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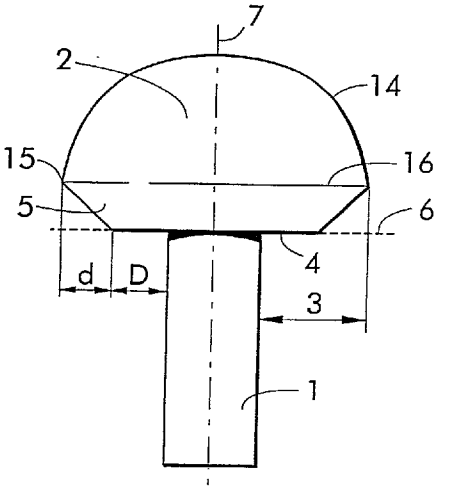
(54) **RIVET A TETE CHANFREINEE**
(54) **CHAMFERED END HEADED RIVET**



(57) Rivet servant à l'assemblage d'objets ayant reçu un traitement de surface, conçu pour réduire la contrainte et les dommages pouvant survenir sur l'objet ayant reçu un traitement de surface pendant l'opération de rivetage. Le rivet comporte une tige sensiblement cylindrique (1) et une tête (2) dont le diamètre est supérieur à celui de la tige. Cette tête comporte une surface limite supérieure (14) et une surface limite inférieure (3), la transition entre la surface supérieure et la surface de contact se situant dans une zone (15) où la tête présente l'extension radiale maximum, et aux points (16) de cette zone les plus proches de la tige (1). La surface inférieure est constituée d'une surface partielle intérieure (4) s'étendant sensiblement de façon perpendiculaire par rapport à l'axe de symétrie de la tige (7), sensiblement symétrique selon cet axe de symétrie (7), et d'une surface partielle extérieure (5) jointive à la surface partielle intérieure (4), telle que tout point appartenant à la surface partielle extérieure est situé à une distance plus grande, dans le sens axial de la tige, de l'extrémité de la tige opposée à la tête, que tout point de la surface partielle intérieure.

(57) The invention relates to a rivet for joining of surface treated objects which is designed for decreasing the stress and damage that may occur on the surface treated frame during the riveting process. The rivet includes a substantially cylindrical shaft (1) and a head (2) having a larger diameter than the shaft, wherein the head comprises an upper limit surface (14) and a lower limit surface (3), where the transition from the upper limiting surface to the contact surface is situated within an area (15) where the head has its maximum radial extension and at the points (16) within this area which are closest to the shaft (1), where the lower limit surface includes an inner limit surface (4) extending substantially perpendicularly from the axis of symmetry of the shaft (7) and which is substantially symmetrical with respect to said axis of symmetry (7) and an outer partial surface (5) adjoining the inner partial surface (4) and there every inner point of the outer partial surface is situated at a greater distance, in the axial direction of the shaft, from the end of the shaft which faces away from the head, than every point on the inner partial surface.

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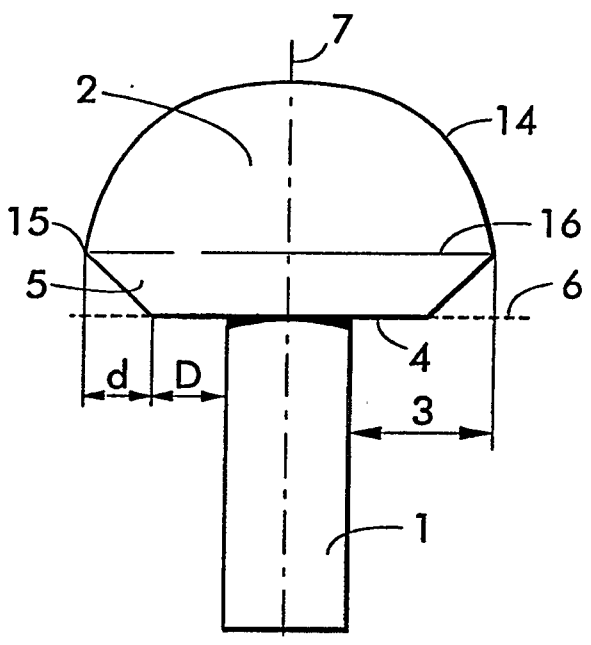
(57) Abstract

