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(54) Benevnelse **DRILL PIPE PROTECTOR**

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General technical field

The present invention relates to the field of oil extraction pipe protectors, and more specifically the protectors for the threads arranged at the ends of said
5 pipes.

State of the art

Oil extraction pipes are used for drilling wells, in
10 order to reach significant depths.

These pipes have, at each of the ends thereof, threads for the interconnection thereof either directly or by means of intermediate elements.

The threaded ends of the pipes are referred to as male
15 ends, whereas the tapped ends of the pipes are referred to as female ends.

According to the practice of those skilled in the art, a protector fitted onto a male end of a pipe is referred to as a male protector (or pin), and a
20 protector fitted onto a female end of a pipe is referred to as a female protector (or box).

Conventionally, these threads were lubricated a first time prior to the storage thereof with so-called
25 storage grease, and again lightly before use, with a lubricant referred to as "operational". This involved significant time consumption for each use of these pipes.

Pipes having solid or permanent lubrication means on the threads thereof have thus been proposed, thus with the aim of no longer requiring thread lubrication operations prior to each use of the pipes, the pipes
5 thus being lubricated permanently from the manufacture thereof.

Oil extraction pipes moreover require protectors to protect the threaded ends thereof, so that the thread
10 and the lubricant are not damaged during storage and handling during pipe transport.

These protectors must meet numerous requirements:

- 15 - remaining in position on the pipe despite vibrations due to the transport and handling phases of the pipes,
- remaining in position under highly variable temperature conditions, typically from -46°C to 66°C ,
- 20 - acting as a shock absorber during the various pipe handling steps,
- preventing pollution inside the pipe and the machined areas, i.e. ensuring the tightness of the pipe,
- 25 - suitable for being mounted and removed easily,
- enabling testing inside the pipe, commonly referred to as "drift",
- enabling gripping, if required, of the pipe by hooks housed in the ends of the pipe.

The API 5CT standard, also referred to as ISO 11960, defines the requirements to be met by these protectors more specifically.

- 5 The use of solid lubricants adds an additional requirement in respect of non-degradation of these lubricants when fitting or removing the protector.

The current solutions propose protectors made mainly
10 from high-density polyethylene (HDPE) and are for the most part machined, which entails means of production such as lathes outside plastics processing standards. Attempts to make injected protectors have been proposed, but are not very satisfactory in terms of the final
15 quality of the product. In sum, the current solutions do not present solutions that satisfy all of these requirements while still remaining reasonable in terms of cost.

In particular, the male protectors do not have a tight
20 connection between the protector and the pipe, while the female and male protectors are a structure that generates either disproportionate costs, or protectors with low shock resistance. The proper fastening and the removability of the protector are not provided over the
25 entire temperature range.

A thread protector of US 6 196 270 intended to protect the threads at the end of a pipe comprises a base part, a threaded part extending axially from a first end of the base part and able to be fixed by threading with
30 the pipe and an extended annular shock absorber extending axially from a second end of the base part.

Presentation of the invention

5 The aim of the present invention is that of providing an extraction pipe thread protector that makes it possible to satisfy these requirements without generating production costs that are too substantial with respect to conventional protectors.

10 The present invention proposes an oil extraction pipe thread protector comprising:

- a connecting segment, having a substantially frustoconical shape that is hollow about a central axis, and having a proximal end, a distal end, and a thread complementary to the thread of said pipe,
- 15 - a bumper segment having a connecting end and a free end, the connecting end thereof being in the extension of the distal end of the connecting segment, said bumper segment having:
 - 20 an internal ring extending coaxially and in the extension of the distal end of the connecting segment, and
 - an external ring extending coaxially from the distal end of the connecting segment, defining an internal
 - 25 space between said internal and external rings, and creating an increase in the external diameter of the protector

said protector being characterised in that all the walls of the protector have a substantially equal

30 thickness.

