

(19) **DANMARK**

(10) **DK/EP 3441225 T3**



(12)

Oversættelse af europæisk patentskrift

Patent- og
Varemærkestyrelsen

-
- (51) Int.Cl.: **B 41 F 17/00 (2006.01)** **B 41 F 13/00 (2006.01)** **F 16 M 7/00 (2006.01)**
- (45) Oversættelsen bekendtgjort den: **2020-01-06**
- (80) Dato for Den Europæiske Patentmyndigheds bekendtgørelse om meddelelse af patentet: **2019-09-25**
- (86) Europæisk ansøgning nr.: **18198752.0**
- (86) Europæisk indleveringsdag: **2017-05-05**
- (87) Den europæiske ansøgnings publiceringsdag: **2019-02-13**
- (30) Prioritet: **2016-05-30 DE 102016109929**
- (62) Stamansøgningsnr: **17169784.0**
- (84) Designerede stater: **AL AT BE BG CH CY CZ DE DK EE ES FI FR GB GR HR HU IE IS IT LI LT LU LV MC MK MT NL NO PL PT RO RS SE SI SK SM TR**
- (73) Patenthaver: **Tampoprint AG, Lingwiesenstrasse 1, 70825 Korntal-Münchingen, Tyskland**
- (72) Opfinder: **NITSCHKE, Oliver, Gerhart-Hauptmann-Straße 19, 71735 Eberdingen, Tyskland**
- (74) Fuldmægtig i Danmark: **Plougmann Vingtoft A/S, Strandvejen 70, 2900 Hellerup, Danmark**
- (54) Benævnelse: **MASKINRAMME**
- (56) Fremdragne publikationer:
DE-A1- 3 926 146
DE-U1- 29 605 123
GB-A- 736 312

Specification

The invention relates to a machine frame, wherein the machine
5 frame includes a plurality of rod elements with a
cylindrically embodied fixation portion and with at least one
platelike load-bearing element with openings or recesses for
the rod elements, and the rod elements are connectable to the
load-bearing element by means of one connection device each
10 in a respective opening or recess, in order in an assembled
state to form the machine frame. In conventional machine
frames, the load-bearing element is not easily connectable to
the rod elements. For that purpose, all that is known in the
prior art is complex connection devices, which, although they
15 do allow mounting the load-bearing element on the rod
elements in an exact location, are nevertheless not simple to
use. The term opening primarily here means a material-free
space located in the load-bearing element, which space is
completely surrounded by material of the load-bearing
20 element. A recess is understood here to be a space in the
load-bearing element that is free of material and that opens
into a narrow side of the load-bearing element. The document
DE-U-296 05 123 discloses a machine frame as defined by the
preamble to claim 1.

25

The object of the present invention is to furnish a machine
frame in which the load-bearing element is connectable easily
to the rod elements in order to form the machine frame in the
assembled state. The connection should not merely be simple
30 to use but should also enable accurate positioning of the
load-bearing element on the rod elements.

This object is attained by a machine frame having the features of claim 1. According to the invention the connection device includes at least one straining element, in particular in the form of a straining screw, a clamping element and a cuff element acting in the assembled state as a clamping collet; the connection device is located in the opening or recess in the load-bearing element, and the cuff element is embodied in flangelike fashion and rests with an outer flange portion, which has a bearing surface, axially against the load-bearing element; and the cuff element, with a radially inner portion forming a collet, surrounds the cylindrically embodied fixation portion of the rod element and in the assembled state rests in clamping fashion with a contact face on the fixation portion, and in the radial direction between the cuff element and a wall of the load-bearing element, which wall defines the opening or recess, forms a preferably annular gap, which tapers conically in the axial direction toward the outer flange portion of the cuff element, and wherein the clamping element is received in the gap and is drawn, by tightening the straining element, axially deeper into the gap and as a result the cuff element is pressed with its contact face radially inward against the fixation portion of the rod element, as a result of which the connection device is consequently braced between the rod element and the load-bearing element and thus the rod element is also fixed in clamping fashion against the load-bearing element.

It is preferable if the gap tapers at an angle of 2° to 10° , preferably 3° to 8° , in particular 3.5° to 6° , in particular 4° to 5° , to the axial direction. As a result, an advantageous ratio of the motion of the clamping element into the gap and

clamping of the cuff element on the other are attained. In particular it is preferable if the clamping face located toward the cuff element and the inner face of the clamping element extend at an angle of 2° to 10° , preferably 3° to 8° , in particular 3.5° to 6° , in particular 4° to 5° , to the axial direction and the tapering of the gap is generated at least partially, and in particular completely, thereby.

