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(54) **Protection device**

(57) There is provided a swaging tool head protection device, comprising a cap 102, 104 arranged to encapsulate a swaging tool head, the cap 102, 104 comprising at least one aperture to permit the passage of a workpiece

into the swaging tool head and arranged such that in the event of a failure of the swaging tool head, the cap 102, 104 acts to shield an operator from debris and/or sharp edges caused by failure of the swaging tool head.

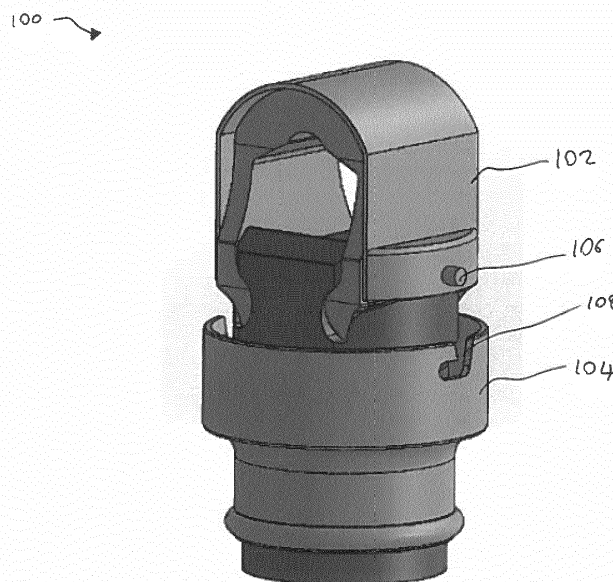


Figure 2

Description

FIELD OF THE INVENTION

[0001] The present invention relates to a protection device. In particular, the present invention relates to a swaging tool head protection device.

BACKGROUND OF THE INVENTION

[0002] In many applications and in many industries, it is necessary to attach fittings to pipes, cables, wire ropes and the like, in order to provide the necessary connectivity and functionality to the pipes/cables. In order to attach fittings to pipes, cables, wire ropes and the like, it is known to use a swaging tool. Swaging tools are typically mechanical tools or hydraulic tools that act to compress and conform a fitting onto a pipe/cable by deforming the fitting around the pipe/cable. In order for a swaging tool to achieve the secure attachment of a fitting to a pipe/cable, it is necessary for the swaging tool to apply large forces to the fitting to provide the desired levels of deformation of the fitting around the pipe/cable. For example, in a hydraulic swaging tool, it is necessary for the tool to be operated at large hydraulic pressures that may be of the order of a few hundred pound-force per square inch (psi) to a few thousand psi. It is known to operate a swaging tool at pressures up to 10000 psi.

[0003] When operated at high pressures, there is the possibility that the swaging tool head may fail, which may result in fragmentation of the tool head. Failure of the tool head can be extremely dangerous to the operator of the tool head, who is typically holding the tool head during operation.

[0004] It is therefore desirable to provide a protection device for a swaging tool head that provides protection for an operator of the swaging tool in the event of a failure.

SUMMARY OF INVENTION

[0005] According to a first aspect of the invention, there is provided a swaging tool head protection device, comprising: a cap arranged to encapsulate a swaging tool head, the cap comprising at least one aperture to permit the passage of a workpiece into the swaging tool head and arranged such that in the event of a failure of the swaging tool head, the cap acts to shield an operator from debris and/or sharp edges caused by failure of the swaging tool head.

[0006] The cap may comprise a first protection portion; and a second protection portion removably engageable to the first protection portion.

[0007] The first protection portion may comprise at least one projection and the second protection portion may comprise at least one recess for receiving the at least one projection. The at least one recess may comprise a first recess portion into which the at least one projection can be linearly received and a second recess

portion into which the at least one projection can be rotationally received. The at least one projection can be retained in the second recess portion so as to maintain the position of the first protection portion relative to the second protection portion.

[0008] The swaging tool head protection device may be for use with a swaging tool head comprising a first deformation member movable relative to a second deformation member and a support member arranged to retain the first and second deformation members in an operational orientation, and wherein when the swaging tool head protection device is in use with the swaging tool head and the first protection portion is engaged with the second protection portion, the first protection portion may be arranged to cover at least a portion of a surface of the second deformation member.

