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(54) SHANK ADAPTER WITH CORROSION PROTECTION

SCHAFTADAPTER MIT KORROSIONSSCHUTZ

ARRANGEMENT SUR UNE PERFORATRICE DE ROCHE ET PERFORATRICE DE ROCHE

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Description

TECHNICAL FIELD

[0001] The present invention relates to neck adapter according to the preamble of claim 1. The invention further relates to a rock drill comprising a neck adapter and a method to corrosion protect a neck adapter.

BACKGROUND

[0002] When rock drilling, rock drilling machines from which rotational power, feeding and impact energy are transferred to a drilling tool, usually under intermediate coupling of splice bars. Through a longitudinal hole in the splice bars a flush medium is supplied, for example water, to the area of the drilling tool. The flush medium has the task of partly cooling the tool and partly brings out the drill cuttings from the drilling hole. For transfer of rotation power, feeding and impact energy from the rock drilling machine to the splice bars and the drilling tool a so called neck adapter is used. This neck adapter is mounted in the drilling machine and has a protruding part. The protruding part constitutes a connection end arranged to be connected with splice bars or the drilling tool. In the neck adapter a through hole is present for transfer of the flush medium from the rock drilling machine to the splice bars and the drilling tool.

[0003] The neck adapter is exposed to corrosive attacks, partly from the water used as flush medium, partly from the corrosive environments that a rock drilling machine is located in during use and transport. The water that is available and is used as flush medium, for example when the rock drilling machine is used for mining, is often very corrosive. Corrosive attacks shorten the lifetime of a neck adapter. To corrosion protect neck adapters tests been performed with for example chroming and lacquer of neck adapters.

[0004] To coat the neck adapter with a chromium layer is partly costly but also vitiated with drawbacks since the neck adapter is exposed to hits on a specific hitting surface. From this hitting surface flakes of chromium come loose. These flakes may cause problems in the rock drilling machine. The same problem may occur with lacquered neck adapters.

[0005] WO 2003/078788 A1 describes a method for corrosion protection of a neck adapter. According to the described method parts exposed to corrosion are coated by zinc phosphate, zinc manganese phosphate or manganese phosphate with a subsequent oiling or waxing. Phosphatising of the neck adapter is done interiorly in the through hole and on a cylindrical exterior surface.

[0006] The cylindrical exterior surface of the neck adapter constitutes a surface against which a seal in the rock drilling machine abuts. It turned out that this seal is exposed to wear as a result of the conversion layer that is formed during the phosphatising has a grinding impact on the seal when the neck adapter rotates in the rock drilling machine. Especially the conversion layer will have a grinding impact when corrosion starts to occur on the cylindrical surface. The conversion layer will then have a relatively rough surface.

[0007] US 6,109,620 discloses a shank adapter formed by two blocks made from different materials having specific properties adapted for the use of each of the parts of the adapter.

SUMMARY OF THE INVENTION

[0008] An object of the present invention is to provide a corrosion protected neck adapter that prevents at least partially of the drawbacks mentioned above.

[0009] This object is obtained according to an aspect of the invention with a neck adapter for a rock drilling machine, which neck adapter comprises an elongated body. The elongated body has an outer surface and an inner surface. The elongated body has further an end surface and a through hole extending through the elongated body between the first part of the outer surface and the end surface. The first part of the outer surface is constituted by a cylindrical surface and the inner surface comprises a limitation surface formed by the elongated body in the through hole. At least a part of the outer surface and a part of the inner surface are provided with a corrosion protecting coating. The first part of the outer surface is provided with a first corrosion protecting coating and a second part of the outer surface and/or at least a part of the inner surface is provided with a second corrosion protecting coating. The first corrosion protecting coating is constituted by a chromium layer and the second corrosion protecting coating is constituted by a conversion layer.

[0010] Since the first and the second corrosion protecting coating are constituted by different material used on different parts of the neck adapter, corrosion protecting coatings may be used with properties that are suitable for respective parts of the neck adapter. For example the first corrosion protecting coating may have a smoother surface than the second corrosion protecting coating. The second corrosion protecting coating may be chosen after other criteria than surface roughness, for example the cost for coating. Thus a neck adapter is provided that on an outer sealing surface is provided with a chromed surface, but that is corrosion protected on other surfaces with a conversion layer that is relatively simple and cheap to manufacture. Accordingly, the object mentioned above is achieved.

[0011] Neck adapters are used in a rock drilling machine to transfer rotational power, feeding and impact energy to splice bars and drilling tools. The inner surface on the neck adapter may form a through hole for through put of a flush medium. The neck adapter is suitably made of a steel material, for example hardened steel. The corrosion protecting coatings shall extend the lifetime of the neck adapter when it is exposed to corrosive attacks during operation, operation interruption and at transports.

With coating is meant a coating on at least a part of the surface of the neck adapters that has been applied on the surface in at least a process step of manufacturing of the neck adapter. For example lubricants applied for operation or mounting are not to be seen as a coating in accordance with the present invention. The through hole may be used for through flow of a flush medium, for example water, from the rock drilling machine to a drilling tool.

[0012] According to embodiments, the first corrosion protecting coating may have a smoother surface than the second corrosion protecting coating. In this way the first corrosion protecting coating may be chosen with a surface roughness to enable a seal to rest against the first part of the outer surface without exposure to the same amount of wear as if it was resting against a surface coated with the second corrosion protecting coating. The second corrosion protecting coating may be chosen by other criteria than surface roughness, for example the cost for coating.