The invention relates to a rivet for joining of surface treated objects which is designed for decreasing the stress and damage that may occur on the surface treated frame during the riveting process. The rivet includes a substantially cylindrical shaft (1) and a head (2) having a larger diameter than the shaft, wherein the head comprises an upper limit surface (14) and a lower limit surface (3), where the transition from the upper limiting surface to the contact surface is situated within an area (15) where the head has its maximum radial extension and at the points (16) within this area which are closest to the shaft (1), where the lower limit surface includes an inner limit surface (4) extending substantially perpendicularly from the axis of symmetry of the shaft (7) and which is substantially symmetrical with respect to said axis of symmetry (7) and an outer partial surface (5) adjoining the inner partial surface (4) and there every inner point of the outer partial surface is situated at a greater distance, in the axial direction of the shaft, from the end of the shaft which faces away from the head, than every point on the inner partial surface.



Chamfered end headed rivet

Technical field

The present invention relates to a rivet suitable for joining surface treated objects according to the preamble of claim 1, such as beams for the chassis of a truck.

Background of the invention

In making frameworks by joining of beams has previously a manufacturing method been used where non surface treated beams are joined by riveting. A surface coating has been applied to the framework when the beams have been joined. In a modernised manufacturing process the procedure of manufacturing has been altered so that the beams are coated prior to the joining of the beams. A result of this manufacturing process is that a surface coated layer is positioned between the head of the rivet and the beam. The rivet is deformed by subjecting it to a substantial pressure in the procedure of joining of the beams by the rivet. In using this process there is a high risk of damaging the underlying layer of surface coating, resulting in surface corrosion and an initial risk of corrosion of the beam. The damage occurs due to the facts that the portion of the head of the rivet that is in contact with the surface coating is shaped with a sharp edge and that said portion of the head is deformed, whereupon a displacement of material under substantial pressure occurs in the radial direction of the rivet. The sharp edge may easily harm the surface coating and said displacement of the material may result surface tension in the coating and that the coating is partly removed.

Disclosure of the invention

The object of the invention is to provide a rivet which does not harm the surface coating of the object to be riveted.

For accomplishing the object of the present invention, a rivet for joining surface coated objects according to the characterising portion of claim 1 is suggested.

Brief description of the drawings

The invention will in the following be described in a couple of modes for carrying out the invention with references to the appended drawings.

Fig 1a shows a rivet with a semi-sphereically shaped head.

Fig 1b shows a rivet obliquely from below.

Fig 1c shows a rivet placed in a recess of a frame.

Fig 2 shows a rivet with a flat head.

Fig 3 shows the schematical deformation of the rivet.

Fig 4a-4d shows a number of preferred embodiments of the rivet.

Preferred embodiment

The rivet comprises a preferably cylindrical shaft 1 with a head 2. The shaft may also have a non circular cross-section. It may for example be shaped as an oval or a polygon. The shaft extends from a contact surface 3 arranged on the head. The contact surface is divided into an inner partial surface 4 and an outer partial surface 5. The shaft adjoins the inner surface at a plane 6 which coincides with the inner surface. The shaft has a central axis 7. The central axis extends in a direction mainly perpendicular to the inner surface. The inner surface extends further from the central axis of the shaft than the shaft itself. This means that the outer rim 8 (fig. 1b) of the inner surface is at a greater distance from the central axis than the limit surface 9 of the shaft. The outer surface is adjoining the inner surface at the outer rim of the inner surface. The outer surface extends further from the central axis of the shaft than the inner surface. The inner surface thus transcends to the outer surface at the outer rim of the inner surface. The outer surface is situated on the side of the plane 6 which is facing away from the shaft to ensure that outer surface of the contact surface is not in contact with the frame10,11 (fig. 1c) prior to the deformation of

the rivet. Thus, a space exists between the outer surface of the rivet and the frame 10 when the rivet is fitted into a passage 13 of the frame 10. This space will be substantially eliminated when the rivet is deformed during the riveting process. Thus the outer surface, except from where it adjoins the inner surface, is positioned at a distance from the plane 6.