[0009] The swaging tool head protection device may be for use with a swaging tool head comprising a first deformation member movable relative to a second deformation member and a support member arranged to retain the first and second deformation members in an operational orientation, and wherein when the swaging tool head protection device is in use with the swaging tool head and the first protection portion is engaged with the second protection portion, the second protection portion may be arranged to engage with and cover at least a portion of a surface of the support member.

[0010] Engagement of the second protection portion with the support member and with the first protection portion may restricts movement of the first and second protection portions relative to the swaging tool head, such that in the event of a failure of the swaging tool head, the first and second protection portions act to shield an operator from debris and/or sharp edges caused by failure of the swaging tool head.

[0011] The second protection portion may be shaped so as to engage with the swaging tool head.

[0012] The second protection portion may comprise an engagement portion arranged to engage with the swaging tool head. The engagement portion may comprise a bead arranged to contact the swaging tool head.

[0013] The cap may be integrally formed with the swaging tool head.

[0014] The cap may be manufactured from one or more materials comprising metal, composite materials and/or plastics materials. The cap may be manufactured from one or more materials comprising stainless steel, titanium and/or carbon reinforced composite materials.

[0015] The swaging tool head protection device may be for use with a radial swaging tool.

[0016] The swaging tool head protection device may be for use with an axial swaging tool.

[0017] According to a second aspect of the invention, there is provided a swaging tool head protection device for a swaging tool head comprising a first deformation member movable relative to a second deformation member and a support member arranged to retain the first and second deformation members in an operational ori-

entation, the swaging tool head protection device comprising: a first protection portion; and a second protection portion removably engageable to the first protection portion, wherein when the swaging tool head protection device is in use with a swaging tool head and the first protection portion is engaged with the second protection portion, the first protection portion is arranged to cover at least a portion of a surface of the second deformation member, the second protection portion is arranged to engage with and cover at least a portion of a surface of the support member, and wherein engagement of the second protection portion with the support member and with the first protection portion restricts movement of the first and second protection portions relative to the swaging tool head, such that in the event of a failure of the swaging tool head, the first and second protection portions act to shield an operator from debris and/or sharp edges caused by failure of the swaging tool head.

BRIEF DESCRIPTION OF THE DRAWINGS

[0018] Embodiments of the present invention will now be described, by way of example only, with reference to the accompanying drawings, of which:

Figure 1 shows a swaging tool head;

Figure 2 shows the swaging tool head protection device according to an embodiment of the invention;

Figure 3 shows the swaging tool head protection device according to an embodiment of the invention; and

Figure 4 shows a cross section of the swaging tool head protection device according to an embodiment of the invention.

DETAILED DESCRIPTION OF THE INVENTION

[0019] Figure 1 shows a known radial swaging tool head 10, generally comprising a yoke section 12, a cylinder section 14 and a hydraulic hose 16 for supplying hydraulic fluid to the swaging tool head. The yoke 12 comprises a first deformation member 18 and a second deformation member 20. The cylinder section 14 acts as a support member to retain the first deformation member 18 and a second deformation member 20 in an operational orientation. As can be seen in Figure 1, an aperture 22 is formed between the first deformation member 18 and a second deformation member 20 for receiving a workpiece. A workpiece generally comprises a pipe or cable and an associated fitting that is to be applied to the pipe or cable.

[0020] In use, the second deformation member 20 may be removed from the support member 14 to ease insertion of the workpiece. The second deformation member 20 is then securely engaged to the support member 14

by sliding the projections 24 of the second deformation member 20 into the recesses 24 of the support member 14. In order to attach a fitting to a pipe or cable, a hydraulic force is applied to the tool head that causes the first deformation member 18 to move towards the second deformation member 20, thereby reducing the diameter of the aperture 22. The action of the first deformation member moving towards the second deformation member will act to compress and deform a fitting onto the pipe or cable located within the aperture. Once the desired force has been applied to the fitting and pipe or cable, the first deformation member 18 is moved away from the second deformation member and the pipe or cable with attached fitting can be removed from the tool head.

[0021] The first and second deformation members 18, 20 apply large forces to workpieces and failure of tool head 10 has been known to occur. A failure may take the form of a failure of the yoke 12 causing fragments of the yoke to become projectiles. This is dangerous to operators of the tool head, who may be hit by the debris caused as the result of a failure of the yoke. A failure may also take the form of the cylinder 14 shearing and cracking leaving sharp edges on the tool head. This is dangerous to operators of the tool head 10, who generally hold the cylinder 14 while operating the tool head. Such a failure may cause harm to the hand of an operator should such a failure occur.

