



US 20090058079A1

(19) **United States**(12) **Patent Application Publication**
Wobben(10) **Pub. No.: US 2009/0058079 A1**(43) **Pub. Date: Mar. 5, 2009**(54) **METHOD FOR THE PRODUCTION OF A
CONNECTION FLANGE**(30) **Foreign Application Priority Data**

Jun. 2, 2003 (DE) 10325032.8

(76) Inventor: **Aloys Wobben, Aurich (DE)****Publication Classification**

Correspondence Address:

**SEED INTELLECTUAL PROPERTY LAW
GROUP PLLC
701 FIFTH AVE, SUITE 5400
SEATTLE, WA 98104 (US)**(51) **Int. Cl.****F16L 55/00** (2006.01)**F03D 9/00** (2006.01)(52) **U.S. Cl. 285/148.25; 290/55**

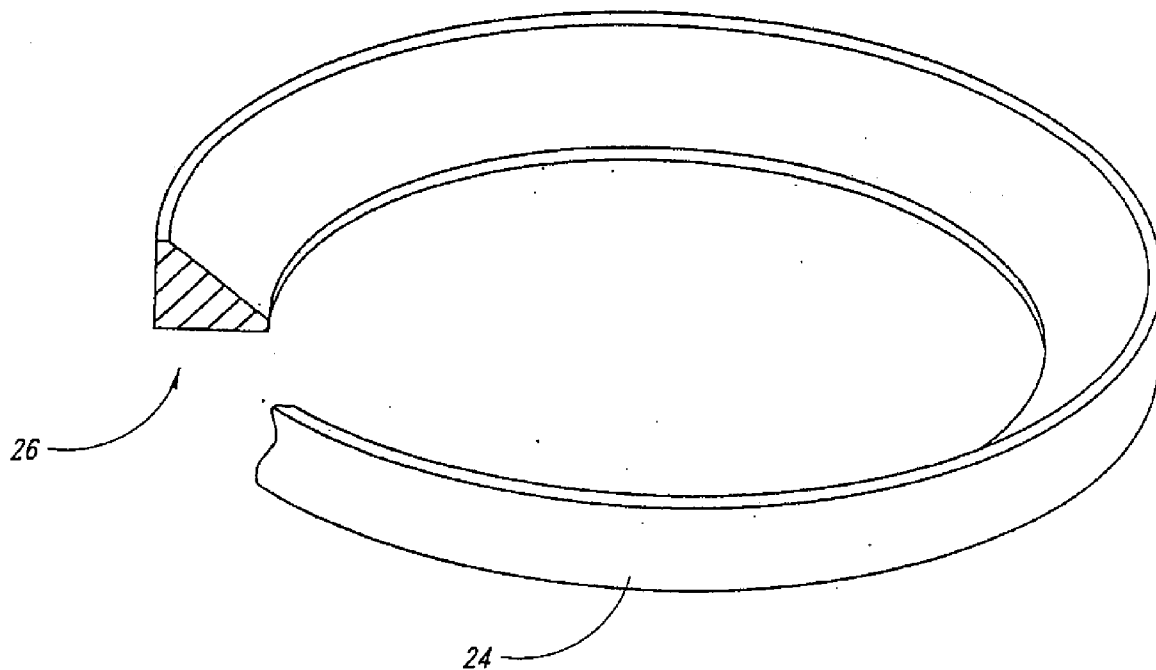
(57)

ABSTRACT

A method for the production of an annular connection flange includes producing the annular connection flange from an element in the form of a circular ring. The element in the form of a circular ring has a substantially triangular profile. An annular flange includes a tubular portion configured to be mounted to an end of a tubular component, and a flange collar adjoining an end of the tubular portion and extending radially inwardly therefrom.

(21) Appl. No.: **12/268,569**(22) Filed: **Nov. 11, 2008****Related U.S. Application Data**

(60) Division of application No. 11/293,872, filed on Dec. 2, 2005, which is a continuation-in-part of application No. PCT/EP2004/002862, filed on Mar. 19, 2004.