[0013] According to embodiments, the conversion layer for example may be constituted by a phosphate layer.

[0014] According to embodiments, the conversion layer may be oiled or waxed. A conversion layer such as a phosphate layer is porous and its corrosion protecting properties may be improved with oiling or waxing.

[0015] According to embodiments, the first coating may have a surface roughness of maximum Ra 1,0 μm. The first part of the outer surface constitutes thereby a suitable surface for contact of a seal in the rock drilling machine.

[0016] According to embodiments, the conversion layer may comprise some or several of zinc phosphate, zinc manganese phosphate, or manganese phosphate.

[0017] According to embodiments, the first corrosion protecting coating may have a thickness between 20 - 150 μm. In this way a good corrosion protection of the first part of the outer surface may be obtained. In case the first corrosion protecting coating is constituted by a chromium layer, the first corrosion protecting coating may have a weight per area unit within 140 -2100 g/m^2.

[0018] According to embodiments, the second corrosion protecting coating may have a thickness between 10 - 50 μm, preferably about 30 μm. In this way a good corrosion protection of the second part of the outer surface and/or the inner surface may be obtained. In case the second corrosion protecting coating is constituted by a conversion layer comprising zinc phosphate, zinc manganese phosphate, or manganese phosphate, the second corrosion protecting coating may have a weight per area unit within 15 - 85 g/m^2, preferably about 50 g/m^2.

[0019] A thickness of a surface coating means the coating height on the neck adapter, i.e. on the material that the neck adapter is manufactured of, for example case-hardened steel. Coating height is measured for example under microscope on a cross section through a neck adapter in the area of the relevant surface. The cross section runs perpendicular to the relevant surface. If the cross section through the neck adapter is done in parts having for example a cylindrical form the cross sectional plane is at right angle to a center axis through the elongated body of the neck adapter.

[0020] According to embodiments, only the first part of the outer surface may be provided with the first corrosion protecting coating and the other surfaces of the neck adapter may be provided with the second corrosion protecting coating. In this way, firstly the first corrosion protecting coating may be applied on the neck adapter in a first process. Thereafter, in a second process, the remaining surfaces of the neck adapter simply may be provided with the second corrosion protecting coating. Since in the second process no account needs to be taken of any surfaces not to be surface treated, the second process is especially simple to perform.

[0021] According to an aspect, the present invention also relates to a rock drilling machine comprising a neck adapter according to any of the above mentioned aspects and/or the above mentioned embodiments.

[0022] According to embodiments the neck adapter is rotatably arranged in the rock drilling machine. The first part of the outer surface may constitute an abutment surface for an, in the rock drilling machine, stationary arranged seal.

[0023] According to embodiments, the rock drilling machine may be arranged to pump a liquid via a space limited by among other the seal and the first part of the outer surface, to the through hole in the neck adapter.

[0024] According to an aspect, the present invention also relates to a method for corrosion protecting a neck adapter according to any of the above mentioned aspects and/or the above mentioned embodiments. According to the method the neck adapter undergoes firstly an electrolytic process to provide the first part of the outer surface with the first corrosion protecting coating. Thereafter, the neck adapter undergoes a second process to provide the second part of the outer surface and/or the said part of the inner surface with the second corrosion protecting coating. The first process may comprise immersing of the neck adapter in a solution comprising chromium ions to coat the first part of the outer surface with a chromium layer.

[0025] According to embodiments, the second process may include application of a solution comprising phosphor acid and zinc ions, or zinc- and manganese ions, or manganese ions on the whole neck adapter. In this way firstly, the first corrosion protecting coating may be applied on the neck adapter in the first process. When the first corrosion protecting coating is constituted by for example of a chromium layer, in the second process simply the remaining surfaces of the neck adapter may be provided with the second corrosion protecting coating as the solution applied in the second process does not affect the chromium layer.

[0026] Further features and advantages of the present invention emerge from the attached claims and the following detailed description. The skilled man within the

area realizes that different features of the invention may be combined to create second embodiments other than the described below. This may be done without deviating from the scope of protection of the present invention defined by the attached claims.

SHORT DESCRIPTION OF FIGURES

[0027] Different approaches to the invention, including specific features and advantages, is shown from the following detailed description and the accompanying figures, in which: Fig. 1 and 2 show different views of a neck adapter according to embodiments,

Fig. 3 shows schematically a rock drilling machine with a neck adapter according to embodiments, and

Fig. 4 shows a method for surface treatment of a neck adapter according to embodiments.

DETAILED DESCRIPTION

[0028] The present invention will now be described more in detail with reference to the attached figures, in which examples of embodiments are shown. The invention shall not be interpreted to be limited to the described examples of embodiments. Like reference numbers in the figures refer to like elements. To simplify, well known functions and constructions will not necessarily be described in detail.