In a preferred embodiment of the invention the rivet is shaped circularly symmetrical with the axis of symmetry. This preferred embodiment is expressed in claim 2. This embodiment refers to a rivet including a mainly cylindrical shaft and a head with a diameter exceeding the diameter of the shaft. The head includes an upper limit surface 14 and a contact surface 3. The transition from the upper limit surface to the contact surface is situated within an area 15 where the head has its maximum radial extension in the radial direction and at the points within this area which are closest to the shaft. These points form the transition line 16 (fig. 1b) between the upper limit surface and the contact surface. The contact surface includes an inner surface 4 extending sustantially perpendicular to the axis of symmetry of the shaft and which is substantially symmetrical with respect to said axis of symmetry, and an outer surface adjoining the inner surface. The outer surface consists of an inner area 18 and the boundary lines of the outer surface. These boundary lines coincides partly with the outer rim 8 (fig. 1b) of the inner surface and partly with the transition line 16 (fig. 1b) between the upper limit surface and the contact surface. An arbitrary inner point of the inner area of the outer surface is situated at a greater distance, in the axial direction of the rivet, from the end of the shaft which is more distant from the head, than any point on the inner partial surface. An inner point of an area refers to a all points on an area which are not situated on the edge or rim of the surface. The outer surface is situated on the side of the plane 6 which is facing away from the shaft to ascertain that outer surface of the contact surface is not in contact with the frame portions 10,11 (fig. 1c) to be joined prior to the deformation of the rivet. Thus, a space exists between the outer surface of the rivet and the frame 10 when the rivet is fitted into a passage 13 of the frame 10. This space will be substantially eliminated when the rivet is deformed during the riveting process. Thus, the outer

partial surface, except from where it adjoins the inner partial surface, is positioned at a distance from the plane 6.

The embodiment as claimed in claim 4 is particularly advantageous. By ascertaining that the transition between the inner partial and outer partial surface is smooth and without edges the risk of rupturing of the surface treatment is considerably decreased.

Figures 4a-4d shows preferred embodiments according to the invention. Fig. 4a and 4b shows a rivet with a substantially semi-spherical head. In fig. 4a the outer limit surface is provided with an inner surface 41 having a radius of curvature of 2-2,5 mm. The transition 8 between the outer partial surface 5 and the inner partial surface 4 is shaped so that the perpendicular of these surfaces changes continuously. The inner surface 41 of the outer partial surface stretches at least 1 mm in the radial direction before its shape is changed into the natural radius formed when shaping the rivet.

In fig. 4a the outer partial surface is provided with an inner surface 41, which is shaped as a truncated cone. The surface perpendicular of said inner surface 41 makes an angeal of 15° with the symmetry axis of the shaft. The inner surface 41 of the outer partial surface extends at least 1 mm in the radial direction before its shape is changed into the natural radius formed when shaping the rivet.

Fig 4c and 4d shows rivets with substantially flat heads. Fig 4c shows a contact surface corresponding to that of the rivet as described in relation to fig. 4a. Fig 4d shows a contact surface corresponding to that of the rivet as described in relation to fig. 4b.

Fig 2 shows an alternative embodiment of the shape of the head of the rivet. The transition from the upper limit surface to the contact surface is situated within an area 15 where the head has its maximum radial extension and at the

points within this area which are closest to the shaft. The shape of the head of the rivet can, with exception of the contact surface, be arbitrarily chosen.

Fig 3 shows a schematical representation of the deformation process of the rivet. The points 26 and 27 are presented at three different degrees of deformation. The point 27 is transported in radial direction only, while the point 26 is transported both in the radial and the axial direction. The upper limit surface of the rivet is changed from shape into the shapes 24', 24" and 24"' under the deformation. Under this deformation the points 26 and 27 of the lower limiting surface are transferred into the points 26', 27', 26", 27", 26"', 27"'. Every point on the lower limit surface will be moved in the radial direction under the process of deformation. The distance in the radial direction that each point is moved is dependent on the distance from the point to the axis of symmetry of the rivet. Points at a greater distance from the axis of symmetry axis will be transported a longer distance. Since the lower limit surface of the rivet is chamfered, the maximum displacement of a point in contact with the frame that is to be connected will be restricted. Less tension will thus occur on the frame. This results in that the surface layer coating the frame is subjected to lower tension and hence the surface coating will less likely to be destroyed. A second advantage is that the sharp edge formed on the transition from the upper limit surface to the lower limit when cold forming a rivet will not be in contact with the surface coated material.

The rivet is manufactured by shapinging the mould in correspondence to the outer surface. An alternative method of manufacturing is that the outer surface is formed by subjecting the contact surface of the rivet to a chamfering process after the forming process.