According to one alternative embodiment, the protector comprises longitudinal ribs connecting said internal ring and said external ring, said ribs having a thickness substantially equal to the thickness of the internal and external rings.

According to one alternative embodiment, said protector is carried out by polycarbonate injection-moulding.

10 According to one alternative embodiment, the protector further comprises a cap removably mounted in the free end of the bumper segment in such a way as to tightly close it while still allowing for the "drift" test of the pipe without removing the protector.

15

The invention relates to a male alternative of said protector, wherein:

- said connecting segment has a diameter that decreases from the proximal end thereof to the distal end thereof;
- 20 - the thread complementary to the thread of said pipe is disposed inside said connecting segment,
- the internal ring comprises a frustoconical portion in the extension of the distal end of the connecting segment, and a portion having a hollow cylindrical shape in the extension of said frustoconical portion,
- 25 - the external ring has a substantially hollow frustoconical shape, extending from the distal end of the connecting segment, and of which the diameter increases from said distal end of the connecting
- 30 segment, the maximum diameter of said external

ring being greater than the diameter of the connecting segment on the proximal end thereof.

According to a particular embodiment, the free end of
5 the protector is bevelled to substantially 45%.

According to another particular embodiment, the male protector further comprises a polymer film fixed on the internal face of the connecting segment, said polymer
10 film being adapted to provide the tightness of the connection between the protector and an oil extraction pipe whereon said protector is fixed.

The invention also relates to a method for positioning
15 such a male protector comprising the steps of:

- rolling back a portion of said polymer film on the external face of the connecting segment,
- positioning the protector on an oil extraction pipe, in such a way that the thread of said pipe and the
20 thread complementary of said protector engages to provide a maintaining in position of the protector on said pipe,
- unwinding the rolled back part of the polymer film on said pipe in such a way as to provide the tightness of
25 the connection between the protector and said oil extraction pipe.

The invention also relates to a female alternative of said protector, wherein:

- 30 - said connecting segment has a diameter that increases from the proximal end thereof to the distal end thereof;

- the thread complementary to the thread of said pipe is disposed outside said connecting segment,
- the internal ring is a hollow cylinder, having a diameter equal to the diameter of the connecting
5 segment on the distal end thereof,
- the external ring has partition extending radially from the distal end of the connecting segment, towards the outside of the protector, and a substantially frustoconical section extending from said partition of
10 which the diameter increases going towards the free end of the bumper segment.

15 Description of the figures

Further features, aims and advantages of the invention will emerge from the description hereinafter, which is merely illustrative and not limiting, and should be
20 read with reference to the appended figures, wherein:

- figure 1 shows a male alternative embodiment of a protector according to the invention;
- figure 2 shows a male protector according to the invention as well as two examples of caps to block
25 off the free end thereof,
- figures 3 and 4 show sectional views of the positioning of a male protector equipped with an elastomer film on a pipe;
- figures 5 and 6 show two views of a female
30 alternative of a protector according to the invention;

- figure 7 shows a sectional view of such a female protector positioned on a pipe.
- figure 8 shows a 3D view of this female protector positioned on a pipe and associated with a cap by blocking off the free end.

Detailed description

Male protector:

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Figure 1 shows an example of an embodiment of a male protector 1 according to the invention.

The male protector 1 as illustrated can be broken down into two parts:

15

- a connecting segment 2, and
- a bumper segment 3.

The connecting segment 2 has a proximal end 21 and a distal end 22, and has a substantially frustoconical shape wherein the diameter decreases from the proximal end 21 to the distal end 22.

20

The bumper segment 3 has a connecting end 31 and a free end 32, the connecting end 31 thereof being in the extension of the distal end 22 of the connecting segment 2.

25

The bumper segment 3 comprises an internal ring 33 and an external ring 34, these two rings 33 and 34 being concentric and defining an internal space 35 therebetween.

