurs, dans laquelle des secteurs se projetant vers l'extérieur (24) forment une surface de contact non continue de forme cylindrique (26) interagissant avec une surface interne d'un pied tubulaire creux (34) et dans laquelle des secteurs se projetant vers l'intérieur (25) forment une surface de contact interne non continue en forme de tronc de cône

(27) inclinée d'un angle (α), lesdits secteurs se projetant vers l'extérieur (24) et lesdits secteurs se projetant vers l'intérieur (25) étant alternés et séparés par des parois radiales (23).

2. Extenseur pour pieds de table selon la revendication 1, **caractérisé en ce que** ledit intervalle d'inclinaison tel qu'il optimise la répartition des forces agissant dans l'extenseur (10) est identifié par l'angle (α) comme allant de 15° à 40°.

3. Extenseur pour pieds de table selon la revendication 2, **caractérisé en ce que** l'angle (α) d'inclinaison est égal, de préférence, à 20°.

4. Extenseur pour pieds de table selon la revendication 1, **caractérisé en ce que** le trou taraudé (14) consiste en une partie cylindrique (15), filetée de façon interne, appliquée à l'intérieur de l'extrémité supérieure du corps en tronc de cône (12).

5. Extenseur pour pieds de table selon la revendication 1, **caractérisé en ce que**, sur la surface interne de la paroi latérale (20) du corps en tronc de cône (12), se trouvent des nervures radiales de rigidité (21).

6. Extenseur pour pieds de table selon la revendication 1, **caractérisé en ce que** le corps en tronc de cône (12) est muni sur la surface externe de la paroi latérale (20), près de la partie supérieure dudit corps en tronc de cône (12), de reliefs (22) répartis, de façon radiale, autour du trou (14).

7. Extenseur pour pieds de table selon la revendication 1, **caractérisé en ce que**, sur la surface externe de contact (26), se trouve une gorge longitudinale (31) s'étendant sur toute la hauteur de ladite paroi (26).

8. Extenseur pour pieds de table selon la revendication 1, **caractérisé en ce qu'**il forme une combinaison entre un pied tubulaire creux de table (34) et un plateau de table (33) pouvant être démontés.

9. Extenseur pour pieds de table selon la revendication 1, **caractérisé en ce que** ladite unité à filetage utilisant son corps fileté (16) dans le trou taraudé (14) du corps en tronc de cône (12) comprend une combinaison de vis et d'écrou (17, 117) avec une tête élargie (18, 118), munie d'une partie de filetage interne (19) ou d'une partie de filetage externe (119) pour un couplage avec la plaque d'ancrage (32) fixée sur le plateau de table (33).

Fig.2

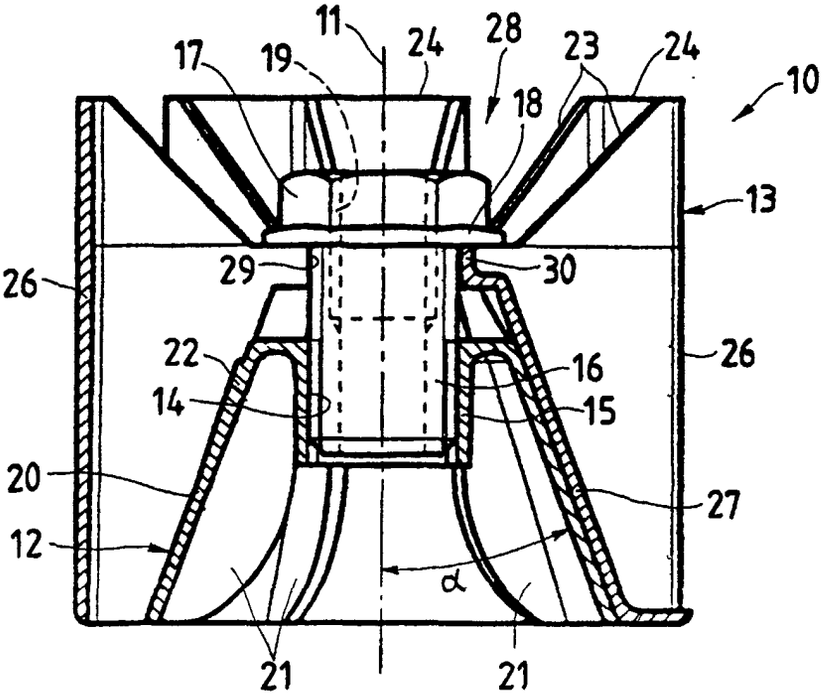
11
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Fig.1