In the machine frame of the invention, placement of the load-bearing element via the outer flange portion with the bearing surface can be done precisely; the orientation and location of the load-bearing element does not change when the straining element is pulled tight, since the clamping element is braced against the cuff element, but the load-bearing element is not braced directly counter to the rod element. In the present machine frame, accordingly, before the straining element is pulled tight, the load-bearing element can be oriented accurately relative to the rod element, and the straining element can then be pulled tight, so that the individual parts of the machine frame are solidly connected to and braced with one another, and upon this tightening, the orientation and location of the load-bearing element relative to the rod element no longer change, and thus in the assembled state the machine frame is set exactly.

25

It is preferable in this respect if the flange portion is embodied in the form of a circular disk. As a result, the load-bearing element, especially if the flange portion is located in a recess, can advantageously be placed against the entire extent of the circular-disklike flange portion, and can thus be positioned accurately.

30

It is also advantageous if a clamping face that defines the gap on the side toward the load-bearing element is embodied cylindrically. In this embodiment, the opening or recess can easily be inserted into the load-bearing element, for instance by means of a drill, since the clamping face on the side toward the load-bearing element, in this embodiment, is embodied cylindrically. As a result, the load-bearing element is simple to manufacture.

It is also advantageous if the clamping element rests with an outer face, which is equivalent to the jacket face of a truncated cone or of a cylinder, on a clamping face toward the load-bearing element, which face extends concentrically toward the outer face and defines the gap. The outer face of the clamping element in this embodiment thus follows the course of the clamping face on the side toward the load-bearing element. As a result, sliding with little resistance on the part of the clamping face on the side toward the load-bearing element over the outer surface of the clamping element can be ensured. Pulling the clamping element into the gap by pulling the clamping element tight thus proceeds advantageously and more smoothly, since less resistance has to be overcome.

It is also advantageous if the clamping element rests with an inner surface, which is equivalent to the jacket face of a truncated cone or of a cylinder, on a clamping face that extends concentrically to the inner face, defines the gap, and is on the side toward the cuff element. As a result, the clamping element, when the straining element is pulled tight,

advantageously slides over the clamping face on the side toward the cuff element, without the possibility of getting caught or stuck.

- 5 It is also advantageous if the cuff element and/or the clamping element has a clamping seam extending from the inside outward, in particular radially. As the clamping element is pulled inward via the straining element into the gap, the cuff element, exactly like the clamping element, can
10 be compressed by the clamping seam in the circumferential direction, which makes for easier tensing and makes a greater degree of tensing possible, with less clamping force.

- It is also advantageous if a plurality of straining elements
15 are provided; this makes it possible for the clamping element, over its circumferential extent and beyond, to be pulled uniformly into the gap, which increases the precision of the assembly.

- 20 It is also advantageous if the flange portion has at least one through opening, through which the straining element extends in the assembled state. This represents a simple possibility of connecting the straining element to the flange portion. The straining element, in this embodiment, can be
25 guided in a simple way through the through opening and then rests, for instance with a screw head, on the flange portion, and an end of the straining element that is opposite the screw head engages the clamping element.

- 30 It is also advantageous if the clamping element has a hole, preferably a blind hole, which is engaged by the straining

element in the assembled state, preferably engaging a thread toward the hole via a thread toward the straining element. As a result, a reliable contact can easily be established between the clamping element and the straining element, so
5 that the clamping element can be pulled into the gap in a simple way.

It is also advantageous if the load-bearing element has a two-dimensional span that is orthogonal to the span of the
10 rod element. This is an embodiment that is easy to achieve and that is suitable for many applications of the machine frame.