[0029] Fig. 1 and 2 show different views of a neck adapter 2 according to embodiments. The neck adapter 2 is designed to be arranged in a rock drilling machine to transfer rotational power, feeding and impact energy from the rock drilling machine to a drilling tool via splice bars. The neck adapter 2 comprises an elongated body 4. The elongated body 4 is
substantially cylindrical and made of for example hardened steel. A center axis X extends through the lengthwise direction of elongated body 4. At one end the neck adapter 2 is provided with a driving part. The driving part comprises exterior splines 6 to enable the neck adapter 2 to be rotated in the rock drilling machine. Further, the driving part comprises a hitting surface 8 to receive and transfer momentum from the drilling machine to the drilling tool. At the second end, the neck adapter 2 is provided with a fastening arrangement 10 arranged to fasten a drilling tool or a splice bar. The fastening arrangement 10 is exemplified in the form of a thread.

[0030] A through hole 12 extends through the neck adapter 2. The through hole 12 has an inlet opening 14 arranged in a part of a cylindrical outer surface 17 of the neck adapter 2. At least a part of the cylindrical surface 17 constitutes a first part of an outer surface of the elongated body 4 and thereby the neck adapter 2. The through hole 12 has an outlet opening 16 in an end surface 18 of the neck adapter 2. The through hole 12 is arranged to lead a flush medium, for example water, from the drilling machine to the splice bars and the drilling tool. The through hole 12 is in this embodiment formed in two parts with a radial hole 13, also named flush hole, and an axial hole 15.

[0031] In Fig. 2 there is shown in addition to the neck adapter 2, also a chamber 20 that encloses a part of the neck adapter 2. The chamber 20 is arranged around the neck adapter 2 in the area of the cylindrical surface 17. The chamber 20 is provided with an inlet tube 22. Thus, a flush medium may be lead via the inlet tube 22 to the chamber 20 and from there through the neck adapter 2 via the inlet opening 14, the through hole 12 and the outlet opening 16. The chamber 20 is included in a not further shown rock drilling machine and constitutes a space limited by among other two seals 24, 24' and the cylindrical surface 17 of the neck adapter 2. The two seals 24, 24' rest sealingly against the neck adapter 2 and seal against the cylindrical surface 17.

[0032] Fig. 3 shows schematically a rock drilling machine 30 with a neck adapter 2 according to embodiments. The rock drilling machine 30 comprises a drilling machine 32 from which the neck adapter 2 protrudes a bit. A number of splice bars 34 and a drilling tool 36 are connected with the neck adapter 2 and are rotated by the drilling machine 32. To transport drill cuttings from a drilling hole 38 being drilled, a flush medium is added, for example water, to the drilling tool 36 via the neck adapter 2 and the splice bars 34. The drilling machine 32 comprises a flush head 40, to which a supply conduct 42 for the flush medium connects.

[0033] When comparing Fig. 2 and 3 it is apparent that the flush head 40 comprises the chamber 20 and that the supply conduct 42 is connected to the inlet tube 22. The rock drilling machine 30 comprises a schematically shown pump 44 connected to the supply conduct 42. During operation the neck adapter 2 is rotated in the drilling machine 32 while the seals 24, 24' seal against the cylindrical surface 17 of the neck adapter 2 so that the flush medium may be pumped via the chamber 20 and the through hole 12 in the neck adapter 2 to the drilling tool 36.

[0034] The neck adapter 2 is exposed to corrosive environment inter alia during operation, at operation interruption and at transports. Especially exposed areas of the neck adapter 2 are areas in contact with the flush medium, for example on the cylindrical surface 17 in the chamber 20 and in the through hole 12. To protect the cylindrical surface 17 against corrosion, the neck adapter 2, at least in the area of the chamber 20 and the seals 24, 24' is provided with a first corrosion protecting coating in the form of a chromium layer with a thickness of about 40 μm. The chromium layer may also have a different thickness, for example within 20 - 150 μm. To ensure that the seals 24, 24' have sufficient sealing function also after long operational time, the chroming layer has a fine surface roughness. In addition to the good corrosion protection of the chromium layer, the roughness of the surface has the advantage that intervals between changing

of the seals 24, 24' may be kept relatively long. For example, the chromium layer may have a surface roughness of maximum Ra 1,0 μm. In the through hole 12 and on the end surface 18, the neck adapter 2 is provided with a second corrosion protecting coating in the form of a conversion layer. Conversion layers comprise for example some or several of zinc phosphate, zinc manganese phosphate, or manganese phosphate. Such a conversion layer is porous and is suitably oiled or waxed to obtain best possible corrosion protecting properties. The conversion layer has a thickness of between 10 - 50 μm, preferably about 30 μm. These thicknesses of a porous conversion layer comprising zinc phosphate, zinc manganese phosphate, or manganese phosphate correspond to a weight per area unit, before oiling or waxing, within 15 - 85 g/m^2, preferably about 50 g/m^2,

[0035] Alternatively the through hole 12 may be partly provided with the first corrosion protecting coating in the form of a chromium layer. For example, the neck adapter 2 as a whole or in parts of the radial hole 13 may be provided with a chromium layer and the remaining parts of the neck adapter 2 in the through hole 12, i.e. in the axial hole 15 and any remaining parts of the radial hole 13, be provided with a conversion layer.

[0036] According to an embodiment of the neck adapter 2, the cylindrical surface 17 is provided with a first corrosion protecting coating and remaining surfaces of the neck adapter 2 are provided with a second corrosion protecting coating comprising zinc phosphate, zinc manganese phosphate, and/or manganese phosphate. The remaining surfaces comprise inter alia outer surfaces such as the hitting surface 8, the surface at the fastening arrangement 10, the surface at the splines 6, the end surface 18 and an inner surface of the elongated body 4 in the through hole 2. The second corrosion protecting coating thus may easily be obtained by immersing the neck adapter 2 in a solution comprising phosphor acid, and zinc ions, or zinc- and manganese ions, or manganese ions.