The rivet is preferably made of steel.

Claims

1) Rivet for joining surface treated objects, for example beams of a truck chassis, which rivet comprises a cylindrical shaft (1) with a head (2), wherein the shaft extends from a contact surface (3) arranged on the head characterised in that the contact surface is divided into an inner partial surface (4) and an outer partial surface (5); the shaft is adjoining the inner partial surface in a plane (6) which coincides with the inner partial surface; the central axis (7) of the shaft extends in a direction mainly perpendicular to the inner partial surface; the extension of the inner partial surface in the radial direction from the central axis of the shaft is greater than the radial extension of the shaft; the outer partial surface (5) is adjoining the inner partial surface (4); the outer partial surface (5) is situated at a greater radial distance from the central axis of the shaft than the inner partial surface (4); the outer partial surface (5) is situated on the side of the plane (6) that is facing away from the shaft; and the outer partial surface (5), is situated at a distance from the plane except where it adjoins the inner partial surface (4).

2) Rivet for joining of surface treated objects, including a substantially cylindrical shaft (1) and a head (2) having a larger diameter than the shaft, wherein the head comprises a upper limit surface (14) and a contact surface (3), where the transition from the upper limit surface to the contact surface is situated within an area (15) where the head has its maximum radial extension and at the points (16) within this area which are closest to the shaft, characterised in that the contact surface includes an inner partial surface (4) and an outer partial surface (5); the inner partial surface (4) extends substantially perpendicularly from the axis of symmetry of the shaft (7); the inner partial surface is substantially symmetrical with respect to the axis of symmetry (7); the outer partial surface (5) is adjoining the inner partial surface (4); every inner point of the outer partial surface is situated at a greater distance, in the axial direction of the rivet, from the end of the shaft which faces away from the head, than every point on the inner partial surface.

3) Rivet according to claim 1 or 2 characterised in that every surface perpendicular to an inner point of the outer partial surface are directed from the axis of symmetry.

4) Rivet according to claim 3 characterised in that the direction of a surface perpendicular of the outerpartial surface and the inner partial surface changes continuously in the transition from the inner partial surface to the outer partial surface.

5) Rivet according to claim 1, 2 or 3 characterised in that the outer partial surface is shaped as a truncated cone.

6) Rivet according to any of the preceding claims characterised in that the inner partial surface has a radial extension D and that the outer partial surface has a radial extension d and that the relation D/d is such that $1/3<D/d<10$

7) Rivet according to any of the preceding claims characterised in that the outer surface, at least in part , contacts the frame after the rivet has been deformed in a riveting process.