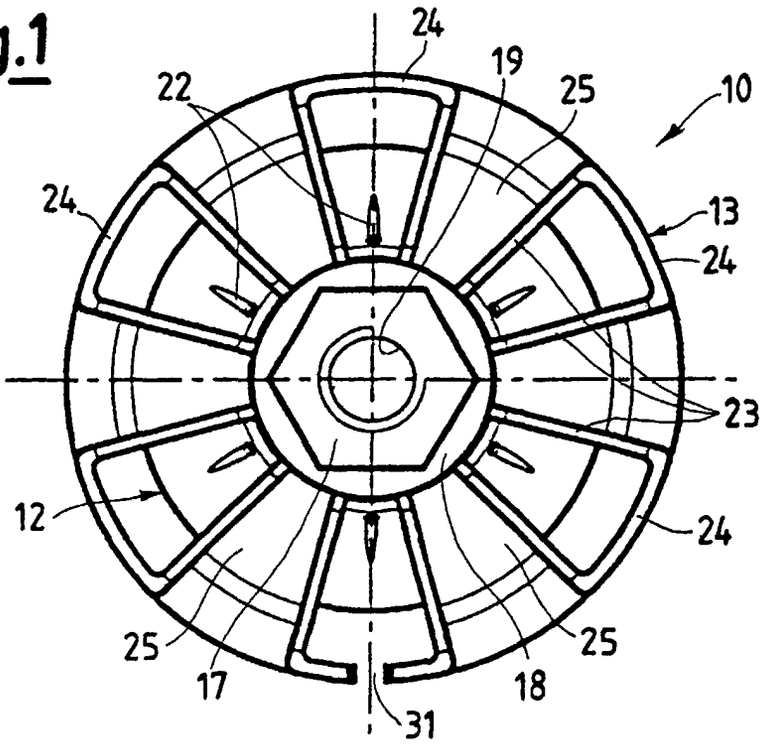
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Fig.5