30

The internal ring 33 as shown comprises a frustoconical portion in the extension of the distal end 22 of the connecting segment 2, and a portion having a hollow cylindrical shape in the extension of said
5 frustoconical portion, the diameter of this cylindrical section being substantially equivalent to the internal diameter of the pipe whereon the male protector is to be positioned.

The internal ring 33 is thus typically radially offset
10 with respect to the frustoconical connecting segment 2 and thus typically comprises a connecting partition 23, shown in figures 3 and 4 which will be detailed hereinafter, said connecting partition 23 being arranged between the frustoconical portion and the
15 cylindrical portion of the internal ring 33.

The external ring 34 has a frustoconical section, wherein the diameter increases from the connecting end 31 to the free end 32 of the connecting segment 3, the maximum diameter of the external ring 34 being
20 greater than the maximum diameter of the connecting segment 2. The external ring 34 thus typically has an angle of 5° with respect to the axis of the male protector 1.

25 The male protector 1 illustrated has two grooves 40 extending along a diameter of the male protector 1, from the free end 32.

These grooves 40 are suitable for enabling the
30 insertion of a tool for screwing and unscrewing the protector on a pipe.

Furthermore, these grooves 40 have apertures 41 provided on one of the walls thereof, these apertures 41 being intended to enable the attachment of a substantially circular cap typically blocking off the free end 32 of the male protector 1.

According to a particular embodiment, the internal spaces 35 are filled with a resin following the manufacture of the male protector 1. The resin is advantageously transparent, and has an index substantially equal to that of the material of which the protector is formed. Thus disposing resin in the internal spaces 35 of the male protector not only makes it possible to improve the transparency of the protector 1 due to the index continuity that the resin allows, but also to substantially improve the mechanical resistance to shocks of the protector.

Figure 2 shows the male protector 1 described above, along with two embodiments of caps 45 and 46 that block off the end of the protector 1.

In these two embodiments of caps 45 and 46, the caps comprise complementary projections 47 to the apertures 41 of the male protector 1, so as to be held in position at the free end 32 thereof.

The embodiment 45 of the cap covers the entire free end 32 thereof, and has a diameter corresponding to the maximum diameter of the male protector 1.

The embodiment 46 merely blocks off the opening defined by the internal ring 33, and thus has a diameter

corresponding substantially to the internal diameter of said internal ring 33.

Other alternatives of caps can be considered, in particular alternatives that do not entirely block off the opening of the protector, in such a way as to prevent water from stagnating within a pipe provided with perfectly tight protectors.

Caps 45 and 46 are advantageously connected to the body of the protector 1 via connecting means such as a chain, a cord or a cable, in such a way that the protector 1 and the associated cap cannot be dissociated.

In the embodiment illustrated, the male protector 1 comprises longitudinal ribs 36 connecting the internal ring 33 and the external ring 34, and thus segmenting the internal space 35 between the internal ring 33 and the external ring 34 into multiple compartments.

As represented in the figure, the male protector 1 comprises twelve longitudinal ribs 36, the sides of each of the grooves 40 are defined by two ribs 36, and the remaining ribs 36 are distributed substantially uniformly between the internal ring 33 and the external ring 34.

As illustrated, the free end 32 of the male protector 1 is bevelled to substantially 45°, resulting in a retraction of the diameter towards the free end 32. This 45° inclination makes it possible to increase the shock resistance of the male protector 1 and thus

protect the pipe whereon it is to be mounted more effectively than a protector having a right-angled free end 32.

5 The male protector 1 further comprises threads 42 arranged at the internal wall of the connecting segment 2, these threads 42 being suitable for engaging with the threads of a pipe whereon said male protector 1 is to be assembled.

10 The threads 42 of the male protector 1 typically comprise one, two or three turns, with further alternative embodiments being obviously possible. Having a small number of turns makes it possible to limit the impact on the lubricant of the threads of the
15 pipe that the male protector 1 is intended to protect, this number of turns being however chosen so as to secure the male protector 1 sufficiently on the pipe.

