Nov. 10, 1942. W. A. ABEGG 2,301,495

METHOD AND MEANS OF RENEWING THE SHOULDERS OF A TOOL JOINT

Filed April 8, 1939

Fig. 1.

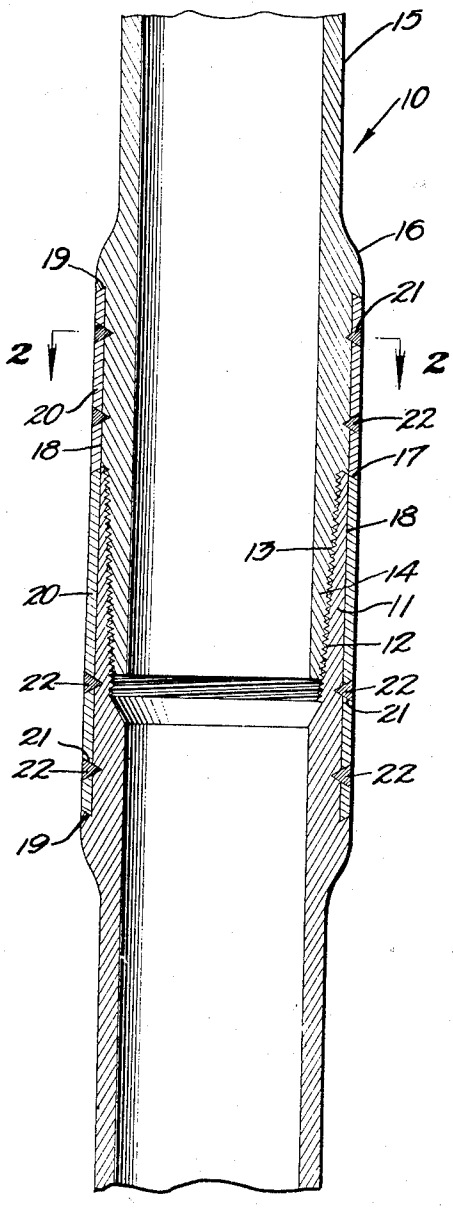
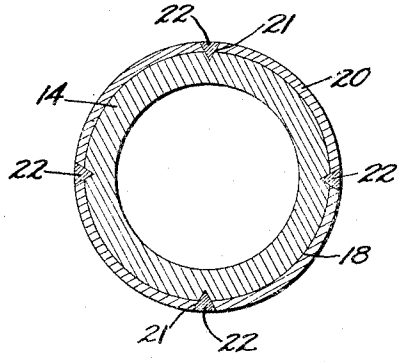


Fig. 2.



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Patented Nov. 10, 1942

2,301,495

UNITED STATES PATENT OFFICE

2,301,495

METHOD AND MEANS OF RENEWING THE SHOULDERS OF TOOL JOINTS

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Application April 8, 1939, Serial No. 266,821

4 Claims. (Cl. 308—4)

This invention relates to a tool joint and particularly pertains to a method and means of renewing the shoulders of a tool joint.

At the present time oil wells are drilled by the rotary method, which is concerned with a rotary driving table and a drill string extending therethrough at the lower end of which a drill bit is carried. The drill string and drill bit are constructed so that circulation of drilling fluid may be brought about through the drill bit and the drill string. In order to insure free circulation of this fluid through the string to the bit a type of drill string has been developed having a particular connecting joint or coupling between the sections of drill string. These joints are known as full hole tool joints. It is characteristic of this type of tool joint that the box and pin sections are formed with an outside upset wall. This produces an enlarged diameter in the portion forming the tool joint with a resulting shoulder at each end thereof. Abrasion takes place around the tool joint due to the circulation of fluid upwardly within the bore of the well and along the drill string. It is desirable to renew those portions of the tool joint which most readily wear, and it is the principal object of the present invention to provide a method and means of renewing the worn portions of the tool joints and restoring the tool joint to its original diameter and configuration.

The present invention contemplates the preparation of tool joints by cutting down portions of their outside surface until the abraded portions of the joint have been cut away and the joint is cylindrical, and thereafter shrinking onto said prepared portions wear sleeves which may then be welded into position.

The invention is illustrated by way of example in the accompanying drawing, in which:

Figure 1 is a view in longitudinal central section showing the present invention.

Fig. 2 is a view in transverse section through one of the tool joints showing the manner in which a wear sleeve is welded into position.