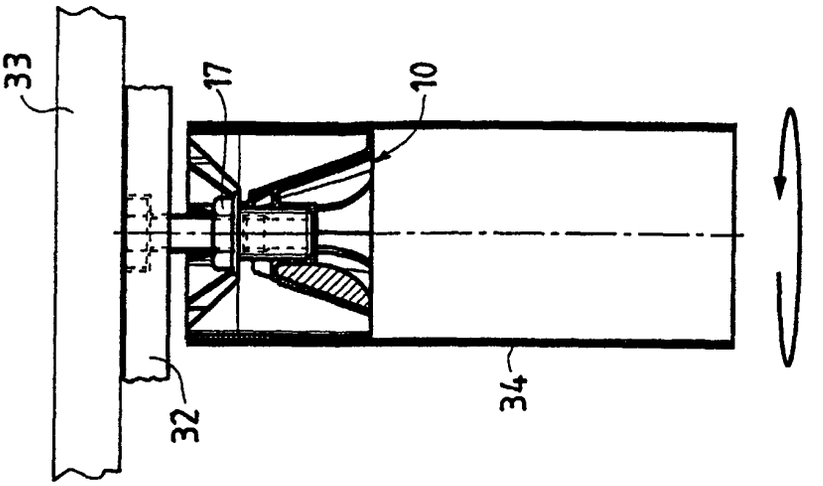

Fig.4

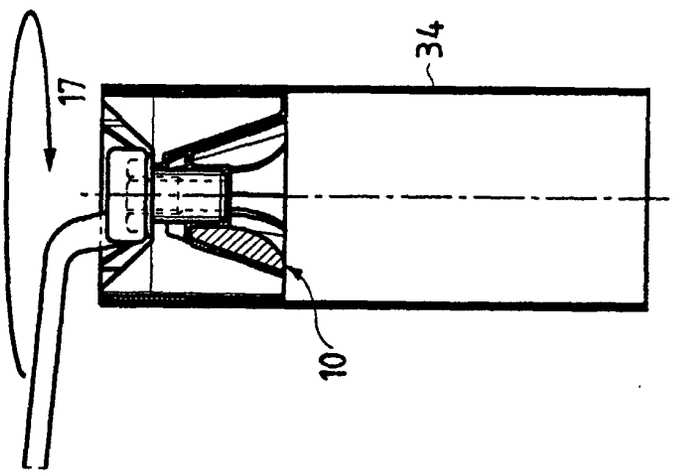

Fig.3

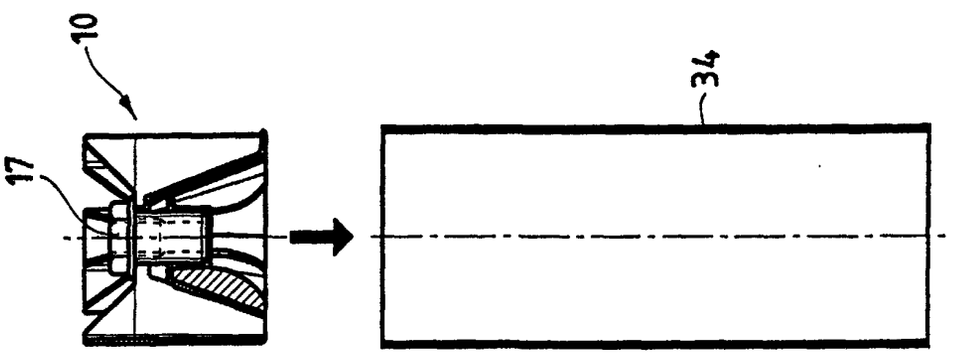

Fig.6

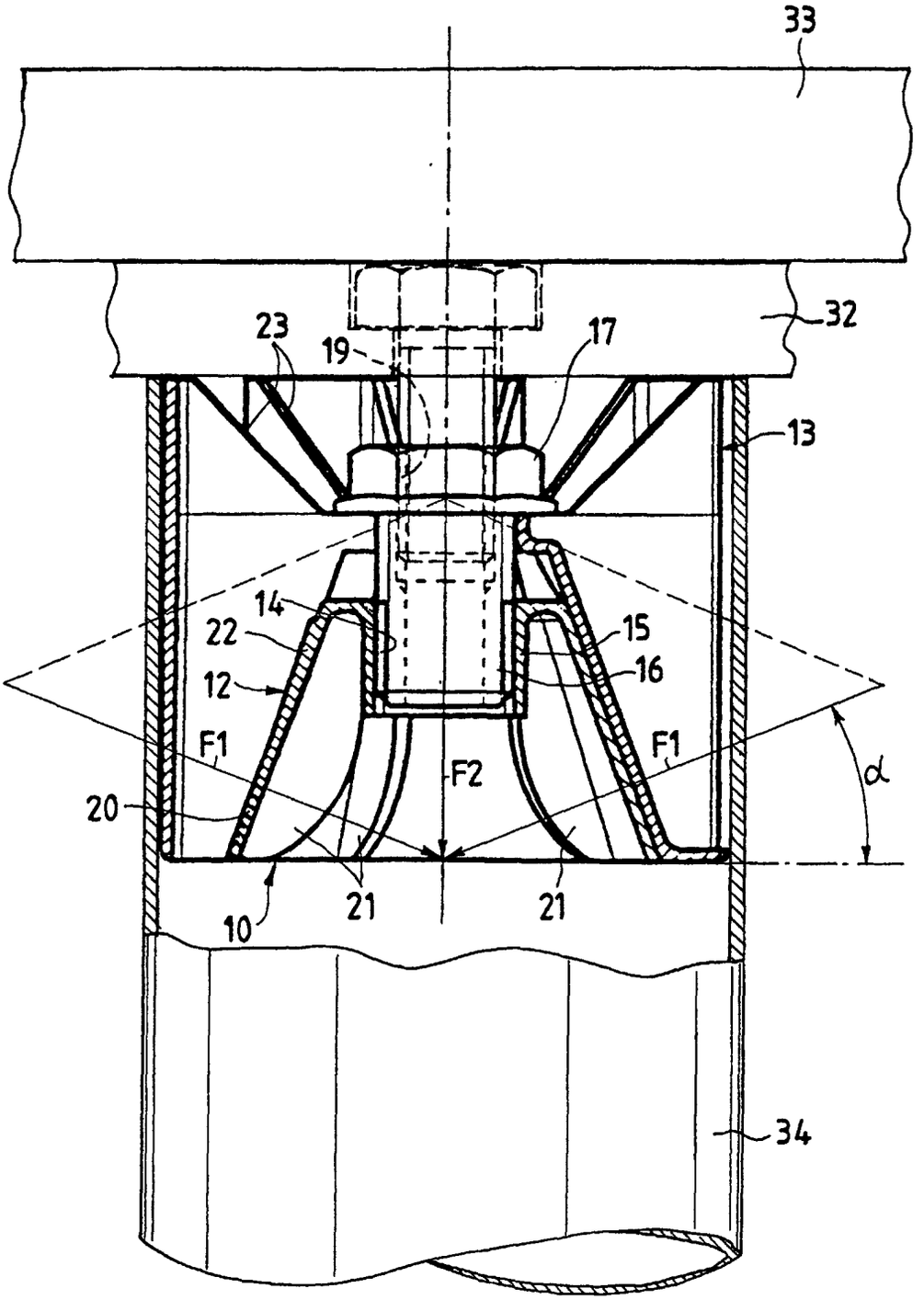

Fig.8