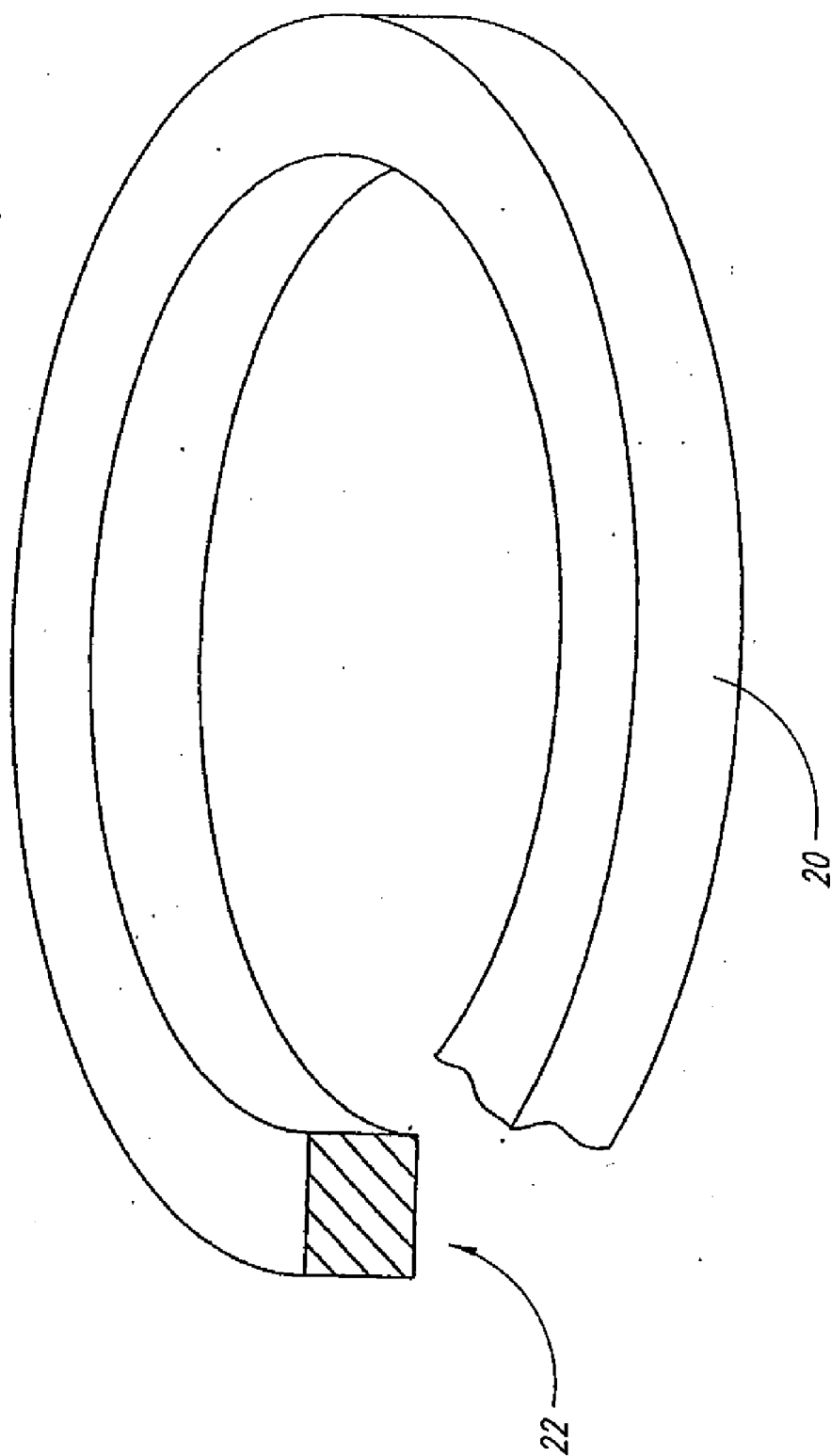


FIG. 1

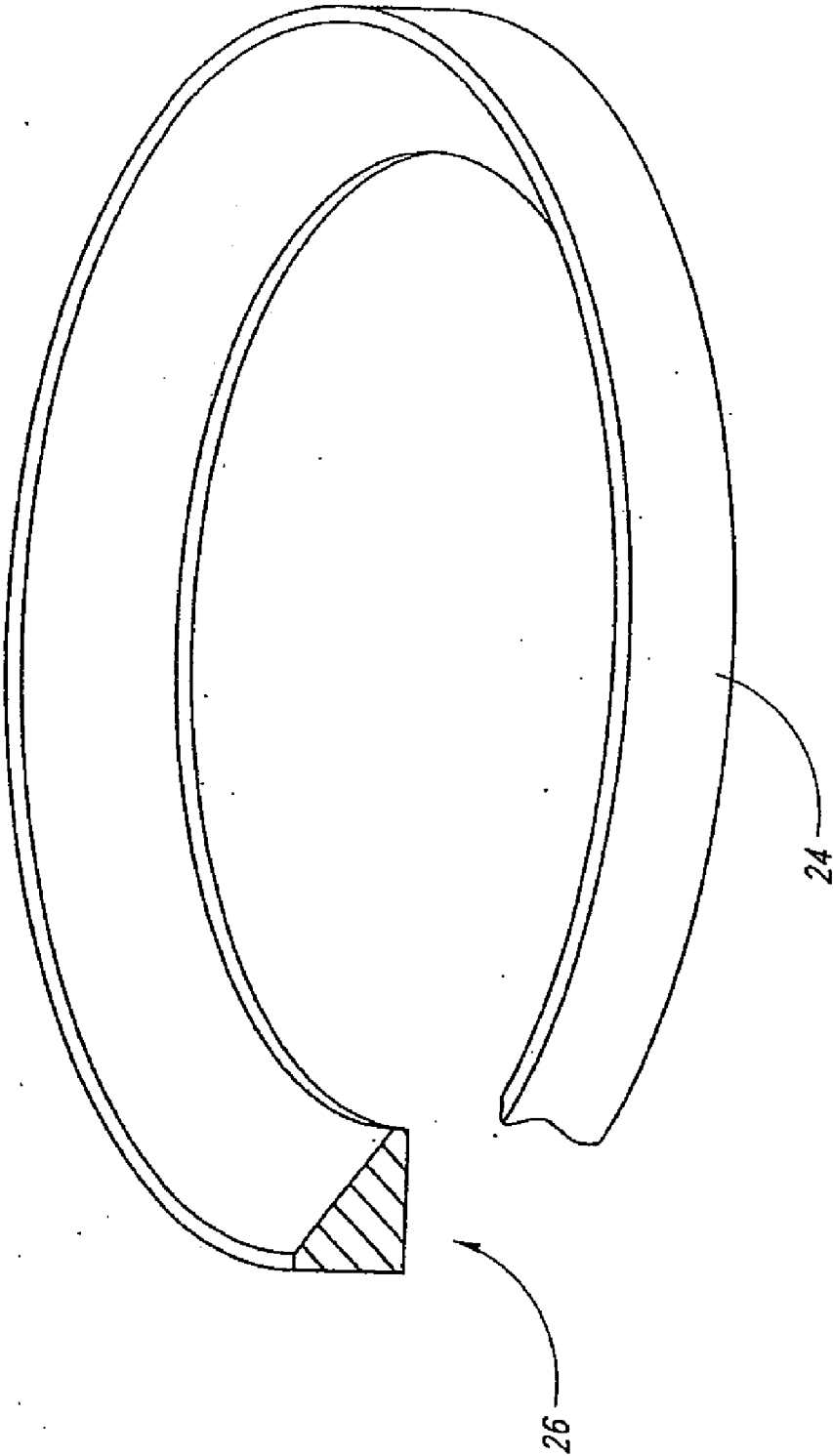


FIG. 2

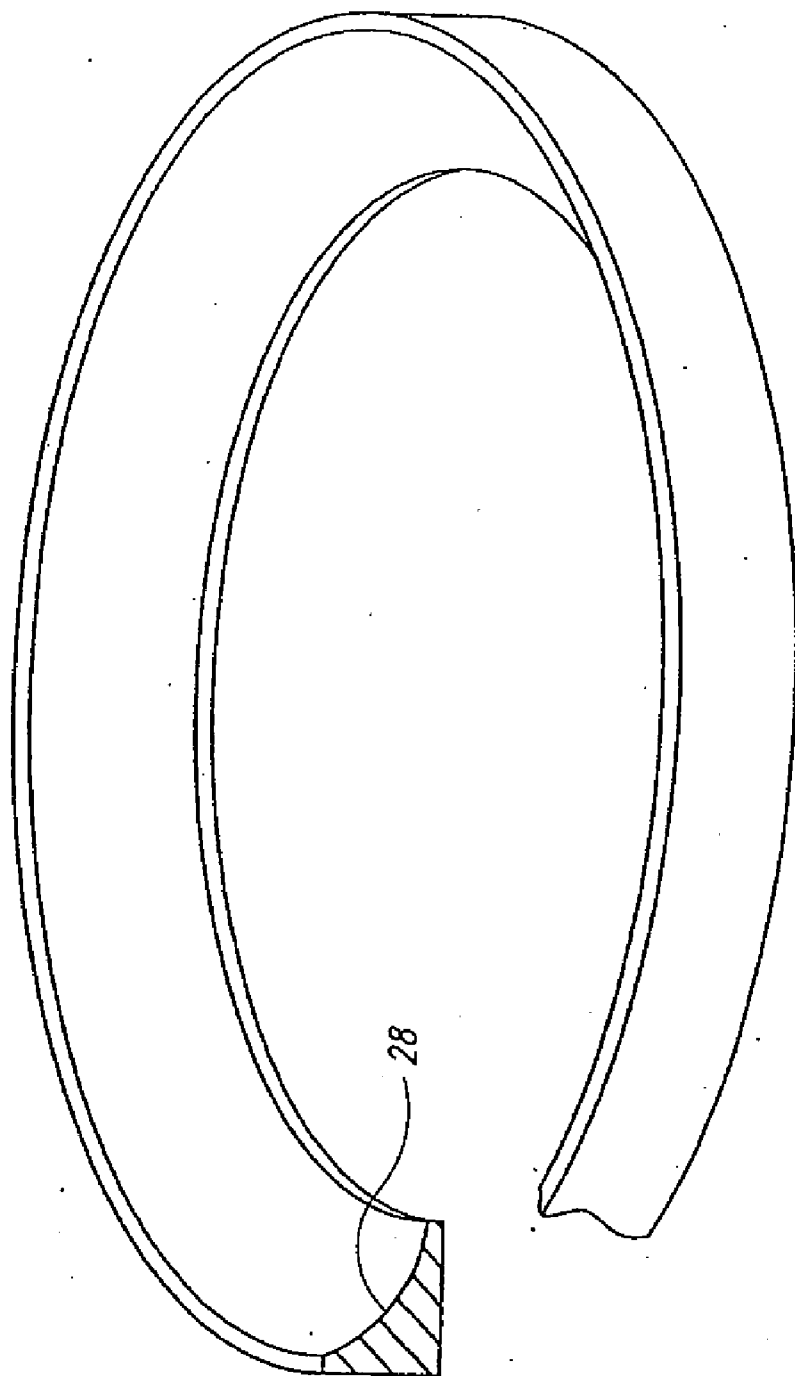


FIG. 3

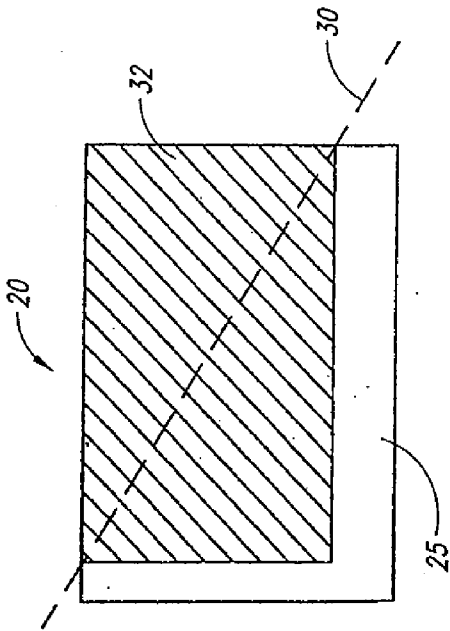


FIG. 4

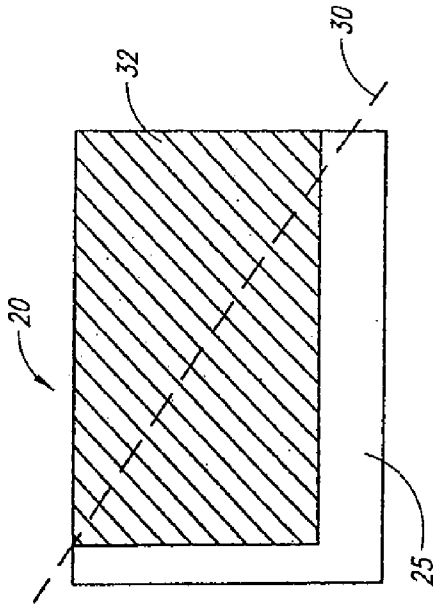


FIG. 6

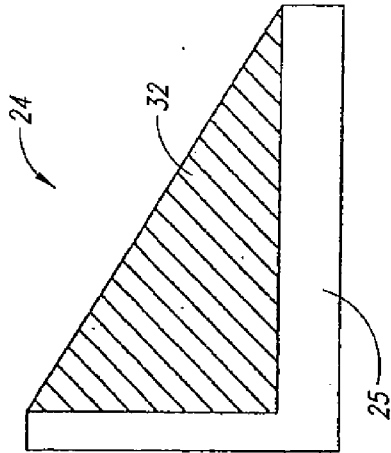


FIG. 5

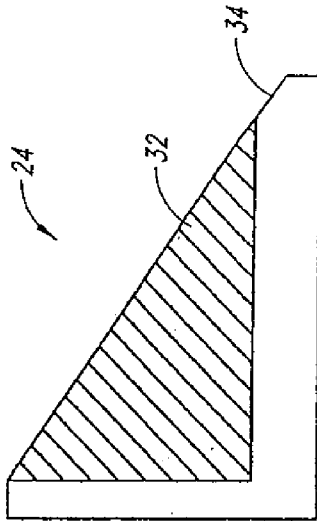


FIG. 7

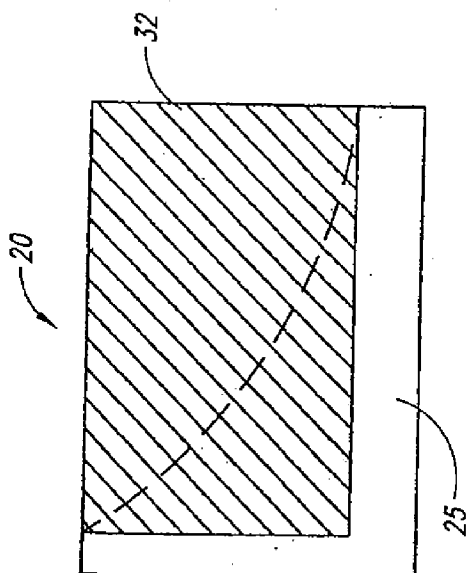


FIG. 8

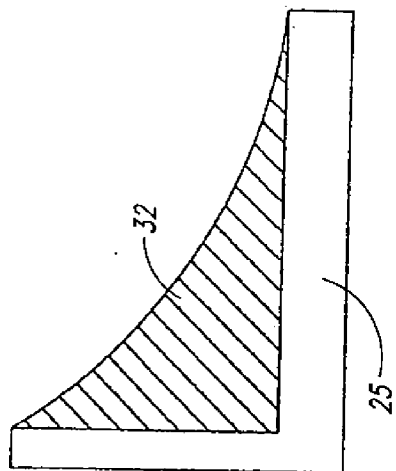


FIG. 9

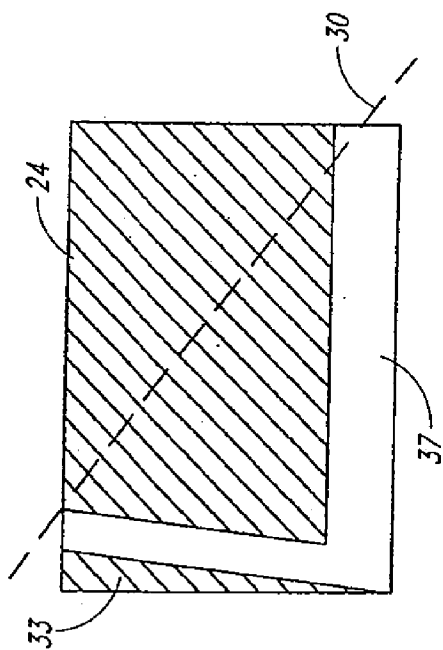


FIG. 10

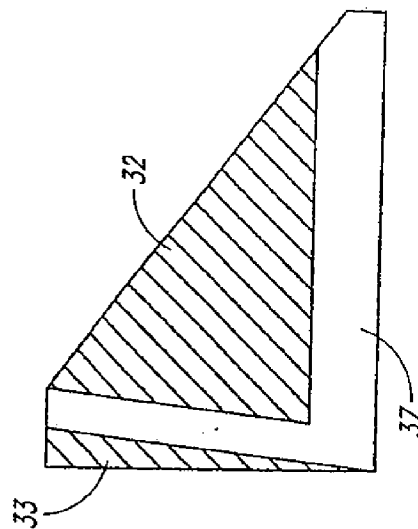


FIG. 11

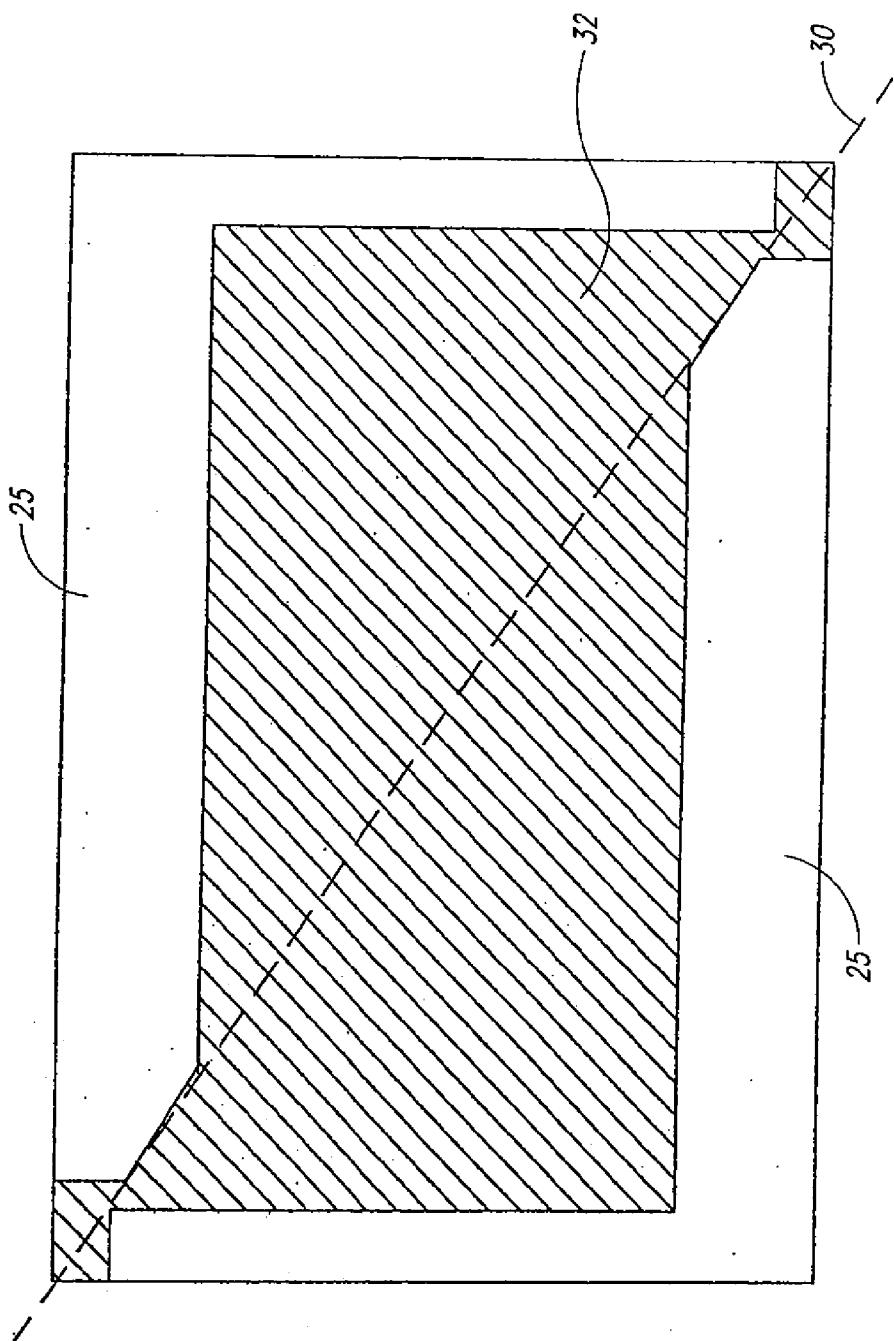


FIG. 12