Polymer film:

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The male protector 1 as represented in figure 1 is typically associated with a polymer film 60.

This polymer film 60 has the shape of a pipe, and is fixed to the male protector 1 using an adhesive or a
25 strip of glue, typically by means of a double-sided adhesive film 6 on the internal face of the connecting segment 2, at an intermediate position between the threads 42 and the proximal end 21 of the connecting segment 2.

30 The adhesive is chosen such that the attachment of the polymer film 60 on the male protector 1 is permanent,

i.e. that the polymer film 60 cannot be removed from the male protector without being damaged, unlike a removable attachment.

5 Once attached to the male protector 1, the polymer film 60 is rolled back around the proximal end 21 so as to cover the external wall of the male protector 1. Figure 3 shows a block diagram of a male protector 1 provided with such a polymer film 60 rolled back on the
10 external wall thereof.

Once the male protector 1 is positioned on a pipe, this portion of the polymer film 60 that was rolled back on the external face of the male protector 1 is unwound in
15 such a way as to cover a portion of the pipe, typically a length comprised between 15 and 20 cm.

Thus, the polymer film 60 carried out the tightness of the connection between the male protector 1 and a pipe
20 whereon it is attached on the proximal end 21 of the male protector 1, the tightness of the connection on the free end 32 of the male protector 1 being carried out by a cap not shown in the figures.

Figure 4 shows a block diagram of a male protector 1
25 positioned on a threaded pipe 4, with the polymer film 60 being rolled back on a portion of the threaded tube 4.

The polymer film 60 is typically a multilayer polymer
30 film, formed in such a way as to:

- have a face having a very low adherence, this surface being that intended to come into contact with the pipe, so as to limit friction on the pipe threads when the protector 1 or 7 is removed from the pipe; this very low adherence is typically obtained by adding a slip agent,
- have a face having a very high adherence, this surface being that intended to come into contact with the protector 1 or 7, in such a way that the protector 1 or 7 drives the polymer film 60 during the removal thereof from the pipe.

The polymer film 60 can moreover be extended, in such a way as to allow it to be folded back on the protector prior to the positioning of the protector 1 or 7 on the pipe, then the unfolding thereof on the external face of the pipe once the protector 1 or 7 is positioned on said pipe, while providing the tightness of the connection.

Furthermore, the polymer film 60 is made so as not to allow tearing, to be very resistant to twisting and shearing, so as not to tear during the screwing or unscrewing of the protector 1 or 7 on the pipe.

The polymer film is typically made via multilayer swelling extrusion, and has a thickness typically comprised between 1nm and 1mm, for example between 15 and 200 μm .

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Female protector:

Figures 5 and 6 show two views of a female protector 7 according to the invention, adapted to protect a female thread on an oil extraction pipe.

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In the same way as the male protector 1 shown in figure 1, the female protector 7 comprises a connecting segment 2 and a bumper segment 3.

10 Elements identical to those shown in figure 1 are marked with identical numerical references.

In the same way as hereinabove, the free end 32 of the female protector 7 is adapted to be closed in a tight manner by a cap not shown in this figure.

15

The connecting segment 2 is here adapted to be inserted inside the pipe that the female protector is intended to protect: for a pipe having a given diameter, the diameter of the connecting segment 2 of a female protector 7 will therefore be less than the diameter of the connecting segment 2 of a male protector 1.

20

In addition, the threads 42 are here disposed on the external face of the connecting segment 2, so as to engage with the threads disposed inside the pipe.

25

In the same way as hereinabove, the threads 42 typically comprise one, two or three turns, with further alternative embodiments able to be considered.

30

Figure 7 shows a sectional view of such a female protector 7 according to the invention associated with a female pipe.

5 This figure reveals the difference in structure of the bumper segment 3 of the female protector 7 with respect to that of the male protector 1, due to the difference in diameter of the connecting segment 2.