[0022] Figures 2 and 3 show a swaging tool head protection device 100 according to an embodiment of the invention together with a swaging tool head similar to that described above in relation to Figure 1. It should be noted that in Figures 2 and 3, the first deformation member of the swaging tool head is not shown.

[0023] As can be seen in Figures 2 and 3, the swaging tool head protection device 100 comprises a cap that generally encapsulates the tool head. The cap is arranged such that in the event of a failure of the swaging tool head, the cap acts to shield an operator from debris and/or sharp edges caused by failure of the swaging tool head.

[0024] The cap comprises a first protection portion 102 and a second protection portion 104. The first protection portion 102 comprises two apertures to permit the passage of a workpiece into the swaging tool head. Although the figures show two apertures provided, it should be appreciated that in certain applications, only a single aperture may be needed in the first protection portion in order to allow access of the workpiece to the swaging tool head. The first protection portion 102 is arranged to surround the second deformation member of the swaging tool head in the direction in which failure of the tool head is most likely to occur.

[0025] The second protection portion 104 is arranged to surround the cylinder section of the swaging tool head at the end of the cylinder closest to the yoke. As can be seen in Figure 3, the second protection portion 104 may also cover lower portions of the first and second deformation members of the swaging tool head.

[0026] The first protection portion may be detachably engagable to second protection portion. This detachable engagement may be provided by providing one or more projections 106 on the first protection portion 102 that can be received in one of more recesses on the second protection portion 104. Two projections 106 and corresponding recesses are shown in Figures 1 and 2, but it should be appreciated that one projection and recess or a plurality of projections and recesses may be provided.

[0027] The first protection portion 102 can be attached to the second protection portion 104 by inserting the projections 106 linearly into a first portion of the recesses 108 and then rotating the projections 106 into a second portion of the recesses 108. The projections 106 can be retained in the second portion of the recesses 108 so as to maintain the position of the first protection portion 102 relative to the second protection portion 104.

[0028] In use, the second protection portion 104 is arranged to contact a shoulder of the swaging tool head. This engagement with the shoulder of the swaging tool head restricts the upward movement of the second protection 104. Therefore, when the swaging tool head protection device is in use with a swaging tool head and the first protection portion 102 is engaged with the second protection portion 104, engagement of the second protection portion with the cylinder of the swaging tool head and with the first protection portion restricts movement of the first and second protection portions relative to the swaging tool head, such that in the event of a failure of the swaging tool head, the first and second protection portions act to shield an operator from debris and/or sharp edges caused by failure of the swaging tool head.

[0029] In use, the second protection portion 104 is located in the area of the swaging tool head that is normally held by the hand of an operator. Therefore, an additional or integral surface (not shown) may be provided on the second protection portion 104 in order to improve operator comfort and reliability of grip of the swaging tool head. This cover or sleeve may be an additional rubberised coating or a milled/etched surface provided on the second protection portion 104.

[0030] Figure 4 shows a cross section of the swaging tool head protection device according to an embodiment of the invention. As can be seen in Figure 4, the second protection device 104 may be provided with an engagement portion 110 that is arranged to circumferentially engage with the cylinder of the swaging tool. The engagement portion may comprise a bead 110. The bead may be made of material that inhibits the movement of the second protection portion along the cylinder of the swaging tool head.

[0031] The first and second protective portions may be made of stainless steel, titanium, carbon fibre or any combination thereof. It should be appreciated that the first and second protective portions may be made of any suitable metal, composite or plastics material.

[0032] Although the above describes embodiments of the invention in relation to use with a radial swaging tool,

it should be appreciated that embodiments of the invention may be equally applicable to an axial swaging tool. In a similar way as described above, for use with an axial swaging tool, a cap may be provided that encapsulates a swaging tool head, the cap comprising at least one aperture to permit the passage of a workpiece into the swaging tool head and arranged such that in the event of a failure of the swaging tool head, the cap acts to shield an operator from debris and/or sharp edges caused by failure of the swaging tool head. The cap may comprise a first protection part arranged to cover the deformation portions in the direction in which a failure is most likely to occur and a second protection part arranged to cover the part a user generally holds on to. As with the radial swaging tool, the first and second protection parts may be detachably engaged.