Further features, possible uses, and advantages of the
15 invention will become apparent from the ensuing description of exemplary embodiments of the invention, which will be explained with reference to the drawings; the described features may be important to the invention both alone and in various combinations, without this being referred to
20 explicitly again. In the drawings:

Fig. 1, a machine frame of the invention in a perspective view;

25 Fig. 2, the machine frame of Fig. 1 in a side view;

Fig.3, an enlarged detail of Fig. 1 around a connection device, in a perspective view;

30 Fig. 4, a further illustration of the region in Fig. 3 around a connection device;

Fig. 5, the connection device of Fig. 4 in an exploded view;
and

5 Fig. 6, a sectional view indicated by the arrow VI in Fig. 4.

In Fig. 1, a machine frame is represented overall by
reference numeral 10 and includes a plurality of rod elements
12, which are all, except for a respective foot portion 14,
10 embodied cylindrically. Each of the rod elements 12 includes
two fixation portions 16 that are also embodied
cylindrically. Via the fixation portions 16, the rod elements
12 are each connected to a first load-bearing element 18 and
a second load-bearing element 20, each via a respective
15 connection device 22. In the situation shown in Fig. 1, in
which the rod elements 12 are connected to the first load-
bearing element 18 and the second load-bearing element 20 via
the connection device 22, these are all in an assembled
state, thus forming the machine frame 10.

20

In Fig. 3, a region around a connection device 22 is shown by
itself and in detail. An axial direction 24 is represented by
an arrow with that reference numeral, as is a radial
direction 26. The axial direction 24 and the radial direction
25 each refer to the rod elements 12 shown in Fig. 3.

The connection device 22 of Fig. 3 includes a clamping
element 30, shown in section in Fig. 5, which in the view of
Fig. 3 is located in an opening 17 of the load-bearing
30 element 20. The connection device 22 further includes a
plurality of straining elements 32, which are embodied as

straining screws 33. Furthermore, the connection device 22 includes a cuff element 34, which is embodied in flangelike fashion and has an outer flange portion 36. An outer flange portion 36 rests with a bearing surface 38 axially against the load-bearing element 20. In the assembled state shown in Fig. 3, the cuff element 34 forms a clamping element in the opening 17 of the load-bearing element 20. The cuff element 34 has clamping seam 40, which is shown quite clearly in Fig. 3.

In Fig. 5, the excerpt from Figs. 3 and 4 is shown during the assembly of the connection device. In this illustration it can be seen that the clamping element 30 also has a clamping seam 40. The clamping element 30, in the embodiment shown in Fig. 5, further has five blind holes 52, each having a thread 44 on the end toward the hole. In the view of Fig. 5, the structure of the cuff element 34 is also quite clearly seen. Along with the outer flange portion 36, which has through openings 46 that are aligned with the blind holes 42 in the clamping element, the cuff element also includes a radially inner portion 48 that forms a collet. The clamping seam 40 extends both through the outer flange portion 36 and through the collet-forming, radially inner portion 48.

In the assembly of the connection device, the clamping element 30 is guided via the rod element 12 and all the way through the opening 17. After that, the cuff element 34 is guided via the rod element 12 and then the load-bearing element 20 is brought to precisely the desired position; the load-bearing element 20 is placed on the bearing surface 38 of the outer flange portion 36. The straining elements 32 are

guided through the respective through openings 46 in the cuff element 34 and then the clamping element 30 is positioned in such a way that the straining elements 32 are introduced into the blind holes 42 in the clamping element 30, and there,
5 with a respective screw thread 50, they engage the thread 44 toward the hole of the blind holes 42.

In the view in Fig. 6, it can be seen that, in the radial direction 26 between the cuff element 34 and a wall 52 which
10 defines the opening 17 and at the time forms a clamping face 52, toward the load-bearing element, a gap 54 is formed, which in the present case is embodied as annular and is continuous in the circumferential direction. The gap 54 narrows in wedgelike fashion in the axial direction 24 toward
15 the outer flange portion 36 of the cuff element 34. The clamping element 30 is received in the gap 54. The clamping element 30 rests with an outer face 56, which is equivalent to the jacket face of a cylinder, on the clamping 52 toward the load-bearing element, which face defines the gap 54 and
20 extends concentrically to the outer face 56. With an inner face 58, which is equivalent to the jacket face of a truncated cone, the clamping element 30 rests on a clamping face 60 on the side toward the cuff element, and this face extends concentrically to the inner face 58 and defines the
25 gap 54.

The gap 54 narrows by an angle w , which in the view in Fig. 4 is shown exaggerated for more clearly illustrating the type of function. In the sense of the invention, the angle w
30 preferably amounts to 2° to 10° , preferably 3° to 8° , in particular 3.5° to 6° , in particular 4° to 5° , relative to

the axial direction 24. As a result, an advantageous ratio is achieved between the motion of the clamping element 30 into the gap 54, on the one hand, and the clamping of the cuff element 34 on the other. In the present case, the tapering of the gap is brought about entirely by the course of the clamping face 60 on the side toward the cuff element and of the inner face 58 of the clamping element 30 at the angle W, since the clamping face 52 facing toward the load-bearing element and the outer face 56 of the clamping element 30 do not extend at an angle relative to the axial direction 24.