[0037] Fig. 4 shows a method for surface treatment of a neck adapter 2 according to embodiments. The used reference numbers refer partly to details in the previous figures, especially Fig. 1 and 2. Between some of the method steps below, other steps may be performed such as for example cleaning from process liquids from a previous method step.

[0038] In step 50, which is optional and depends on which surface roughness the neck adapter has after previous manufacturing steps, grinding of the cylindrical surface 17 to a surface roughness of about 1 μm is done.

[0039] In step 52 masking of outer surfaces of the neck adapter 2 except for the cylindrical surface 17 is done.

- In step 54 a first process in the form of an electrolytic coating of the cylindrical surface 17 with a first corrosion protecting coating for example a chromium layer through electrolysis in a liquid comprising chromium ions is done.

[0040] In step 56 coating of remaining surfaces of the neck adapter 2 with a second corrosion protecting coating in the form of a conversion layer is done in a second process comprising immersing the neck adapter 2 in a solution comprising phosphor acid, and zinc ions, or zinc- and manganese ions, or manganese ions.

[0041] In step 58 the conversion layered is oiled or waxed.

- A step 60 may optionally be performed and comprises polishing of the cylindrical surface with the first corrosion protecting coating.

[0042] Step 60 may alternatively be performed optionally after step 54. In case of the first corrosion protecting coating being a chromium layer, before step 56 this chromium layer need not be masked.

[0043] The skilled person within the area realizes that the embodiments described above may be combined. Also different modifications are apparent to the skilled person. For example the surface of the elongated body may be coated with the first corrosion protecting coating on other parts than the first part, e.g. a second part of the outer surface may be coated with the first corrosion protecting coating. The second part of the outer surface then for example may constitute an abutment surface for another seal or a bearing seat.

[0044] Further, several parts of the inner surface may be coated with the second corrosion protecting coating. When it comes to the cylindrical surface 17 another surface roughness before and/or after coating with the first corrosion protecting coating may be enough in certain cases, for example a surface roughness of maximum Ra 2,0 μm or of maximum Ra 3,0 μm. Further, flush head 40 may be more integrated in the drilling machine 32 than according to the embodiments shown in Fig. 3. The flush head 40 may incorporate bearing members and driving force transferring parts of the drilling machine 32. Further, pump 44, shown in Fig. 3, alternatively may be separately arranged and need thus not be part of the rock drilling machine 30. Further, the solution comprising phosphor acid, and zinc ions, or zinc- and manganese ions, or manganese ions for example, may be applied to the neck adapter through spraying instead of immersing in the solution. Further, the masking mentioned in step 52 of the method shown in Fig. 4, may be obtained in several different ways. For example, two tubes may be threaded over the neck adapter so the parts that are not to be coated with the first corrosion protecting coating are covered by these tubes. Thus, the invention is not limited to the embodiments described. The invention is limited only by the scope of protection defined in the claims.

Claims

1. A neck adapter (2) for a rock drilling machine, which neck adapter (2) comprises an elongated body (4),

which elongated body (4) has an outer surface, an end surface (18) and an inner surface forming a through hole (12) extending through said elongated body between a first part (17) of said outer surface and said end surface (18), wherein said first part (17) of said outer surface is constituted by a cylindrical surface (17), which first part (17) of the outer surface is adapted to constitute a contact surface for a stationary arranged seal in the rock drilling machine, and wherein at least a part of said outer surface and a part of said inner surface (12) are provided with a corrosion protecting coating,
characterized in that said first part (17) of said outer surface is provided with a first corrosion protecting coating and a second part of said outer surface and/or at least a part of said inner surface (12) is provided with a second corrosion protecting coating, wherein said first corrosion protecting coating is constituted by a chromium layer and said second corrosion protecting coating is constituted by a conversion layer, wherein said conversion layer comprises any or several of zinc phosphate, zinc manganese phosphate, or manganese phosphate, and wherein said conversion layer is oiled or waxed.

2. The neck adapter (2) according to claim 1, wherein said first corrosion protecting coating has a smoother surface than said second corrosion protecting coating.

3. The neck adapter (2) according to any of the preceding claims, wherein said first coating has a surface roughness of maximum Ra 1,0 μm.

4. The neck adapter (2) according to any of the preceding claims, wherein said first corrosion protecting coating has a thickness between 20 - 150 pm.

5. The neck adapter (2) according to any of the preceding claims, wherein said second corrosion protecting coating has a thickness between 10 - 50 μm, preferably about 30 μm.

6. The neck adapter (2) according to any of the preceding claims, wherein only said first part of said outer surface is provided with said first corrosion protecting coating and other surfaces of said neck adapter (2) are provided with said second corrosion protecting coating.

7. A rock drilling machine (30) comprising a neck adapter (2) according to any of the claims 1-6.

8. The rock drilling machine (30) according to claim 7, wherein said neck adapter (2) is rotatably arranged in said rock drill (30) and said first part (17) of said outer surface constitutes a contact surface for an, in the rock drill (30), stationary arranged seal (24, 24').