[0033] Although the above describes the swaging tool head protection device as two portions that are separate from the swaging tool head, it should be appreciated that the swaging tool head protection device may be implemented as a single member engageable to the swaging tool. Further, it should be appreciated that the swaging tool head protection device may be integrated into the swaging tool itself. For example, the first protection portion may be moulded integrally to the second deformation member. Similarly, the second protection portion may be integrally moulded to the cylinder of the swaging tool head.

Claims

1. A swaging tool head protection device, comprising:

a cap arranged to encapsulate a swaging tool head, the cap comprising at least one aperture to permit the passage of a workpiece into the swaging tool head and arranged such that in the event of a failure of the swaging tool head, the cap acts to shield an operator from debris and/or sharp edges caused by failure of the swaging tool head.

2. A swaging tool head protection device according to claim 1, wherein the cap comprises:

a first protection portion; and
a second protection portion removably engageable to the first protection portion,
wherein the first protection portion comprises at least one projection and the second protection portion comprises at least one recess for receiving the at least one projection.

3. A swaging tool head protection device according to claim 2, wherein the at least one recess comprises a first recess portion into which the at least one projection can be linearly received and a second recess

portion into which the at least one projection can be rotationally received.

4. A swaging tool head protection device according to claim 3, wherein the at least one projection can be retained in the second recess portion so as to maintain the position of the first protection portion relative to the second protection portion.
5. A swaging tool head protection device according to any of claims 2 to 4, wherein the swaging tool head protection device is for use with a swaging tool head comprising a first deformation member movable relative to a second deformation member and a support member arranged to retain the first and second deformation members in an operational orientation, and wherein when the swaging tool head protection device is in use with the swaging tool head and the first protection portion is engaged with the second protection portion, the first protection portion is arranged to cover at least a portion of a surface of the second deformation member.
6. A swaging tool head protection device according to any of claims 2 to 5, wherein the swaging tool head protection device is for use with a swaging tool head comprising a first deformation member movable relative to a second deformation member and a support member arranged to retain the first and second deformation members in an operational orientation, and wherein when the swaging tool head protection device is in use with the swaging tool head and the first protection portion is engaged with the second protection portion, the second protection portion is arranged to engage with and cover at least a portion of a surface of the support member.
7. A swaging tool head protection device according to claim 6, wherein engagement of the second protection portion with the support member and with the first protection portion restricts movement of the first and second protection portions relative to the swaging tool head, such that in the event of a failure of the swaging tool head, the first and second protection portions act to shield an operator from debris and/or sharp edges caused by failure of the swaging tool head.
8. A swaging tool head protection device according to any of claims 2 to 7, wherein the second protection portion is shaped so as to engage with the swaging tool head.
9. A swaging tool head protection device according to any of claims 2 to 8, wherein the second protection portion comprises an engagement portion arranged

to engage with the swaging tool head.

10. A swaging tool head protection device according to claim 9, wherein the engagement portion comprises a bead arranged to contact the swaging tool head.
11. A swaging too head protection device according to any preceding claim, wherein the cap is integrally formed with the swaging tool head.
12. A swaging tool head protection device according to any preceding claim, wherein the cap is manufactured from one or more materials comprising metal, composite materials and/or plastics materials.
13. A swaging tool head protection device according to any preceding claim, wherein the cap is manufactured from one or more materials comprising stainless steel, titanium and/or carbon reinforced composite materials.
14. A swaging tool head protection device according to any preceding claim, wherein the swaging tool head protection device is for use with a radial swaging tool or an axial swaging tool.
15. A swaging tool head protection device for a swaging tool head comprising a first deformation member movable relative to a second deformation member and a support member arranged to retain the first and second deformation members in an operational orientation, the swaging tool head protection device comprising:
 - a first protection portion; and
 - a second protection portion removably engageable to the first protection portion, wherein when the swaging tool head protection device is in use with a swaging tool head and the first protection portion is engaged with the second protection portion, the first protection portion is arranged to cover at least a portion of a surface of the second deformation member, the second protection portion is arranged to engage with and cover at least a portion of a surface of the support member, and wherein engagement of the second protection portion with the support member and with the first protection portion restricts movement of the first and second protection portions relative to the swaging tool head, such that in the event of a failure of the swaging tool head, the first and second protection portions act to shield an operator from debris and/or sharp edges caused by failure of the swaging tool head.