Below, the assembly of the load-bearing element 20 via the connection device 22 will be described in further detail with reference to Fig. 6. In the situation shown in Fig. 6, in which the clamping element 30 is received in the gap 54, the clamping element 30, by tightening of the straining element 32, is pulled axially more deeply into the gap 54, since the thread 50 of the straining element 32 engages the thread 44 in the blind hole 42 of the clamping element 30. As a result of the pulling of the clamping element into the gap 54, the cuff element 34 is pressed with its contact face 62 radially inward, that is, counter to the radial direction 26, toward the fixation portion 16 of the rod element 12. By this means, the connection device 22 is tensed between the rod element 12 and the load-bearing element 20, and thus the rod element 12 is also fixed in clamping fashion against the load-bearing element 20. It is advantageous here that, because the clamping element 30 on being tensed in the gap 54 slides counter only to the load-bearing element 20 and the cuff element 34 but not counter to the rod element 12, the

relative position of the load-bearing element 20, cuff element 34, and rod element 12 does not change.

When the connection device 22 is pulled tight, the clamping
5 element 30 with its outer face 56 slides along the clamping
face 52 extending toward the load-bearing element,
concentrically to the outer face 56, and with its inner face
58 slides toward the cuff element along the clamping face 60,
which clamping face likewise extends concentrically to the
10 inner face 58. Since the gap 54 narrows toward the flange
portion 36, the gap 54 is as it were widened by the pulling
inward of the clamping element, and as a result, the contact
face of the cuff element 34 is pressed against the fixation
portion 16 of the rod element 12, and at the same time, the
15 outer face 56 of the clamping element is pressed against the
clamping face 52 toward the load-bearing element, which face
defines the gap 54.

Patentkrav

1. Maskinramme (10), hvor maskinrammen (10) omfatter flere stavelementer (12) med et cylindrisk udformet fastgørelsesafsnit (16) og mindst et, fortrinsvis
5 pladeagtigt udformet bæreelement (18, 20) med åbninger (17) eller udsparinger til stavelementerne (12), idet hvert stavelement (12) kan forbindes med bæreelementet (18, 20) ved hjælp af en forbindelsesindretning (22) i en respektiv åbning (17) eller udsparring for i en monteringsstilstand (MS) at danne maskinrammen (10) med en aksial retning (24) og en radial retning (26),
10 **kendetegnet ved, at** forbindelsesindretningen (22) omfatter mindst et spændeelement (32), især i form af en spændeskrue (32), et klemmeelement (30) og et i monteringsstilstanden (MS) som klemmuffe virkende manchetelement (34) og er anbragt i bæreelementets (18, 20) åbning (17) eller udsparring, idet manchetelementet (34) er udformet flangeagtigt og med et ydre flangeafsnit (36)
15 ligger aksialt an mod bæreelementet (18, 20) med en anlægsflade (38), og idet manchetelementet (34) omgiver stavelementets (12) cylindrisk udformede fastgørelsesafsnit (16) med et muffedannende radiale indre afsnit (48) og i monteringsstilstanden (MS) ligger klemmende an mod fastgørelsesafsnittet (16) med en kontaktflade (62), idet der i radial retning (26) mellem
20 manchetelementet (34) og en åbningen (17) eller udsparringen begrænsende sidevæg (52) i bæreelementet (18, 20) er dannet en, fortrinsvis ringformet, spalte (54), der i aksial retning (24) spidser kegleformet til mod manchetelementets (34) ydre flangeafsnit (36), og idet klemmeelementet (30) er optaget i spalten (54) og ved stramning af spændeelementet (32) trækkes aksialt dybere ind i spalten
25 (54), og manchetelementet (34) derved med sin kontaktflade (62) presses radiale indad mod stavelementets (12) fastgørelsesafsnit (16), hvorved forbindelsesindretningen (22) følgelig fastspændes mellem stavelementet (12) og bæreelementet (18, 20), og stavelementet (12) dermed også fastgøres klemmende mod bæreelementet (18, 20).
30
2. Maskinramme (10) ifølge krav 1, **kendetegnet ved, at** flangeafsnittet (36) er udformet i form af en cirkulær skive.