9. The rock drilling machine (30) according to claim 8, wherein the rock drill (30) is arranged to pump a liquid, via a space delimited by among other said seal (24, 24') and said first part (17) of said outer surface, to said through hole (12) in said neck adapter (2).

10. A method for corrosion protecting of a neck adapter according to any of claims 1-6, wherein said neck adapter first undergoes an electrolytic process to provide said first part of said outer surface with said first corrosion protecting coating and thereafter undergoes a second process to provide said second part of said outer surface and/or said part of said inner surface with said second corrosion protecting coating.

11. The method according to claim 10, wherein said second process includes application of a solution comprising phosphorus acid, and zinc ions, or zinc- and manganese ions, or manganese ions on the whole neck adapter.

Patentansprüche

1. Halsadapter (2) für eine Gesteinsbohrmaschine, wobei der Halsadapter (2) einen länglichen Körper (4) umfasst, wobei der längliche Körper (4) eine äußere Oberfläche, eine Endoberfläche (18) und eine innere Oberfläche aufweist, die ein Durchgangsloch (12) bilden, das sich durch den länglichen Körper zwischen einem ersten Teil (17) der äußeren Oberfläche und der Endoberfläche (18) erstreckt, wobei der erste Teil (17) der äußeren Oberfläche durch eine zylindrische Oberfläche (17) gebildet ist, wobei der erste Teil (17) der äußeren Oberfläche angepasst ist, um eine Kontaktoberfläche für eine stationär angeordnete Dichtung in der Gesteinsbohrmaschine zu bilden, und wobei zumindest ein Teil der äußeren Oberfläche und ein Teil der inneren Oberfläche (12) mit einer Korrosionsschutzbeschichtung versehen sind,
dadurch gekennzeichnet, dass der erste Teil (17) der äußeren Oberfläche mit einer ersten Korrosionsschutzbeschichtung versehen ist und ein zweiter Teil der äußeren Oberfläche und/oder zumindest ein Teil der inneren Oberfläche (12) mit einer zweiten Korrosionsschutzbeschichtung versehen ist,
wobei die erste Korrosionsschutzbeschichtung durch eine Chromschicht gebildet ist und die zweite Korrosionsschutzbeschichtung durch eine Konversionsschicht gebildet ist,
wobei die Konversionsschicht jedes beliebige oder mehrere von Zinkphosphat, Zinkmanganphosphat oder Manganphosphat umfasst und wobei die Konversionsschicht geölt oder gewachst ist.

2. Halsadapter (2) nach Anspruch 1, wobei die erste

Korrosionsschutzbeschichtung eine glattere Oberfläche als die zweite Korrosionsschutzbeschichtung aufweist.

3. Halsadapter (2) nach einem der vorstehenden Ansprüche, wobei die erste Korrosionsschutzbeschichtung eine Oberflächenrauhigkeit von maximal Ra 1,0 μm aufweist.

4. Halsadapter (2) nach einem der vorstehenden Ansprüche, wobei die erste Korrosionsschutzbeschichtung eine Dicke zwischen 20-150 pm aufweist.

5. Halsadapter (2) nach einem der vorstehenden Ansprüche, wobei die zweite Korrosionsschutzbeschichtung eine Dicke zwischen 10-50 μm, vorzugsweise etwa 30 μm, aufweist.

6. Halsadapter (2) nach einem der vorstehenden Ansprüche, wobei nur der erste Teil der äußeren Oberfläche mit der ersten Korrosionsschutzbeschichtung versehen ist und andere Oberflächen des Halsadapters (2) mit der zweiten Korrosionsschutzbeschichtung versehen sind.

7. Gesteinsbohrmaschine (30), umfassend einen Halsadapter (2) nach einem der Ansprüche 1-6.

8. Gesteinsbohrmaschine (30) nach Anspruch 7, wobei der Halsadapter (2) drehbar in dem Gesteinsbohrer (30) angeordnet ist und der erste Teil (17) der äußeren Oberfläche eine Kontaktoberfläche für eine in dem Gesteinsbohrer (30) stationär angeordnete Dichtung (24, 24') bildet.

9. Gesteinsbohrmaschine (30) nach Anspruch 8, wobei der Gesteinsbohrer (30) angeordnet ist, um eine Flüssigkeit über einen Raum, der unter anderem durch die Dichtung (24, 24') und den ersten Teil (17) der äußeren Oberfläche begrenzt wird, zu dem Durchgangsloch (12) in dem Halsadapter (2) zu pumpen.

10. Verfahren zum Korrosionsschutz eines Halsadapters nach einem der Ansprüche 1-6, wobei der Halsadapter zuerst einem elektrolytischen Prozess unterzogen wird, um den ersten Teil der äußeren Oberfläche mit der ersten Korrosionsschutzbeschichtung zu versehen und danach einem zweiten Prozess unterzogen wird, um den zweiten Teil der äußeren Oberfläche und/oder den Teil der inneren Oberfläche mit der zweiten Korrosionsschutzbeschichtung zu versehen.

11. Verfahren nach Anspruch 10, wobei der zweite Prozess ein Aufbringen einer Lösung, die phosphorhaltige Säure und Zinkionen oder Zink- und Manganionen oder Manganionen umfasst, auf dem gesamten Halsadapter aufweist.