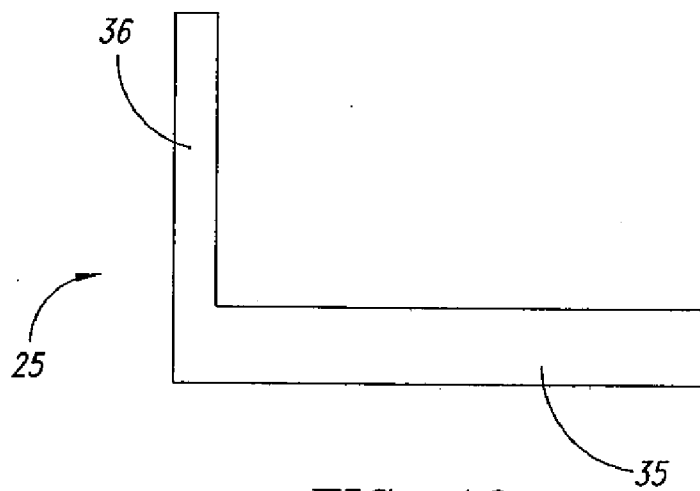


FIG. 13

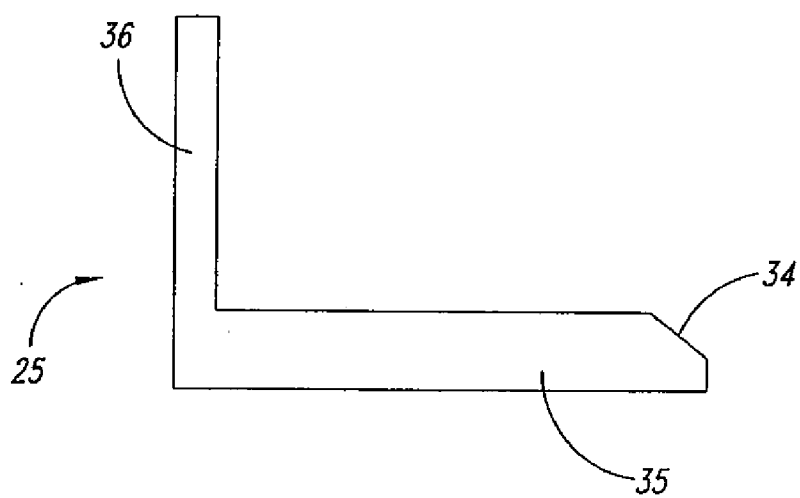


FIG. 14

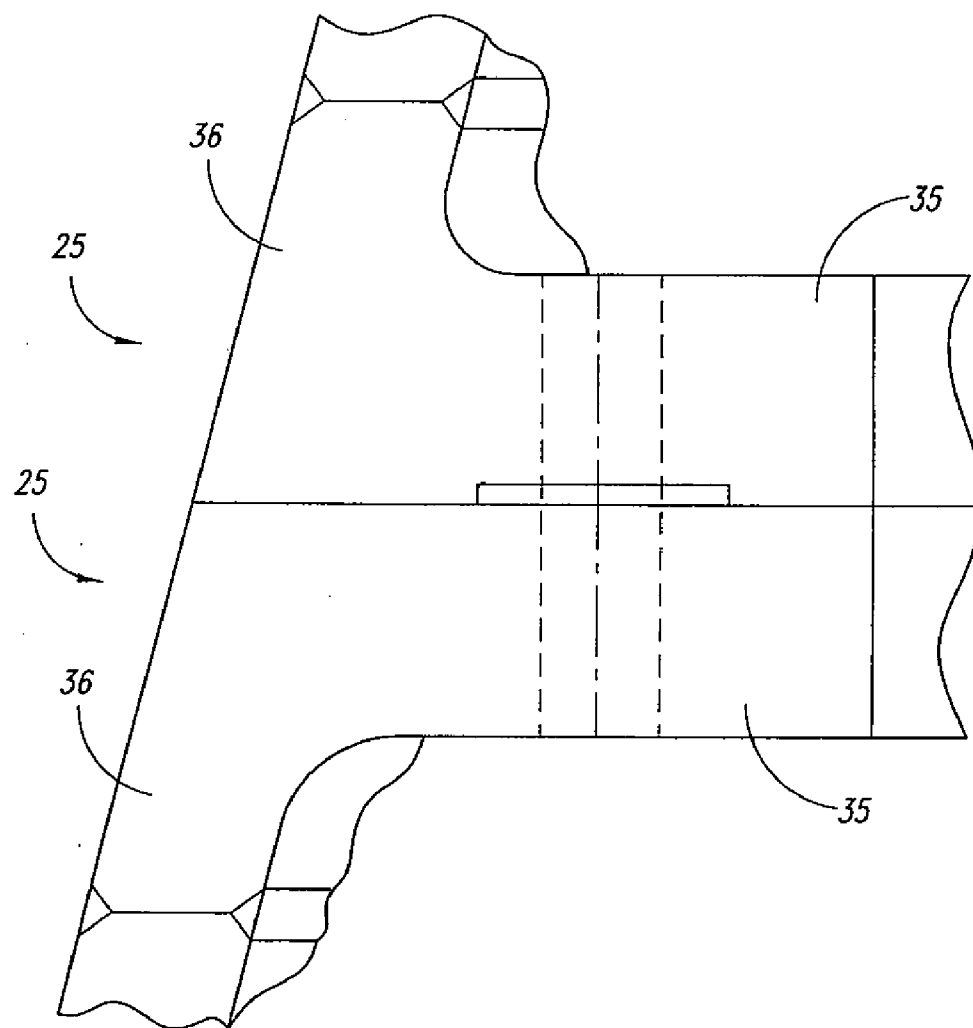


FIG. 15

METHOD FOR THE PRODUCTION OF A CONNECTION FLANGE

CROSS-REFERENCE TO RELATED APPLICATION

[0001] This application claims priority from the International Application PCT/EP2004/002862, filed Mar. 19, 2004, which application is incorporated herein by reference in its entirety.

BACKGROUND OF THE INVENTION

[0002] 1. Field of the Invention

[0003] DE 101 26 049 A1 already discloses an annular connection flange having a tubular portion for mounting to an end of a