3. Maskinramme (10) ifølge krav 1 eller 2, **kendetegnet ved, at** en spalten (54) begrænsende spændeflade (52) på bæreelementsiden er udformet cylindrisk.
4. Maskinramme (10) ifølge et eller flere af de foregående krav 1 til 3,
- 5 **kendetegnet ved, at** klemelementet (30) med en yderside (56), der svarer til en keglestubs kegleflade eller en cylinders cylinderflade, ligger an mod en koncentrisk med ydersiden (56) forløbende, spalten (54) begrænsende, spændeflade (52) på bæreelementsiden.
- 10 5. Maskinramme (10) ifølge et eller flere af de foregående krav, **kendetegnet ved, at** klemelementet (30) med en inderside (58), der svarer til en keglestubs kegleflade eller en cylinders cylinderflade, ligger an mod en koncentrisk med indersiden (58) forløbende, spalten (54) begrænsende, spændeflade (60) på manchetelementsiden.
- 15
6. Maskinramme (10) ifølge et eller flere af de foregående krav, **kendetegnet ved, at** spalten (54) spidser til i en vinkel (w) på 2° til 10°, fortrinsvis 3° til 8°, især 3,5° til 6°, især 4° til 5°, i forhold til den aksiale retning (24), fortrinsvis at en inderside (58) i klemelementet (30) og en spændeflade (60) på
- 20 manchetelementsiden forløber i en vinkel (w) på 2° til 10°, fortrinsvis 3° til 8°, især 3,5° til 6°, især 4° til 5°, i forhold til den aksiale retning (24), hvorved indsnævringen af spalten (54) er i det mindste delvis, især fuldstændigt forårsaget.
- 25 7. Maskinramme (10) ifølge et eller flere af de foregående krav, **kendetegnet ved, at** manchetelementet (34) og/eller klemelementet (30) har en indefra og udad forløbende spændefuge (40).
- 30 8. Maskinramme (10) ifølge et eller flere af de foregående krav, **kendetegnet ved, at** der er tilvejebragt flere spændeelementer (32).
9. Maskinramme (10) ifølge et eller flere af de foregående krav, **kendetegnet ved, at** flangeafsnittet (36) har mindst en gennemgangsåbning (46), gennem hvilken spændeelementet (32) forløber i monteringsstanden (MS).

10. Maskinramme (10) ifølge et eller flere af de foregående krav, **kendetegnet ved, at** klemelementet (30) har et hul (42), fortrinsvis et bundhul (42), som spændeelementet (32) i monteringsstillingen griber ind i, fortrinsvis at et gevind (50) på spændeelementsiden griber ind i et gevind (44) på hulsiden.