Revendications

1. Adaptateur à col (2) pour une perforatrice de roche, lequel adaptateur à col (2) comprend un corps allongé (4), lequel corps allongé (4) présente une surface extérieure, une surface d'extrémité (18) et une surface intérieure formant un trou débouchant (12) s'étendant au travers dudit corps allongé entre une première partie (17) de ladite surface extérieure et ladite surface d'extrémité (18), dans lequel ladite première partie (17) de ladite surface extérieure est constituée par une surface cylindrique (17), laquelle première partie (17) de la surface extérieure est adaptée pour constituer une surface de contact pour un joint agencé de manière stationnaire dans la perforatrice de roche,
et dans lequel au moins une paire de ladite surface extérieure et une partie de ladite surface intérieure (12) sont dotées d'un revêtement de protection contre la corrosion, **caractérisé en ce que** ladite première partie (17) de ladite surface extérieure est dotée d'un premier revêtement de protection contre la corrosion et une seconde partie de ladite surface extérieure et/ou au moins une partie de ladite surface intérieure (12) est dotée d'un second revêtement de protection contre la corrosion,
dans lequel ledit premier revêtement de protection contre la corrosion est constitué par une couche de chrome et ledit second revêtement de protection contre la corrosion est constitué par une couche de conversion, dans lequel ladite couche de conversion comprend l'un quelconque ou plusieurs parmi le phosphate de zinc, phosphate de manganèse de zinc, ou phosphate de manganèse, et dans lequel ladite couche de conversion est huilée ou cirée.

2. Adaptateur à col (2) selon la revendication 1, dans lequel ledit premier revêtement de protection contre la corrosion présente une surface plus lisse que ledit second revêtement de protection contre la corrosion.

3. Adaptateur à col (2) selon l'une quelconque des revendications précédentes, dans lequel ledit premier revêtement présente une rugosité de surface de maximum Ra 1,0 μm.

4. Adaptateur à col (2) selon l'une quelconque des revendications précédentes, dans lequel ledit premier revêtement de protection contre la corrosion présente une épaisseur entre 20 à 150 pm.

5. Adaptateur à col (2) selon l'une quelconque des revendications précédentes, dans lequel ledit second revêtement de protection contre la corrosion présente une épaisseur entre 10 à 50 μm, de préférence

d'environ 30 μm.

6. Adaptateur à col (2) selon l'une quelconque des revendications précédentes, dans lequel seule ladite première partie de ladite surface extérieure est dotée dudit premier revêtement de protection contre la corrosion et d'autres surfaces dudit adaptateur à col (2) sont dotées dudit second revêtement de protection contre la corrosion.

7. Perforatrice de roche (30) comprenant un adaptateur à col (2) selon l'une quelconque des revendications 1 à 6.

8. Perforatrice de roche (30) selon la revendication 7, dans laquelle ledit adaptateur à col (2) est agencé de manière à pouvoir tourner dans ladite perforatrice de roche (30) et ladite première partie (17) de ladite surface extérieure constitue une surface de contact pour un joint (24, 24') agencé de manière stationnaire dans la perforatrice de roche (30).

9. Perforatrice de roche (30) selon la revendication 8, dans laquelle la perforatrice de roche (30) est agencée pour pomper un liquide, via un espace délimité parmi un autre dit joint (24, 24') et ladite première partie (17) de ladite surface extérieure, vers ledit trou débouchant (12) dans ledit adaptateur à col (2).

10. Procédé de protection contre la corrosion d'un adaptateur à col selon l'une quelconque des revendications 1 à 6, dans lequel ledit adaptateur à col subit en premier lieu un processus électrolytique pour doter ladite première partie de ladite surface extérieure dudit premier revêtement de protection contre la corrosion et subit ensuite un second processus pour doter ladite seconde partie de ladite surface extérieure et/ou ladite partie de ladite surface intérieure dudit second revêtement de protection contre la corrosion.

11. Procédé selon la revendication 10, dans lequel ledit second processus inclut l'application d'une solution comprenant de l'acide phosphorique, et des ions de zinc, ou des ions de zinc et de manganèse, ou des ions de manganèse sur l'adaptateur à col entier.