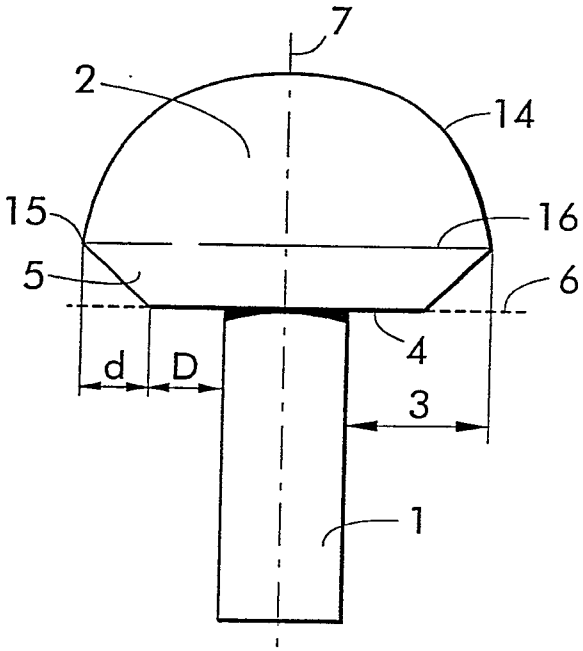


FIG. 1a

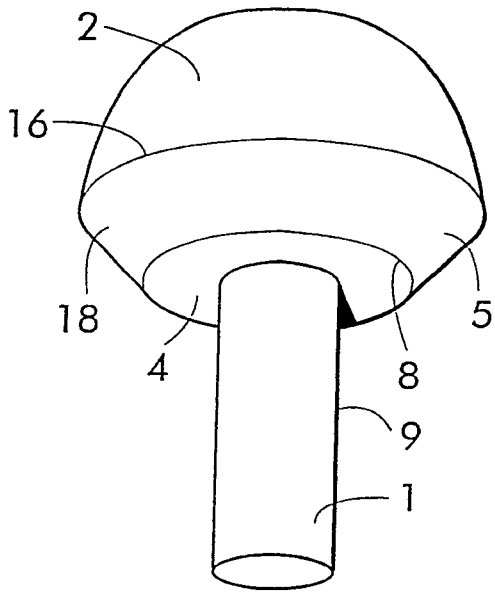


FIG. 1b

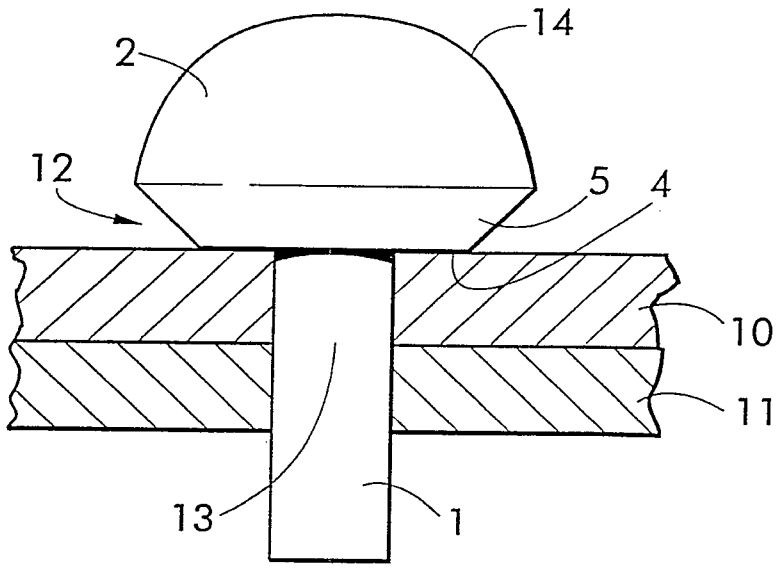


FIG. 1c

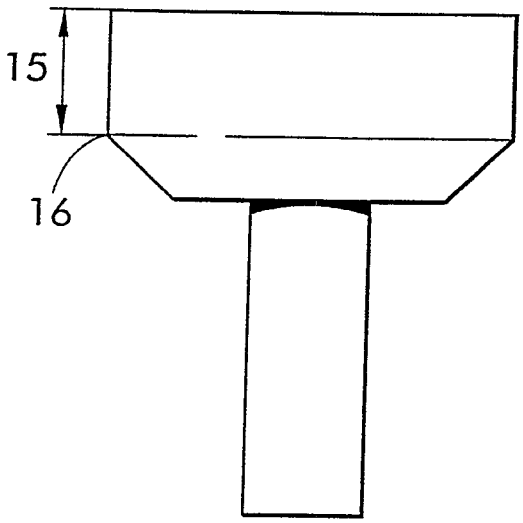