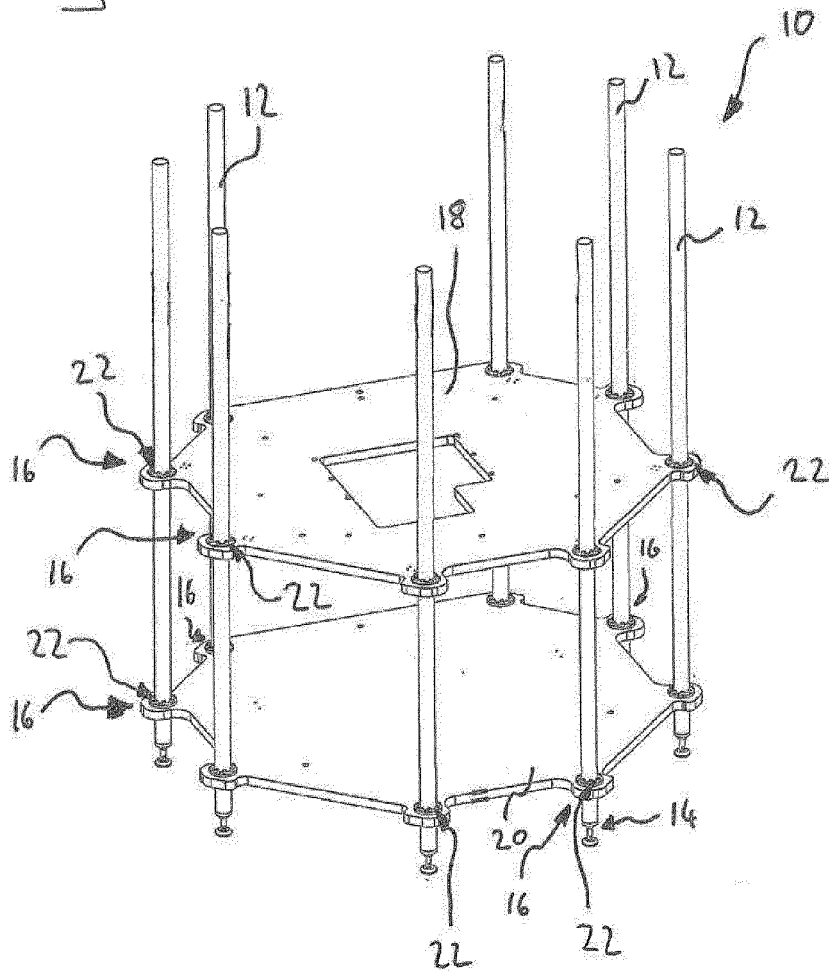
5

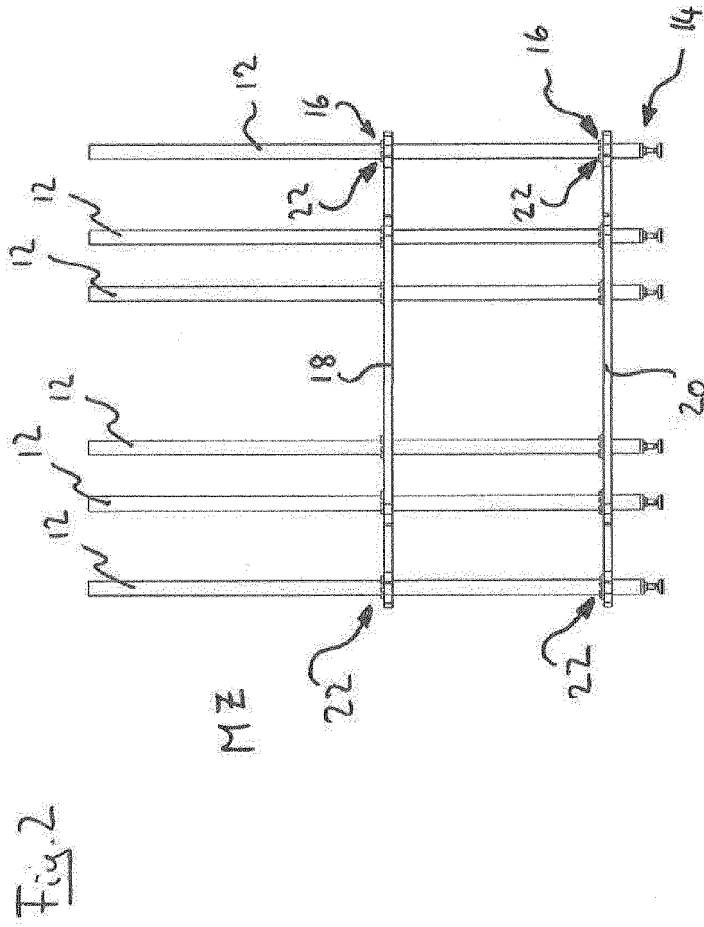
11. Maskinramme (10) ifølge et eller flere af de foregående krav, **kendetegnet ved, at** bæreelementet (18, 20) har en plan udstrækning, der er ortogonal på en udstrækning af stavelementet (12).

10 **12.** Maskinramme (10) ifølge et eller flere af de foregående krav, **kendetegnet ved, at** mindst et af stavelementerne (12) er et rør, især et rør af rustfrit stål.