Referring more particularly to the drawing, **10** indicates a drill string section here shown as formed at its lower end with a box **11**. This box **11** is constructed by an outside upset portion in the wall of the pipe at the lower end. Within the box **11** is a female thread **12** which receives a male thread **13** of a pin **14**. The pin **14** is formed at the end of a drill string section **15** and projects beyond an upset wall portion **16**. It will thus be seen that due to the externally upset wall the passageway through the drill string will be a full hole of uniform diameter through the string and the tool joint. When this type of drill string is lowered into a well and fluid is circulated downwardly through the drill string and then upwardly around the drill string and within the well bore abrasion takes place on the outer surface of the upset portions **11** and **16**. In this type of device the upset portions **11** and **16** abut against each other at **17**. This forms a joint tending to provide a fluid seal between the removable parts. This joint also tends to wear away.

The present invention contemplates renewing the outer faces of the upset portions **11** and **16** of the tool joint and the abutting faces forming the joints **17**. In order to provide a firm and permanent joint which will not weaken the parts of the tool joint the outer circumference of the upset walls of the box and pin sections are turned down to form the cylindrical face **18**. These faces are undercut, as indicated at **19**. A cylindrical sleeve **20** is then prepared and placed over the turned face **18** with a tapered end fitting into the undercut portion **19**. The faces forming the joint at **17** are also tapered, the outside diameter of the turned faces **18** and the inside diameters of the sleeves **20** bearing such relation to each other as to make it possible for the sleeves to be held in place by a shrink fit. The sleeves are formed with holes **21** through them into which a metal flux may be placed to form a weld **22** between the sleeves and the portion of the tool joints which they embrace. This insures that the sleeve will be welded to the joint at various points so that regardless of the point at which the sleeve may wear the sleeve will be held and will not fall off and be dropped into the well. Attention is directed to the fact that shrinking alone is not sufficient since the sleeve tends to wear eccentrically and would be thin at the point of wear. It is also true that welding alone would not be sufficient since it is difficult to obtain a bond between the parts in view of the fact that welding cannot be done at the ends of the sleeve where wear takes place.

It will thus be seen that while the present invention is simple in its construction and operation that means are provided for rapidly reconditioning tool joints in a manner to restore them to their original configuration and strength, whereby they may be used in ordinary operations the same as though they were new, thus making it possible for the tool joints to be used over a long period of time without having to be discarded and replaced by complete new joints.

While I have shown the preferred form of my invention and means of renewing tool joints, it will be understood that various changes may be made in the combination, construction and arrangement of parts and the steps of the method without departing from the spirit of the invention as claimed.

Having thus described my invention, what I claim and desire to secure by Letters Patent is:

1. A tool joint comprising a cylindrical body portion having an enlarged cylindrical shoulder at the end thereof, an undercut face on said shoulder facing the end of the tool joint, a sleeve applied over said cylindrical portion with a shrink fit and having a tapered end face fitting into the undercut shoulder, the outer diameter of the sleeve agreeing with the outer diameter of the shoulder, holes being formed through the side wall of the sleeve whereby the sleeve may be welded to the wall of the cylindrical portion.

2. A tool joint comprising a cylindrical body portion having an enlarged cylindrical shoulder at the end thereof, an undercut face on said shoulder facing the end of the tool joint, a sleeve applied over said cylindrical portion with a shrink fit and having a tapered end face fitting into the undercut shoulder, the outer diameter of the sleeve agreeing with the outer diameter of the shoulder, holes being formed through the side wall of the sleeve whereby the sleeve may be welded to the wall of the cylindrical portion, the outer end of the sleeve being tapered to agree with the taper of an abutting face on a complementary joint section.

3. A tool joint comprising box and pin structures adapted to be threaded together, said box and pin structures each being formed with an annular undercut shoulder thereon facing the end of the tool joint, a pair of sleeves adapted to be applied over the shoulder portions of the two tool joint sections having tapered end faces fitted into the undercut shoulders of said sections, the outer diameter of the two sleeves agreeing with the outer diameter of the shoulders of the tool joint sections, holes being formed through the side wall of the sleeves and corresponding holes formed in the outer diameter of the tool joint sections whereby the sleeves may be welded to the walls of the cylindrical tool joint sections, the outer ends of the sleeves abutting one against the other when the complementary tool joint sections are in their assembled position.

4. A tool joint comprising box and pin structures adapted to be threaded together, said box and pin structures each being formed with an annular undercut shoulder thereon facing the end of the tool joint, a pair of sleeves adapted to be applied over the shoulder portions of the two tool joint sections having tapered end faces fitted into the undercut shoulders of said sections, the outer diameter of the two sleeves agreeing with the outer diameter of the shoulders of the tool joint sections, holes being formed through the side wall of the sleeves and corresponding holes formed in the outer diameter of the tool joint sections whereby the sleeves may be welded to the walls of the cylindrical tool joint sections, the outer ends of the sleeves being tapered and complementary to each other whereby when the box and pin structure are in their assembled relation the tapered faces of the sleeves will be in an abutting position and will form a continuous surface conforming to the outer diameter of the cylindrical shoulders.

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