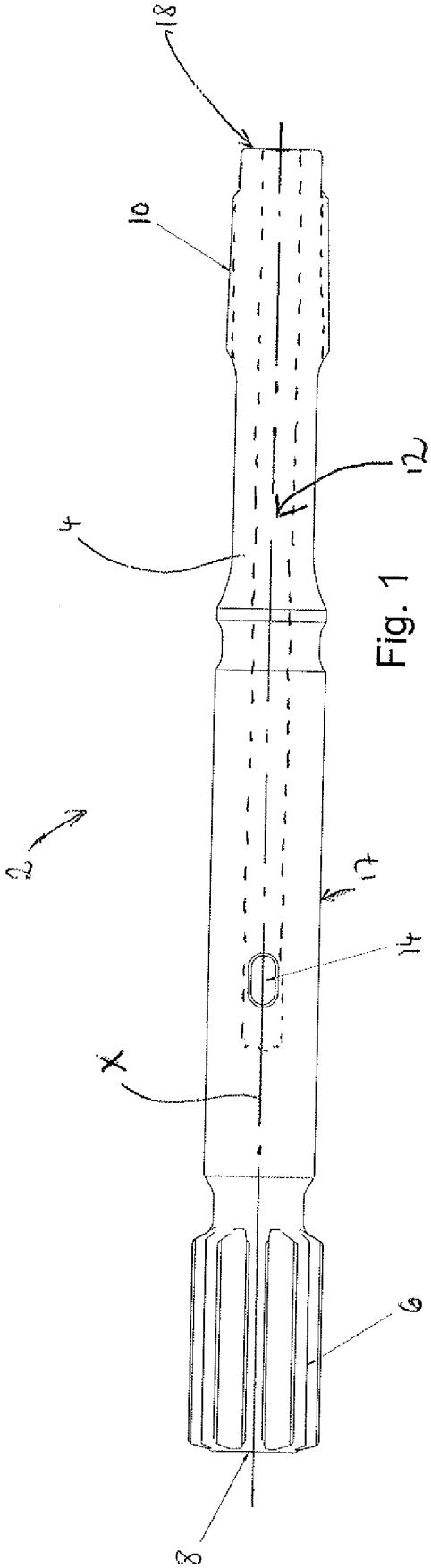

Fig. 1

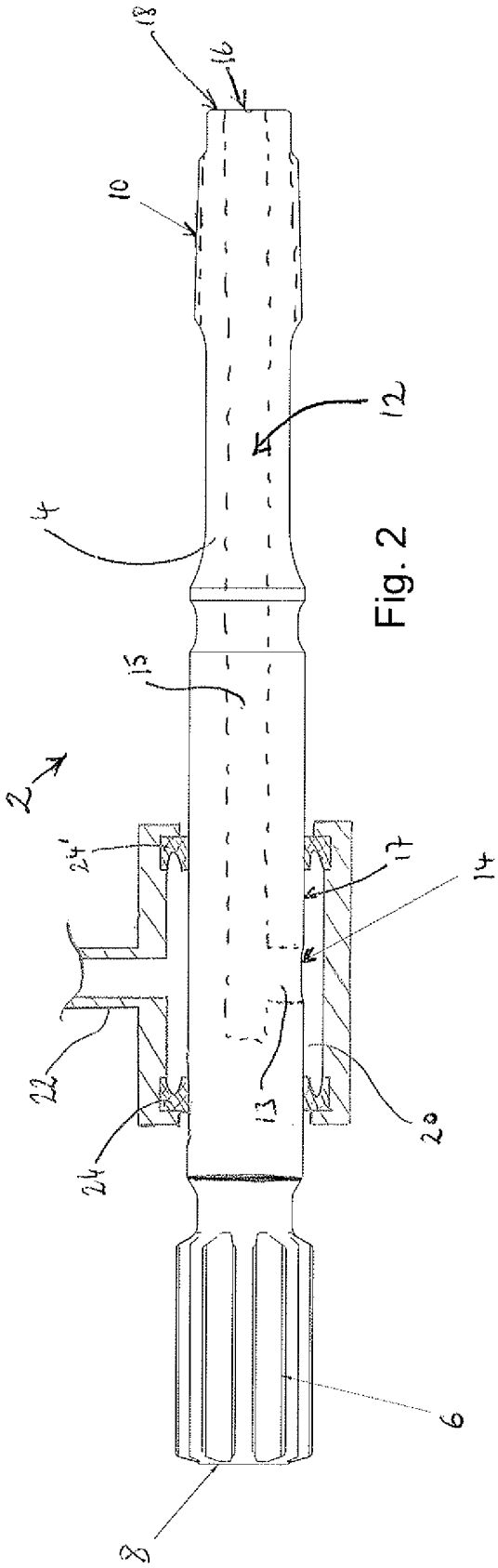

Fig. 2

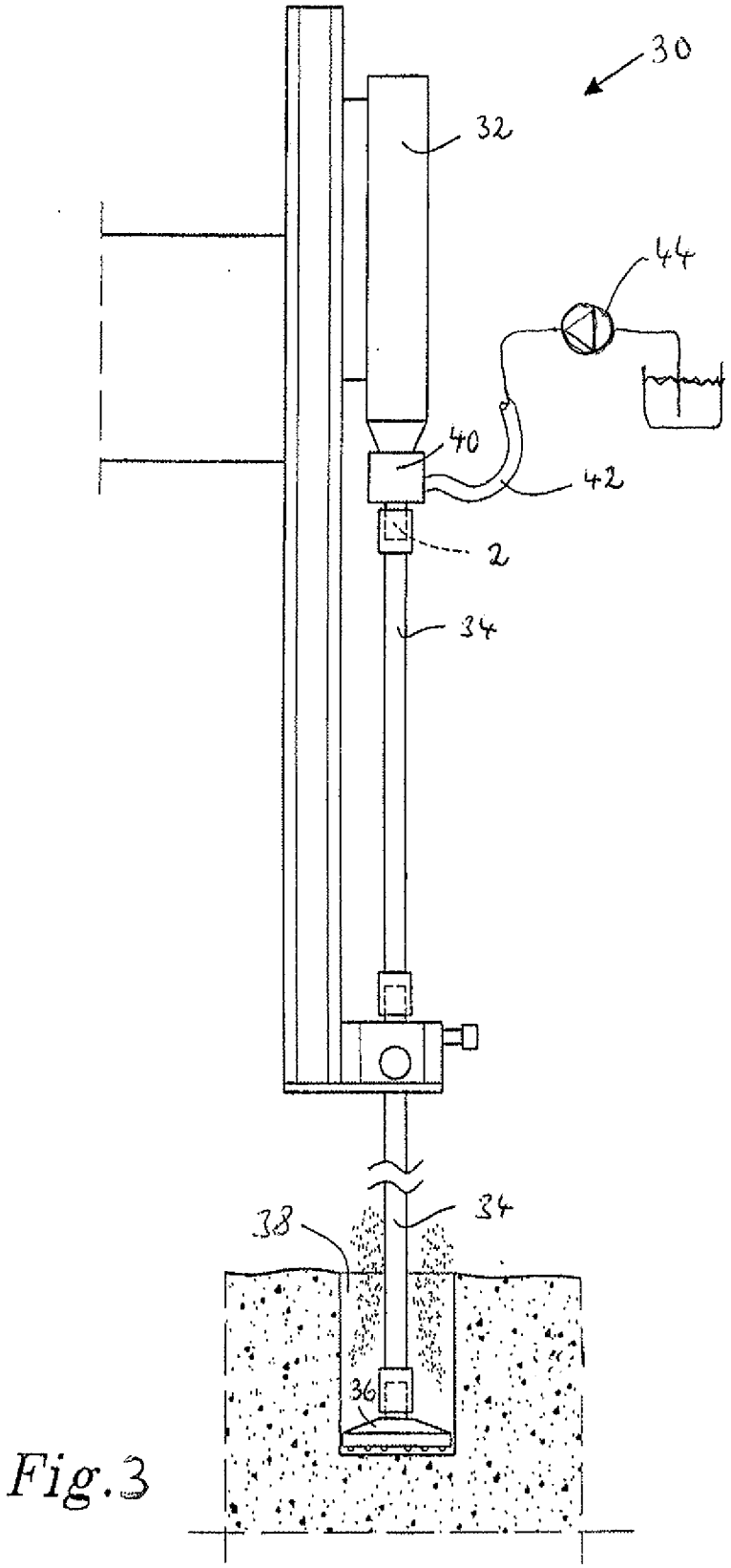

Fig.3

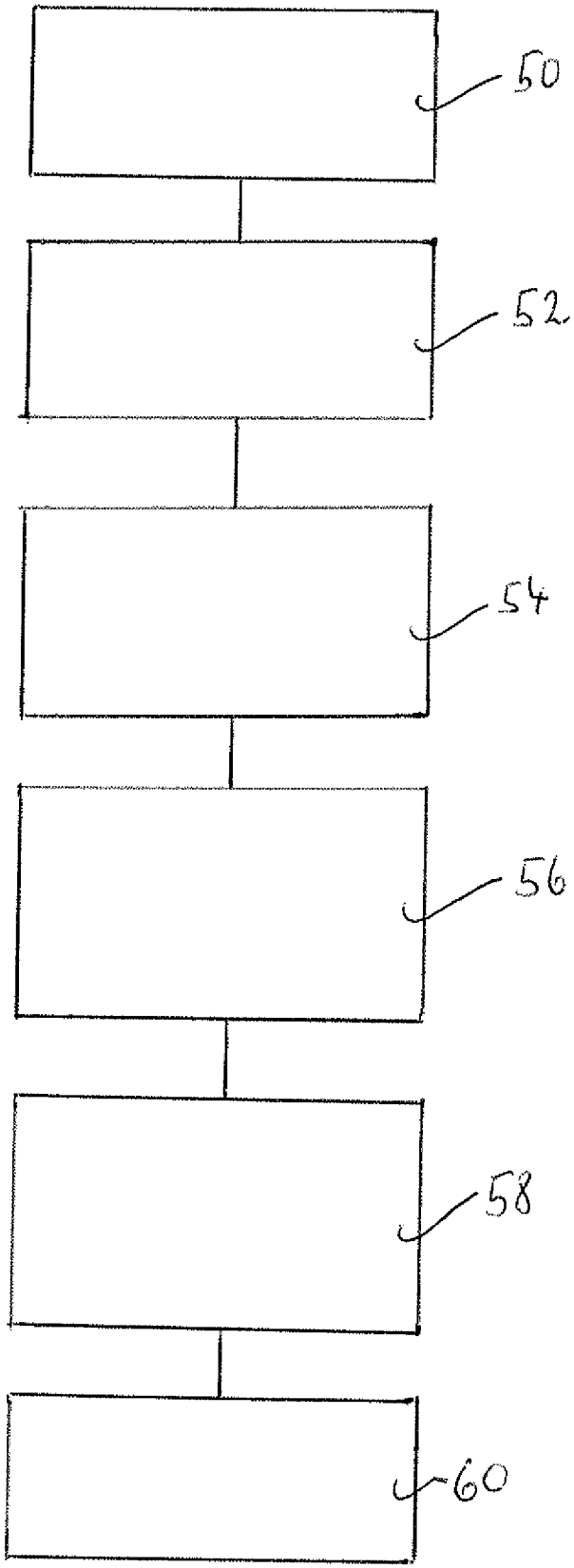

Fig. 4

REFERENCES CITED IN THE DESCRIPTION

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Patent documents cited in the description

- WO 2003078788 A1 **[0005]**
- US 6109620 A **[0007]**