tubular component, in particular for a pylon segment for constructing a pylon of a wind power installation, wherein it is formed with a flange collar radially adjoining one end of the portion and having a flange surface oriented axially away from the tubular portion.

[0004] 2. Description of the Related Art

[0005] To produce such an annular connection flange, the state of the art uses an element in the form of a circular ring which is substantially quadrangular in its cross-section (profile) and that element in the form of the circular ring is then machined so that the annular connection flange is left. In the machining operation material is removed from the element in the form of the circular ring, in a not insignificant amount, in order then to obtain in the cross-section (profile), the desired profile of the annular connection flange, in one piece. It is therefore accordingly known for a connection flange to be turned in one piece from a metal semifinished product, to produce the connection flange.

[0006] Above-mentioned DE 101 26 049 also discloses an annular connection flange in which the outside wall of the tubular portion is conical, in particular for mounting to a component which is also conical.

BRIEF SUMMARY OF THE INVENTION

[0007] The invention is based on the realization that, at its free end, the flange collar has to transmit only relatively low forces and possibly even no forces at all. Therefore in terms of the strength and the stability of the connection flange, it is harmless if the thickness of the flange collar at its free end is less than in the region where the flange collar forms a transition into the tubular portion. That can also provide that the starting material which can be used for production of the connection flange is not for example just a segment in the form of a circular ring which is of a substantially rectangular cross-sectional configuration, but it can also be substantially of a triangular cross-section.

[0008] The particular advantage is that in that way the cutting or turning operations for producing the connection flange from the semifinished product are considerably reduced. When the semifinished product is of a substantially triangular cross-section, it is also markedly better than a previous semifinished product because at the initial stage the semifinished product does not need to have as much material as hitherto. Further configurations are the subject-matter of the appendant claims.