FIG. 2

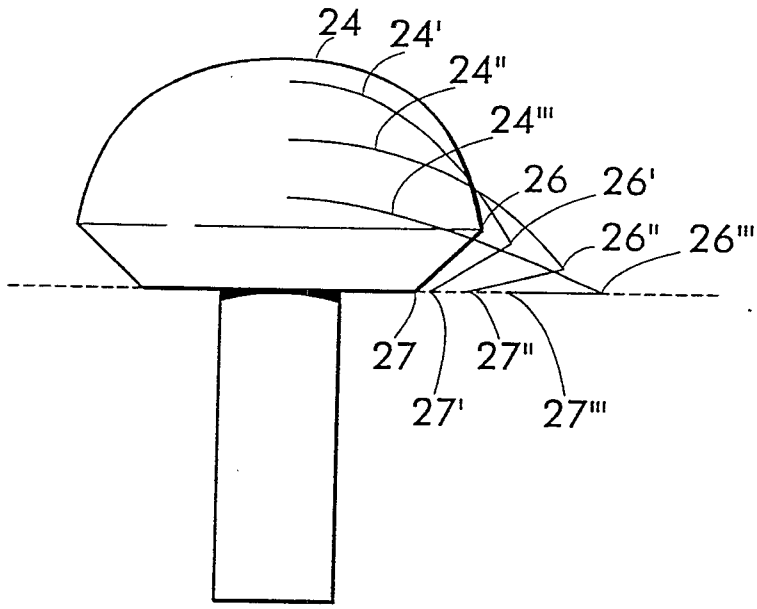


FIG. 3

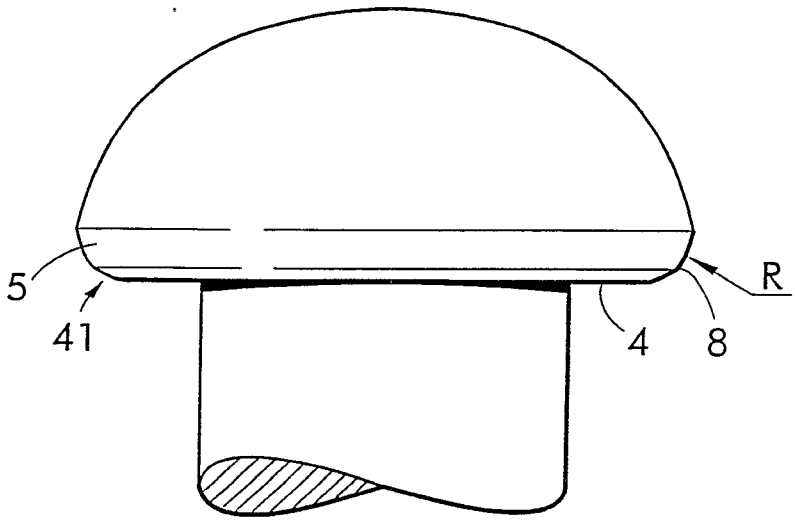


FIG. 4a

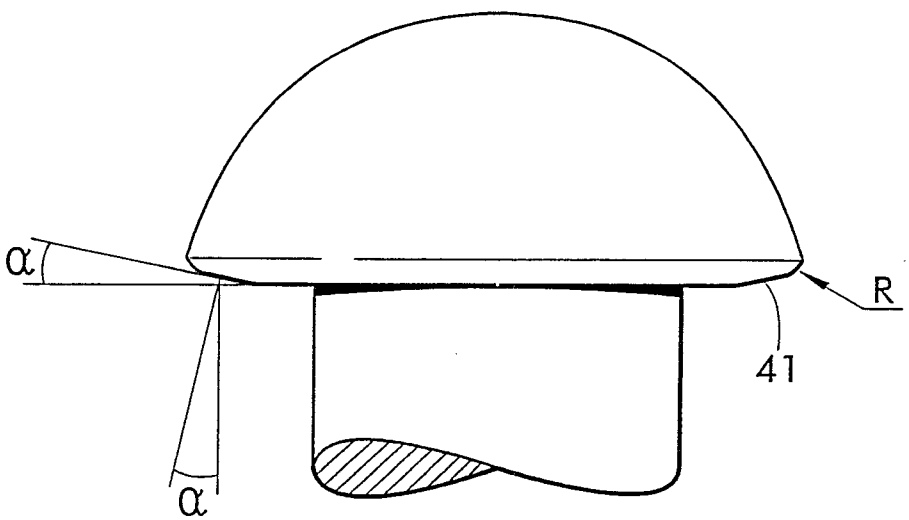


FIG. 4b