10

Indeed, the external ring 34 of the bumper segment 3 must necessarily have a maximum diameter greater than the diameter of the pipe, typically identical to the maximum diameter of the male protector 1 presented hereinabove, in order to be able to absorb the shocks and prevent them from being applied on the pipe.

15

In the case of the female protector 7, the connecting segment 2 being position in the pipe, the external wall 34 also comprises a partition 37 extending radially with respect to the axis of the female protector 7, and making it possible to create an abutment between the external ring 34 and the connecting segment 2, and thus increase the external diameter of the external ring 34 in such a way that it is greater than that of the pipe.

20

25

In addition, the thickness of the connecting segment 2 and of the internal ring 33 is typically chosen in such a way that the female protector 7 allows for the insertion of a means for measuring the

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internal diameter of the pipe whereon said female protector is intended to be positioned.

5 More precisely, figure 7 shows an embodiment wherein the pipe has a main section 81 with a substantially constant thickness, and a threaded section 82 of reduced thickness, thus having an internal housing wherein the female protector 7 can be positioned without reducing the internal diameter of the whole to a value less than the diameter of the main section 81 of the pipe.

10

In the same way as for the male protector 1 shown hereinabove, the internal spaces 35 are filled with resin following the manufacture of the female protector 7. The resin is advantageously transparent, and has an index substantially equal to that of the material of which the protector is formed. Thus disposing resin in the internal spaces 35 of the female protector 7 not only makes it possible to improve the transparency of the protector 7 due to the index continuity that the resin allows, but also to substantially improve the mechanical resistance to shocks of the protector 7.

15

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25 In addition, such as has already been shown for the male protector 1, the female protector 7 can comprise a cap 45 or 46 such as shown in figure 2, totally or partially blocking off the free end of the protector 7. this cap is then advantageously connected to the body of the protector 7 via

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connecting means such as a chain, cord or cable, in such a way that the protector 7 and the associated cap cannot be dissociated.

5 The female protector 7 such as presented does not require being combined with a polymer film in order to carry out a tight connection.

Indeed, in the case of the female protector, the compression of the pipe on the partition 37 when it abuts against the latter as well as the contact
10 between the threads of the pipe and the complementary threads 42 of the female protector 7 are sufficient to carry out a sufficient tightness.

According to one alternative embodiment, the female
15 protector 7 has a seal at the contact between the pipe and the partition 37, typically an O-ring seal.

According to another alternative embodiment, the
20 female protector 7 is carried out via bi-injection, the abutment zone of the pipe on the partition 37 then being typically made of a material that is more elastic than the rest of the protector 7, in such a way as to provide the tightness of the connection.

25 Figure 8 shows a view of the female protector 7 according to the invention positioned on a pipe 8, and associated with a cap 46 that blocks off its free end 32.

30

Manufacture:

The male 1 or female 7 protector is made of polycarbonate by injection-moulding.

5

The specific geometry of the protector 1 or 7 offers significant advantages for the manufacture thereof by injection-moulding. Indeed, all the walls of the protector 1 or 7 have a substantially equal thickness, including the walls of the bumper segment 3 due to the presence of the ribs 36.

10

"Substantially equal thickness" means that the thickness has zones such that the junctions between several walls of the protector vary by a maximum of 150%, or advantageously by a maximum of 100% with respect to the average thicknesses of the walls of the protectors, typically by a maximum of 60%.

15

As an example, in an embodiment wherein the walls of protector 1 or 7 have a thickness of 5mm, the thickness on the connecting end 31 of the bumper segment 3 is advantageously substantially equal to 8.5mm, with such a difference in thickness on a zone that has rounded forms being entirely acceptable and adapted for the carrying out of the protector via injection, contrary to known examples of protectors that have variations in thickness of about 300%, and of which the carrying out via an injection method would result in prohibitive cooling times for the part, and substantial manufacturing faults.