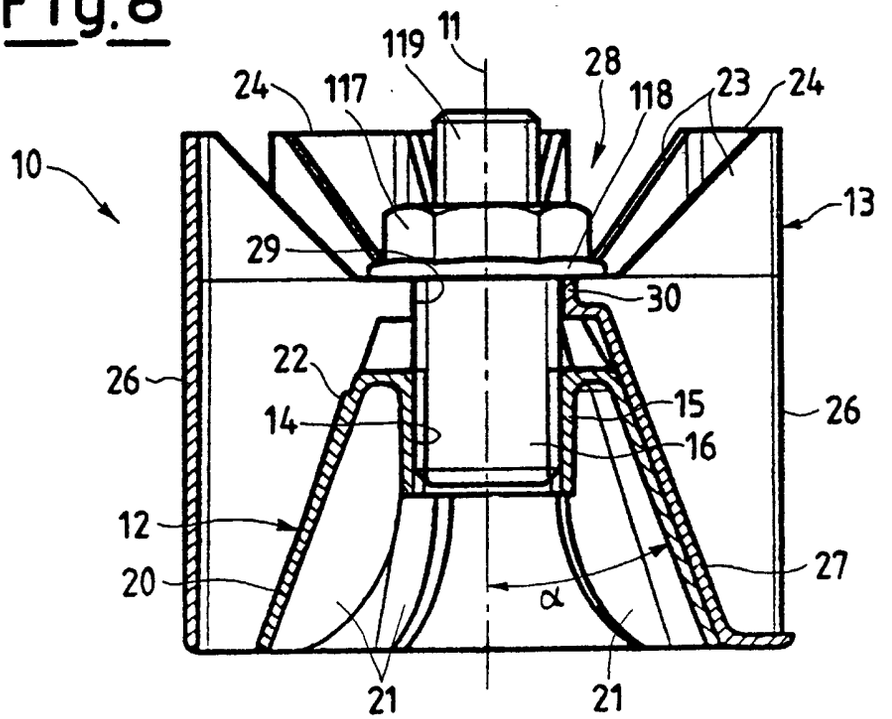
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Fig.7

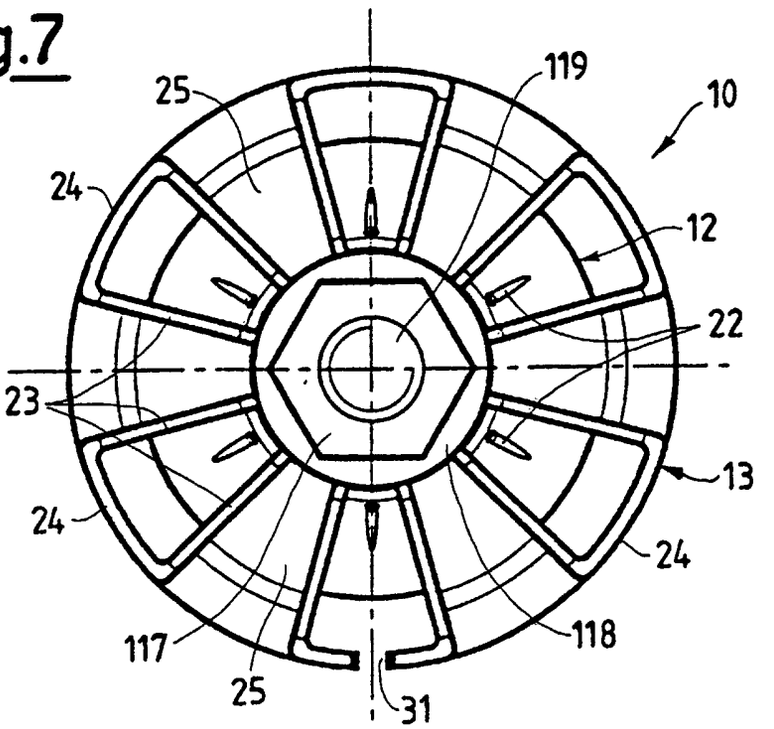
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Fig.9