MZ

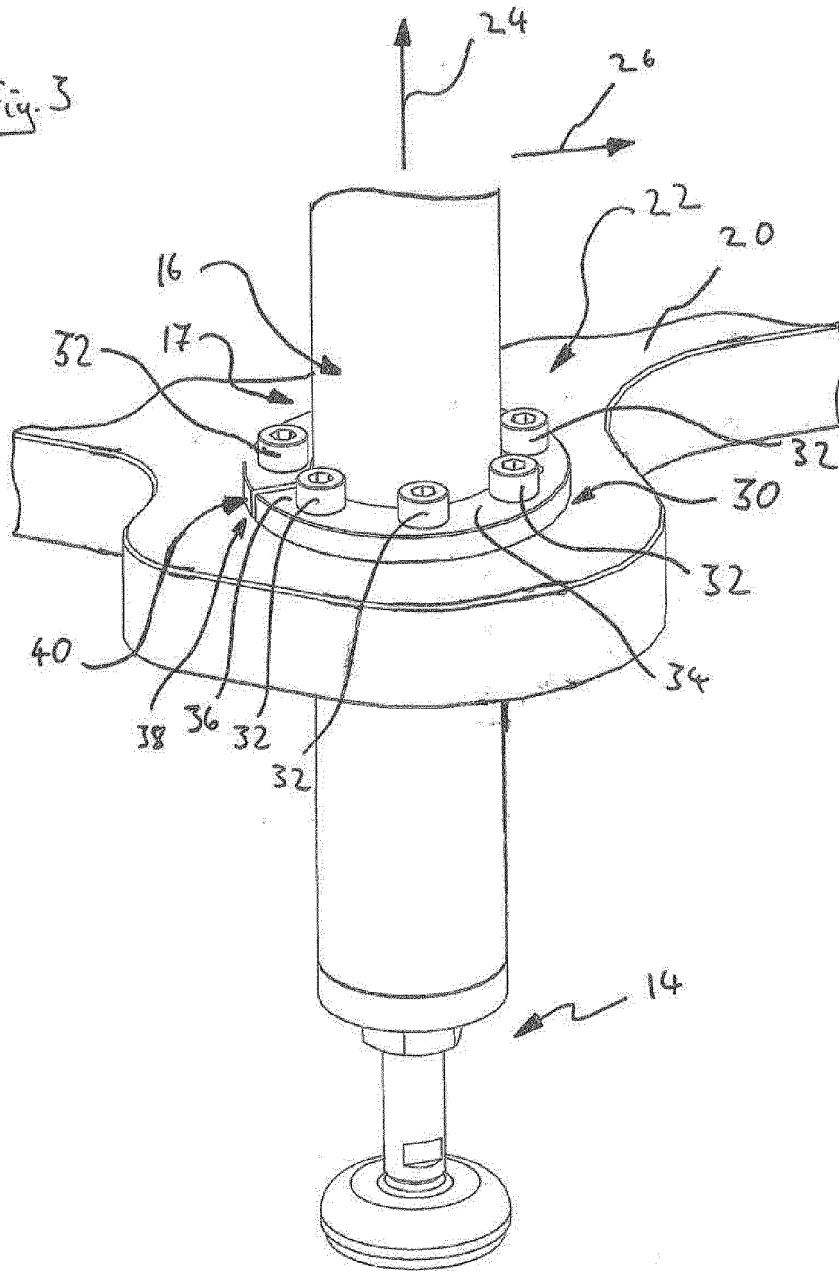
Fig-1

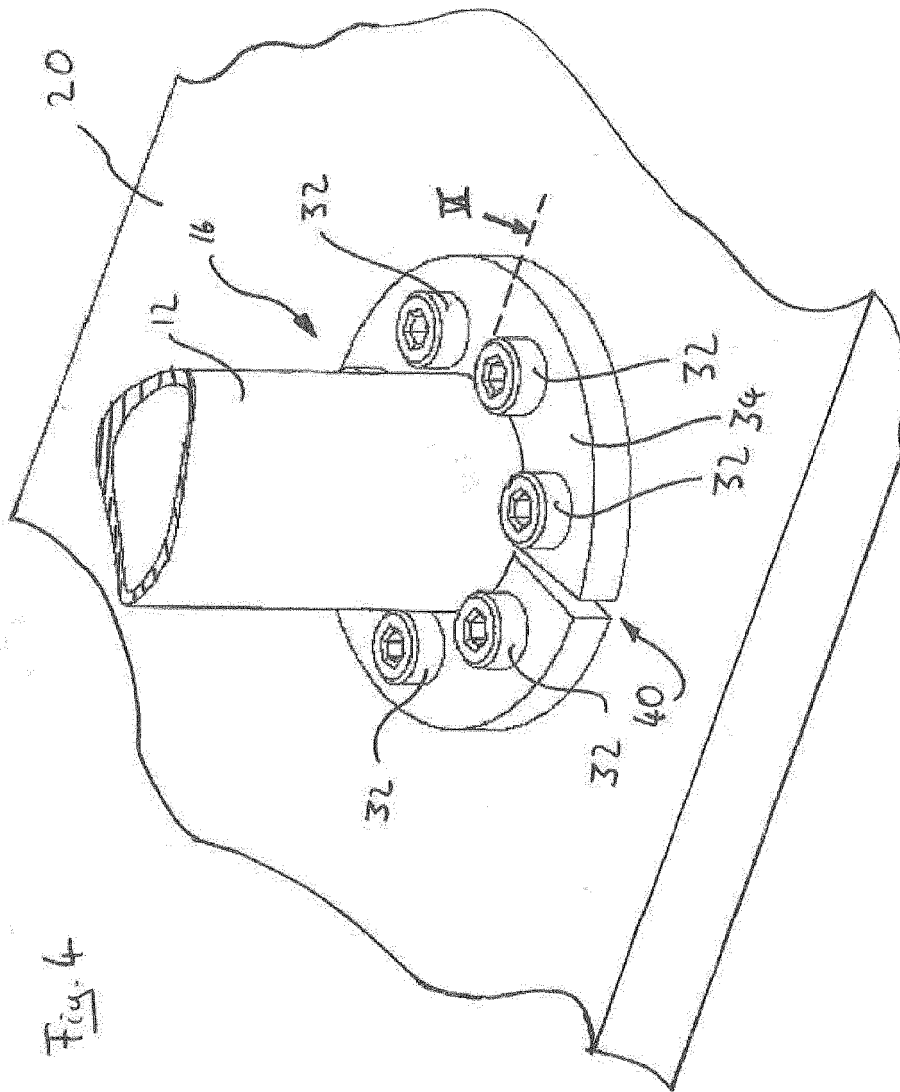