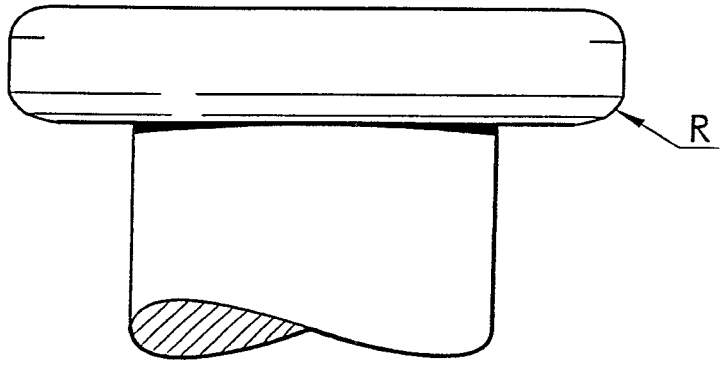


FIG. 4c

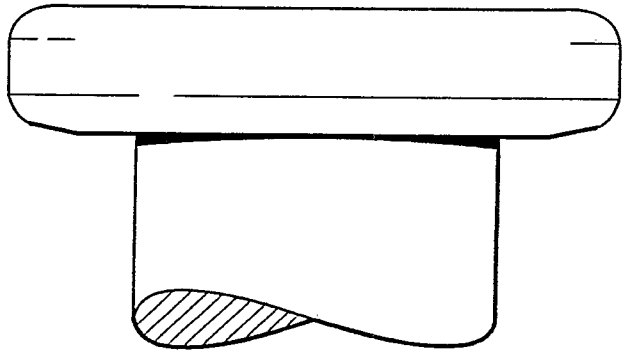
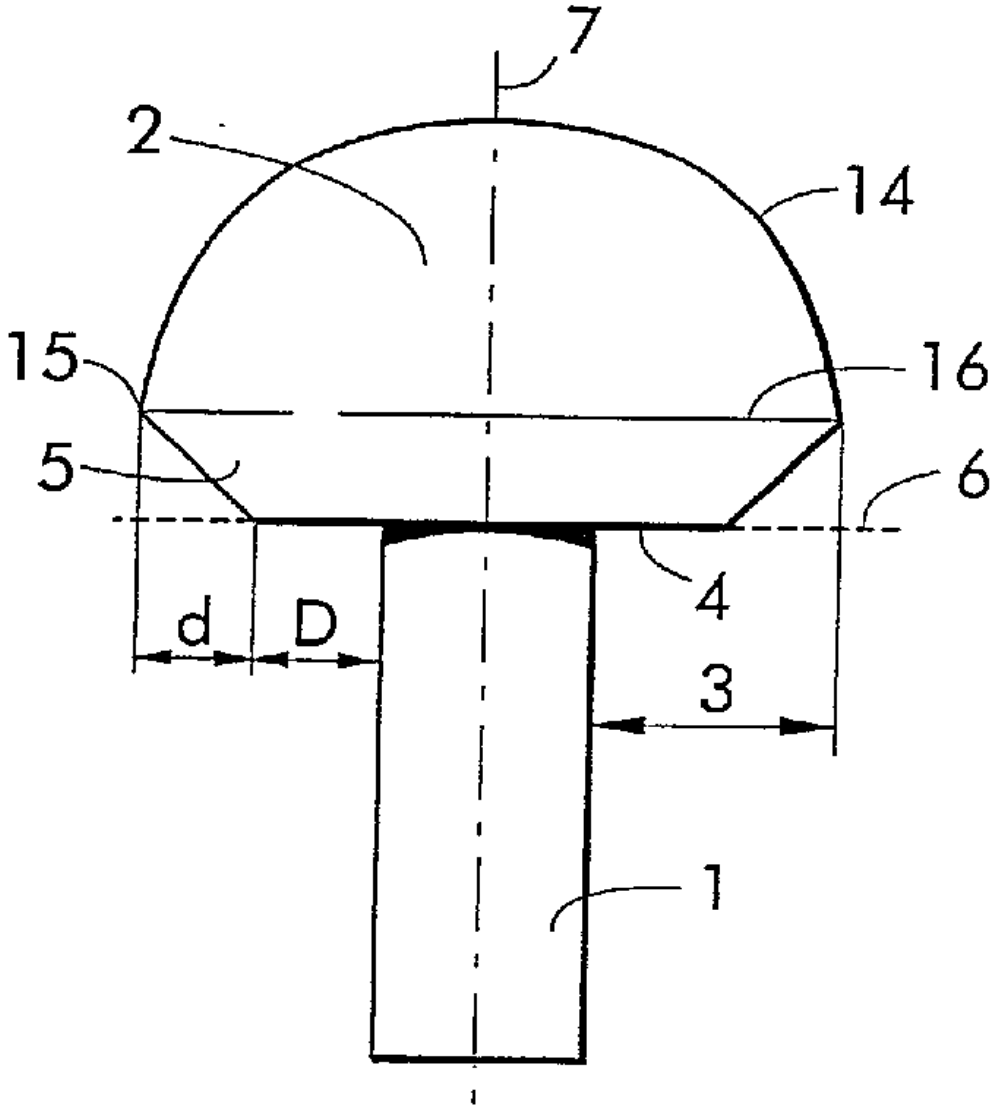


FIG. 4d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