20

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This substantially constant thickness for the entire male protector makes it possible to:

- prevent shrinkage cavities,
- reduce the quantity of material required,
- 5 - reduce the solidification time significantly in relation to an equivalent part where the bumper segment 3 would be produced in a "solid" piece, thus making it possible to reduce machine use considerably by reducing the cycle time for producing the male 1 and female 7 protector, thus
- 10 making it possible to save energy and obtain a higher production rate.

In this way, the protector 1 or 7 as shown has a lower production cost in relation to a protector having an

15 equivalent overall shape, but wherein the bumper segment 3 is "solid".

Furthermore, all the connections and edges advantageously have fillets or curves so that the

20 protector 1 or 7 comprises no sharp angles, favouring mould release thanks to these angles, commonly referred to as draft angles, and to prevent sharp angles that can degrade the film and that have a highly negative impact on the manufacture of the protector via

25 injection.

Polycarbonate is a very high-performance material for producing the protector 1 or 7, the injection-moulding whereof is enabled due to the specific shape of the

30 protector.

Furthermore, polycarbonate is a transparent material, enabling the user to inspect the condition of the pipe threads whereon the protector 1 or 7 is positioned directly, without the need to remove the protector 1 or
5 7 to conduct such an inspection.

This easy inspection makes it possible to prevent risks of degradation of the lubrication of the threads of the pipe at each removal and repositioning of the protector 1 or 7.

10

Moreover, the protector 1 or 7 is subjected to a surface treatment, so as to perform ultraviolet and/or infrared filtering, such a treatment typically consisting of soaking, followed by microwave plasma
15 treatment in the presence of ozone.

The material from which the protector 1 or 7 is formed, typically polycarbonate, can be chosen so as to have such ultraviolet and/or infrared filtering characteristics.

20

The solid lubricants used on the pipe threads are indeed ultraviolet- and infrared-sensitive, and thus should be protected therefrom.

In this way, the male 1 and female 7
25 protectors proposed are suitable for effectively protecting the threaded ends of an oil extraction pipe, by producing a tight connection while enabling the various pipe handling and inspection operations, and retaining a reasonable production cost due to the
30 specifically suitable shape thereof for injection-moulding.

In addition injection makes it possible to obtain and single-piece protector 1 or 7, having increased mechanical properties with respect to protectors that would be produced by association of several parts
5 produced individually, and manufacturing times and costs that are substantially reduced with respect to protectors that have non-specific shapes or that require machining steps for the forming thereof.

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Patentkrav

1. Beskyttelsesanordning (1 eller 7) for en oljeekstraksjonsrørgjenge, der beskyttelsen (1 eller 7) omfatter:

5 - et hult i det vesentlige frustokonisk forbindelsessegment (2) rundt en sentral akse, og som har en proksimal ende (21), en distal ende (22) og en gjenge (42) som er komplementær til dette røret,

- et støtdempersegment (3) som har en forbindelsesende (31) og en fri ende (32), der forbindelsesenden (31) derav er i utstrekningen av den distale enden (22) av forbindelsessegmentet (2), der støtdempersegmentet (3) inkluderer:

10 en indre ring (33) som strekker seg koaksialt og i utstrekningen av den distale enden (22) av forbindelsessegmentet (2), og

en ytre ring (34) som strekker seg koaksialt fra den distale enden (22) av forbindelsessegmentet som definerer et indre rom mellom den indre (33) og den ytre (34) ringen, og øker den ytre diameteren til beskyttelsesanordningen (1 eller 7),

15 der beskyttelsesanordningen (1 eller 7) er **karakterisert ved at** alle veggene til beskyttelsesanordningen (1 eller 7) har en i det vesentlige lik tykkelse, slik at den har en form som er egnet for produksjon ved hjelp av sprøytetestøping, og **ved at** den produseres ved hjelp av sprøytetestøping.