3

Fig. 3





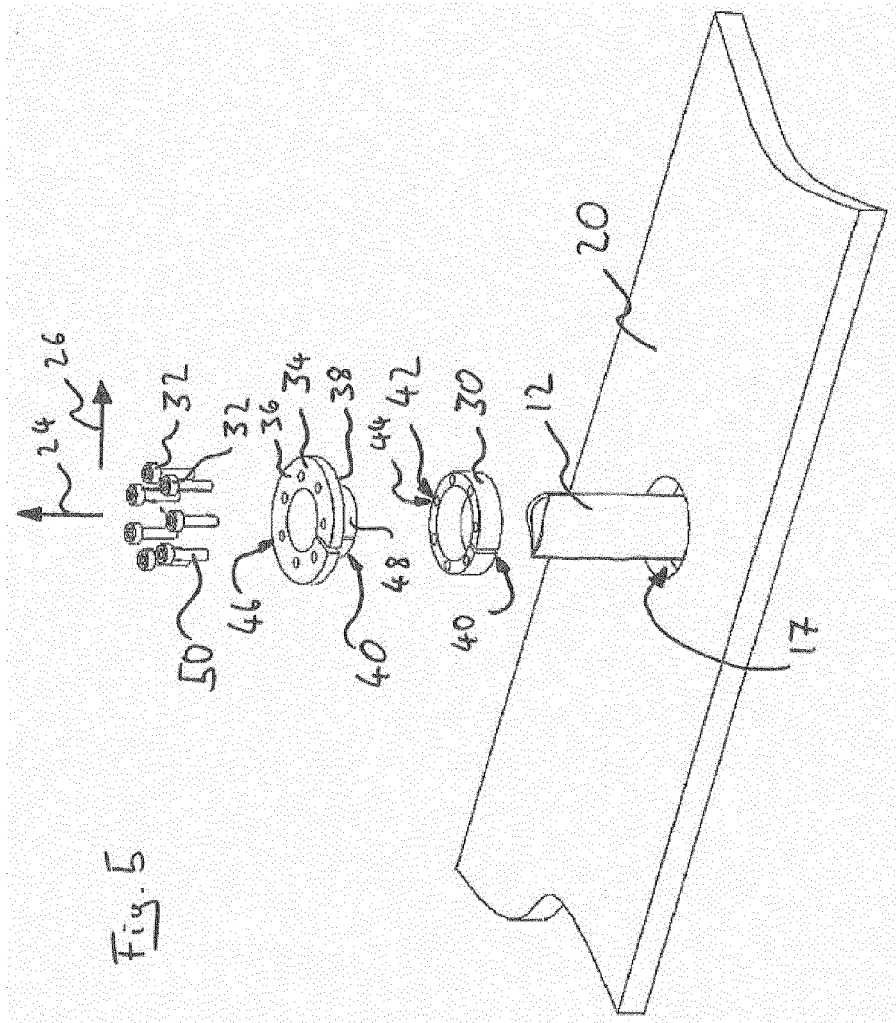


Fig. 6

