Oct. 14, 1969 T. O. AHO 3,471,904

SEALED FLEXIBLE STRAND ASSEMBLY AND FITTING

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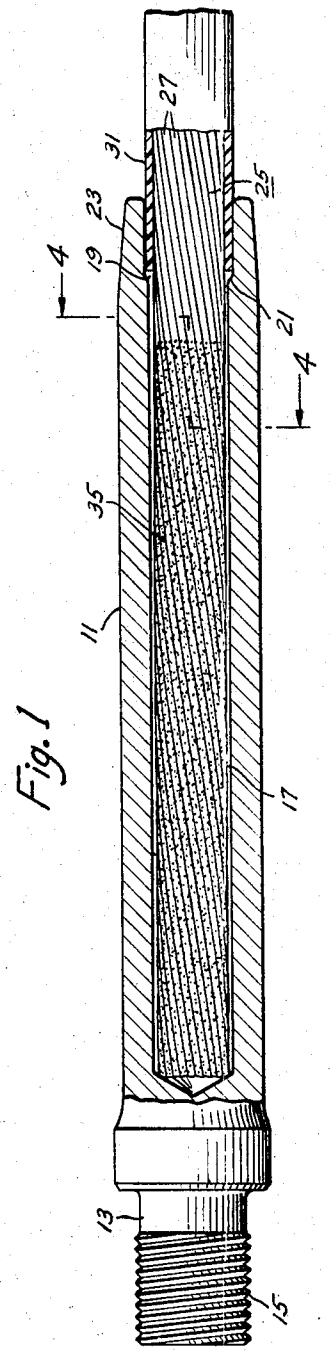