BRIEF DESCRIPTION OF THE SEVERAL VIEWS OF THE DRAWING(S)

[0009] FIG. 1 shows a semifinished product in accordance with the state prior of the art,

[0010] FIG. 2 shows a semifinished product according to the invention of substantially triangular cross-section,

[0011] FIG. 3 shows a semifinished product according to the invention with a concave surface,

[0012] FIGS. 4 and 5 show semifinished products of a first embodiment,

[0013] FIGS. 6 and 7 show semifinished products of a second embodiment,

[0014] FIGS. 8 and 9 show semifinished products of a third embodiment,

[0015] FIGS. 10 and 11 show a fourth embodiment of the semifinished products, and

[0016] FIG. 12 shows a workpiece from which two flanges are produced.

[0017] FIG. 13 is an example of a finished product according to principles of the present invention.

[0018] FIG. 14 is an alternative embodiment of a finished product according to principles of the present invention.

[0019] FIG. 15 is an embodiment showing the flange of the present invention in the final structure.

DETAILED DESCRIPTION OF THE INVENTION

[0020] FIG. 1 shows a semifinished product 20 as is used in the state of the art, of a rectangular cross-section, from which the flange is produced. It can be seen that the semifinished product 20 is generally of rectangular or square cross-sectional shape 22. The final product to be produced is similar to that shown in FIG. 15.

[0021] FIG. 2 shows a semifinished product 24 according to the invention of substantially triangular cross-section 26, wherein the hypotenuse of the triangle is straight. FIG. 3, instead of a straight hypotenuse, illustrates an arc 28, thus affording a concave surface portion.

[0022] FIG. 4 shows a first embodiment, according to the state of the art. The semifinished product 20 is illustrated as being rectangular in this Figure and a broken line 30 indicates what region of that semifinished product is not needed in accordance with the invention from the outset.

[0023] FIG. 5 is a view in cross-section through a corresponding semifinished product 24 after having been cut along line 30. In the remaining FIGS. 4-12, those regions 32 which have to be removed to obtain the final product are shown in cross-hatched. They can be removed by any acceptable method, such as by machining, grinding or other known methods to remove metal.

[0024] The views in FIGS. 6 and 7 are comparable to those in FIGS. 4 and 5. The difference is that, in FIGS. 6 and 7, the inner edge 34 of the flange ring is no longer rectangular but of a bevelled configuration.

[0025] FIGS. 8 and 9 show a comparable embodiment to that shown in FIGS. 4 and 5, but with a concave surface portion instead of a straight surface.

[0026] FIGS. 10 and 11 show an embodiment with an inclined flange 35. Some material 33 is cut from the back surface of the semifinished product 24.

[0027] FIG. 12 again shows a right-angled semifinished product and illustrates how two flanges can be obtained from a single a semifinished product. According to one method of the present invention, a rectangular cross-section flange is cut in half along a diagonal line 30 as shown in FIG. 12. After this, each half has the section 32 removed by acceptable metal working techniques. Thus, the current method can obtain two flanges in place of the one flange that was obtained in the prior art.

[0028] FIGS. 13 and 14 show completed finished products prior to use in the structure of the type described in DE 101 26 049 A1. The structure therefore includes an L-shaped flange 25 having a first end 35 and an upstanding leg 36. In the embodiment of FIG. 14, the leg 35 has a beveled edge 34.

[0029] FIG. 15 is an example of the flange 25 as used in a completed construction. This Figure is taken from DE 101 26 049 A1. The flange 25 is mounted in a completed structure to provide connection and support. Leg ends 35 extend inward and vertical arms 36 are along the outer surface. The flange 25 is connected by welding, bolting or other appropriate technique to the end structure.

[0030] All of the above U.S. patents, U.S. patent application publications, U.S. patent applications, foreign patents, foreign patent applications and non-patent publications referred to in this specification and/or listed in the Application Data Sheet, are incorporated herein by reference, in their entirety.

[0031] From the foregoing it will be appreciated that, although specific embodiments of the invention have been described herein for purposes of illustration, various modifications may be made without deviating from the spirit and

scope of the invention. Accordingly, the invention is not limited except as by the appended claims.

1-2. (canceled)

3. An annular flange comprising:

a tubular portion configured to be mounted to an end of a tubular component; and

a flange collar adjoining an end of the tubular portion and extending radially inwardly therefrom, the flange collar defining a flange surface oriented axially away from the tubular portion, and the flange collar having a beveled region at a free end of the flange collar.

4. The annular flange of claim 3, wherein the flange collar has a smaller thickness in the beveled region of the flange collar than in a region proximate where the flange collar adjoins the tubular portion.

5. The annular flange of claim 3, wherein the tubular portion is inclined with respect to a central axis of the annular flange.

6. A wind power plant, comprising:

a pylon segment; and

the annular flange of claim 3 mounted to the pylon segment.

* * * * *