2. Beskyttelsesanordning (1 eller 7) ifølge det ovennevnte kravet, **karakterisert ved at** dens frie ende (32) er avskrådd i det vesentlige 45 %.

25 **3.** Beskyttelsesanordning (1 eller 7) ifølge ett av de ovennevnte kravene, **karakterisert ved at** den omfatter langsgående ribber (36) som forbinder den indre ringen (33) og den ytre ringen (34), der ribbene (36) har en i det vesentlige lik tykkelse som tykkelsen til den indre (33) og den ytre (34) ringen.

30 **4.** Beskyttelsesanordning (1 eller 7) ifølge hvilket som helst av de ovennevnte kravene, **karakterisert ved at** den produseres ved hjelp av polykarbonat-sprøytetestøping.

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5. Beskyttelsesordning (1) eller (7) ifølge hvilket som helst av de ovennevnte kravene, **karakterisert ved at** den ytterligere omfatter en hette avtakbart montert i den frie enden (32) av støtdempersegmentet (3) for å forsegle dette tett.

5

6. Beskyttelsesordning (1) ifølge hvilket som helst av de foregående kravene, **karakterisert ved at:**

- forbindelsessegmentet (2) har en reduserende diameter fra den proksimale enden (21) derav til den distale enden (22) derav;

10

- gjengen (42) som er komplementær til gjengen til røret, er anbrakt inni forbindelsessegmentet (2),

- den indre ringen (33) omfatter et frustokonisk parti i utstrekningen av den distale enden (22) av forbindelsessegmentet (2), og et parti som har en hul sylindrisk form i utstrekningen av det frustokoniske partiet,

15

- den ytre ringen (33) har en i det vesentlige hul frustokonisk form som strekker seg fra den distale enden (22) av forbindelsessegmentet (2), og hvori diameteren øker når den beveger seg bort fra den distale enden (22) av forbindelsessegmentet (2), der maksimumsdiameteren til den ytre ringen (34) er større enn diameteren til forbindelsessegmentet (2) i den proksimale enden (21) derav.

20

7. Beskyttelsesordning (1) ifølge det ovennevnte kravet, **karakterisert ved at** den ytterligere omfatter en polymerfilm (60) festet på den indre flaten av forbindelsessegmentet (2), der polymerfilmen (60) er egnet for å sikre tettheten til forbindelsen mellom beskyttelsesordningen (1) og et oljeekstraksjonsrør som beskyttelsesordningen (1) er festet på.

25

8. Fremgangsmåte for å plassere en beskyttelsesordning (1) ifølge det ovennevnte kravet, **karakterisert ved at** den omfatter trinnene med:

- å sammenrulle et parti av polymerfilmen (60) som er festet på den indre flaten av forbindelsessegmentet (2), på den ytre flaten av forbindelsessegmentet (2),

30

- å plassere beskyttelsesordningen (1) på et oljeekstraksjonsrør, slik at gjengen til røret og den komplementære gjengen (42) til beskyttelsesordningen (1) går i inngrep for å sikre at beskyttelsesordningen (1) holdes på plass på røret,

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- å rulle ut det sammenrullede partiet av polymer filmen (60) på røret for å sikre tettheten til forbindelsen mellom beskyttelsesanordningen (1) og oljeekstraksjonsrøret.

5 **9.** Beskyttelsesanordning ifølge hvilket som helst av kravene 1 til 5, **karakterisert ved at:**

- forbindelsessegmentet (2) har en økende diameter fra den proksimale enden (21) derav til den distale enden (22) derav;

10 - den komplementære gjengen (42) til rørets gjenge er anbrakt utenfor forbindelsessegmentet (2),

- den indre ringen (33) er en hul sylinder som har en diameter lik diameteren til forbindelsessegmentet (2) i den distale enden (22) derav,

15 - den ytre ringen (34) omfatter en skillevegg (37) som strekker seg radially fra den distale enden (22) av forbindelsessegmentet (2) mot utsiden av beskyttelsesanordningen (7), og en i det vesentlige frustokonisk seksjon som strekker seg fra skilleveggen (37), hvori diameteren øker mot den frie enden (32) av støtdempersegmentet (3).