Fig. 1

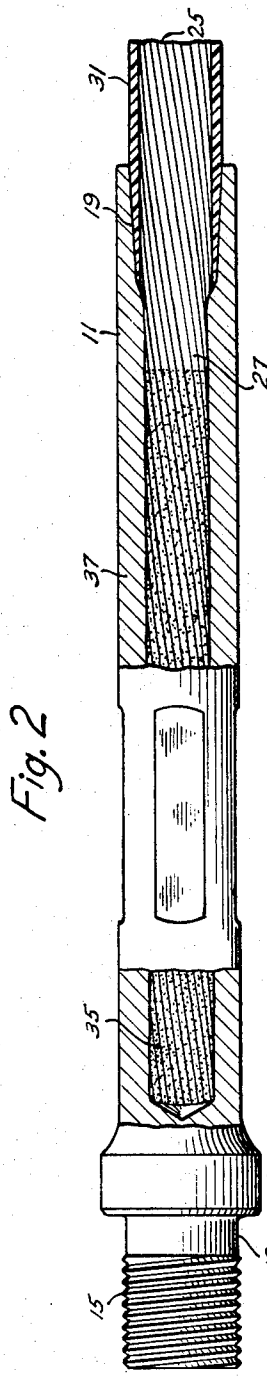


Fig. 2

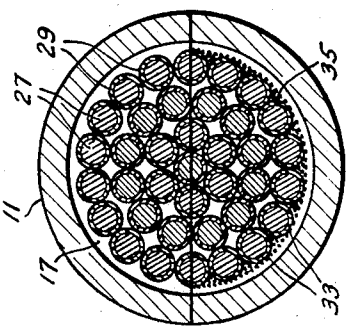


Fig. 4

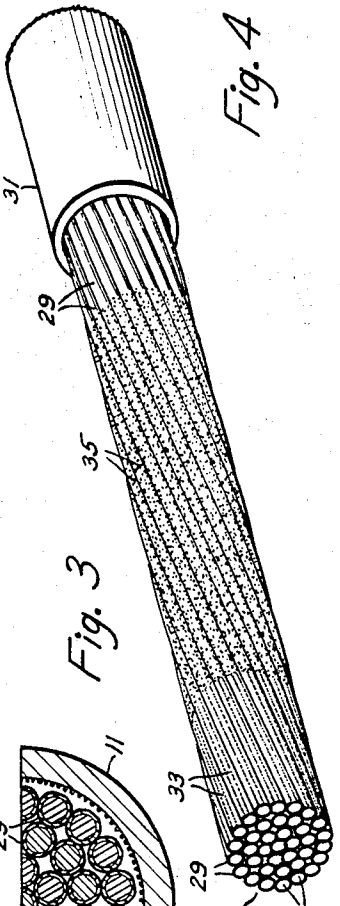


Fig. 3

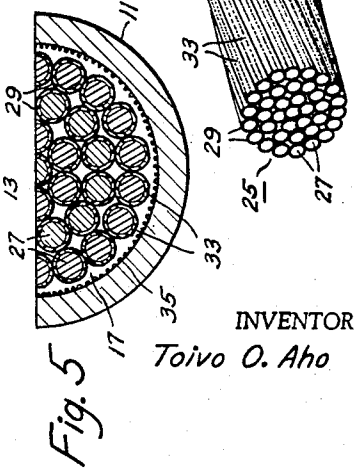


Fig. 5

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SEALED FLEXIBLE STRAND ASSEMBLY AND FITTING

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U.S. Cl. 24—122.3 3 Claims

ABSTRACT OF THE DISCLOSURE

A steel compression sleeve having an internal bore for reception of a wire cable, a larger bore at the end for the reception of a plastic covering on the cable and a calculated wall taper over the larger bore when compressed on the cable provides a tight, evenly flexible liquid seal.

This invention relates to fittings for plastic coated wire strand, and more particularly to fittings for flexible plastic coated pumping strand for use in oil wells and the like.

Flexible strand comprising a bundle of individually nylon coated wires surrounded by an outer nylon jacket has been proposed for various uses including flexible pumping strand for oil wells. For such purpose it is necessary to provide a fitting on the end of the strand for the attachment of apparatus such as a pump. Compression fittings have been used an difficulty has been encountered in obtaining a secure grip on the strand and a corrosion proof joint between the outer nylon jacket and the fitting.

It is an object of the present invention, therefore, to provide a flexible strand assembly which is both strong and corrosion proof.

It is a further object of this invention to provide an economical easily applied fitting for plastic coated strand which will cooperate with the strand to form a strong unitary corrosion proof flexible strand assembly.

I have discovered that the foregoing objects can be attained by providing a compression fitting having a particular shape and specially designed taper which when compressed on a plastic coated strand provides a secure corrosion proof bond with the plastic coating of the strand.

Referring to the drawings:

FIGURE 1 is a section through a compression fitting according to the present invention after placement of the fitting over the end of a plastic coated strand but prior to compression to secure the two elements together.

FIGURE 2 is a view partially in section of the fitting shown in FIGURE 1 after compression.

FIGURE 3 is an isometric view of the end of the plastic coated strand prepared for insertion into the fitting shown in FIGURE 1.

FIGURE 4 is a sectional view along 4—4 of FIGURE 1.

FIGURE 5 is a lower half section of an alternate arrangement.

In FIGURE 1 is shown a steel compression fitting **11** having an attachment **13** at one end with threads **15** for attachment to some apparatus. Fitting **11** has an internal orifice **17** and an enlargement **19** in the orifice separated by a shoulder **21** defined by smooth convex and concave radii. The end of the fitting **11** has a taper **23** over the enlargement **19** and preferably extending partially beyond orifice **17**. One end of a strand **25** comprised of a plurality of wires **27** having plastic coatings **29** and an outer plastic sheath **31** is prepared as shown in FIGURE 3 by removing outer sheath **31** from a predetermined length of the end of the strand **25** and at least partially removing the plastic coating from the outer circumference of the wires **27** for a predetermined distance on the end of the outer circumference of the strand **25** by sanding or other suitable expedient to form thin or even discontinuous plastic

coating portions **33**. A coating of abrasive particles **35** is then adhered to these portions with any suitable adhesive. In FIGURE 3 the extreme end of the strand is shown without abrasive particles **35** in order to more clearly indicate portions **33** of wires **27** from which plastic coating **29** has been partially removed. The abrasive particles **35** should be kept away from the edge of sheath **31** for at least approximately one half inch.

The prepared end of strand **25** is inserted into orifice **17** of fitting **11** as shown in FIGURE 1. Abrasive particles **35** as shown in FIGURE 1 are approximately one half inch away from shoulder **21** in order to avoid premature fatigue failure of the assembly. The thickness of the tapered wall of the enlargement **21** of orifice **17** should at its inner end be from 75% to 95% of the thickness of the walls of the fitting over bore **17** immediately beyond the taper, and adjacent its outer end be from 50% to 70% of the thickness of the walls of the fitting over bore **17** immediately beyond the taper. The heavier wall thickness should be at least 10% greater than the thinner wall thickness. It has been found that these dimensions are critical if balling or extrusion of the plastic sheath, and a consequent poor seal between fitting **11** and sheath **31**, is to be avoided when the fitting is compressed.