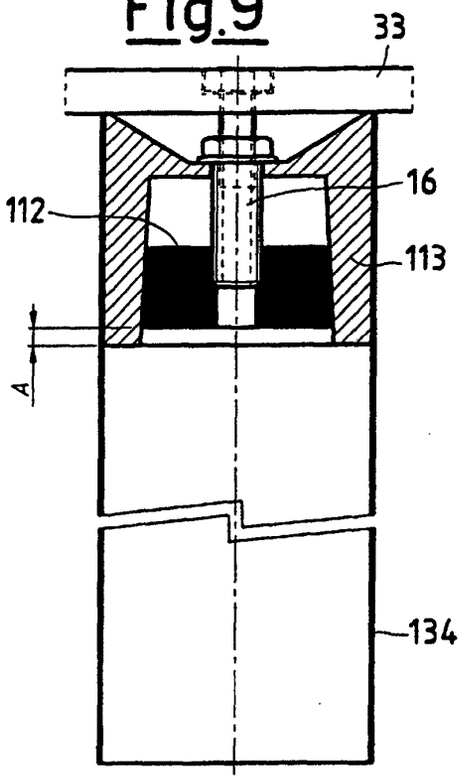

Fig.10

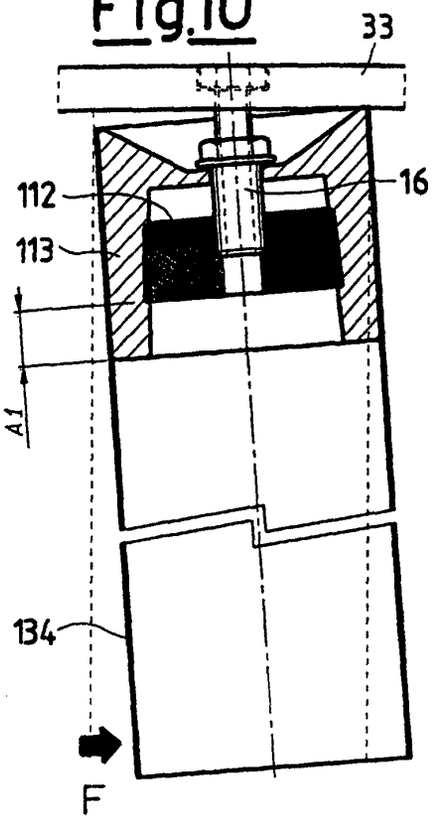

Fig.11

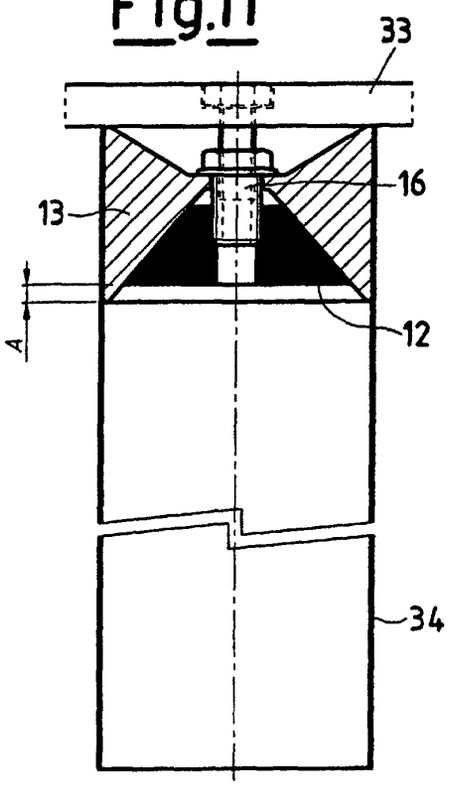

Fig.12