20 **10.** Fremgangsmåte for å fremstille en beskyttelsesanordning (1 eller 7) ifølge hvilket som helst av kravene 1 til 7 eller 9, **karakterisert ved at** den omfatter et sprøyttestøpingstrinn under hvilket beskyttelsesanordningen (1 eller 7) dannes.

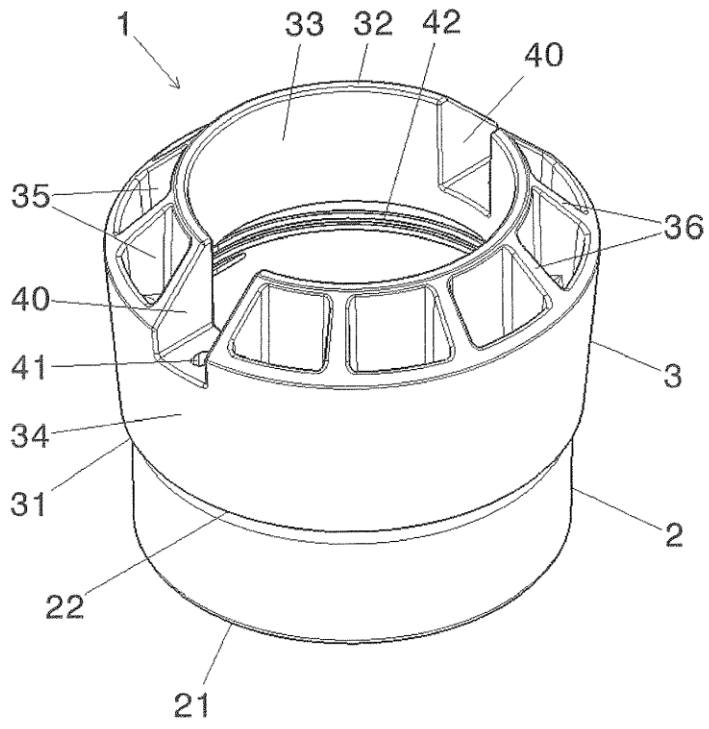


FIG 1

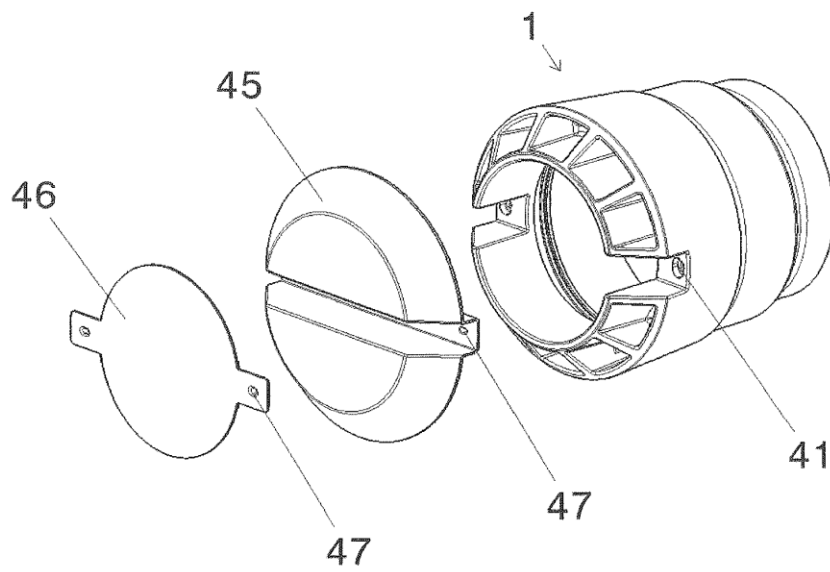


FIG 2