When the fitting **11** is compressed as shown in FIGURE 2 the taper **23** upon the outside of the fitting is in effect transferred to the inside of the enlargement **19** and the wall thickness of the enlargement **19** over sheath **31** may range at its inner end from 70% to 90% of the thickness of the compressed wall thickness of the main body portion **37** immediately beyond the original tapered portion, to 45% to 65% of such main body wall thickness at the outer end of enlargement **19** over sheath **31**. Shoulder **21** is extended out into a smooth bell shape as shown in FIGURE 2 after compression of the fitting. FIGURE 5 shows an alternate embodiment of the invention wherein the abrasive particles are adhered to the wall of the fitting before compression rather than to the surface of the strand.

I claim:

1. A compression fitting for a flexible strand having a plastic sheath comprising:

(a) an elongated steel body member having a cylindrical internal orifice having compressible walls of substantially uniform thickness for the receipt of a flexible strand,

(b) a substantially cylindrical enlargement in the internal orifice at one end of the elongated body member extending to the effective terminal end of said member, said enlargement constiuting a recess for the receipt of a flexible plastic coating on the exterior of the flexible strand;

(c) the wall of the enlarged recess in the end of the fitting being tapered and having a thickness at its inner end equal to 75% to 95% of the thickness of the wall of the internal orifice immediately adjacent the tapered portion and having a thickness at its terminal end equal to 50% to 70% of said thickness of the walls of the orifice immediately adjacent the tapered portion, the heavier thickness being at least 10% heavier than the thinner wall thickness,

(d) said fitting being adapted to be compressed on an unsheathed end of the flexible strand and upon a portion of the plastic sheath remaining within the cylindrical enlargement to provide a superior corrosion tight seal with the plastic sheath.

2. A compression fitting for a flexible strand having a plastic sheath comprising:

(a) an enlarged steel body member having an attachment means at one end for detachably securing to a fitting and a cylindrical internal orifice having com-

pressible walls of substantially uniform thickness for the receipt of a flexible strand,

(b) a substantially cylindrical enlargement in the internal orifice at the opposite end of the elongated body member from said attachment means extending to the effective terminal end of said member, said enlargement constiuting a recess for the receipt of a plastic coating on the exterior of the flexible strand,

(c) the wall of the enlarged recess in the end of fitting being tapered, the taper extending beyond the enlargement, and having a thickness at its inner end equal to 75% to 95% of the thickness of the wall of the internal orifice immediately adjacent the tapered portion and having a thickness at its terminal end equal to 50% to 70% of said thickness of the walls of the orifice immediately adjacent the tapered portion, the heavier wall thickness being at least 10% heavier than the thinner wall thickness,

(d) said fitting being adapted to be compressed on an unsheathed end of the flexible strand and upon a portion of the plastic sheath remaining within the cylindrical enlargement to provide a superior corrosion tight seal with the plastic sheath.

3. A flexible strand assembly comprising:

(a) a plurality of nylon coated wires forming a strand,

(b) a nylon outer sheath surrounding the plurality of nylon coated wires and terminating short of the end of the strand,

(c) an alloy steel fitting compressed on said end of said strand,

(d) said fitting having a main body portion with a cylindrical internal orifice and walls of substantially uniform thickness compressed to securely engage the plurality of nylon coated wires beyond said nylon

outer sheath and a tapered end portion with substantially conical internal dimensions extending to the effective terminal end of said member compressed to securely engage the nylon outer sheath,

(e) the thickness of the tapered portion at its inner end being equal to 70% to 90% of the thickness of the wall of the main body portion and being equal at its terminal end to 45% to 65% of said thickness of the wall of the main body portion, the heavier wall thickness being at least 10% heavier than the thinner wall thickness,

(f) abrasive particles located between the wires and the main body portion of the fitting and spaced from the tapered portion, said abrasive particles securing the wires from movement with respect to the fitting,

(g) said tapered end portion of said fitting providing a superior corrosion tight seal with said nylon outer sheath.

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BERNARD A. GELAK, Primary Examiner

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24—115, 123; 174—79, 90; 287—78