

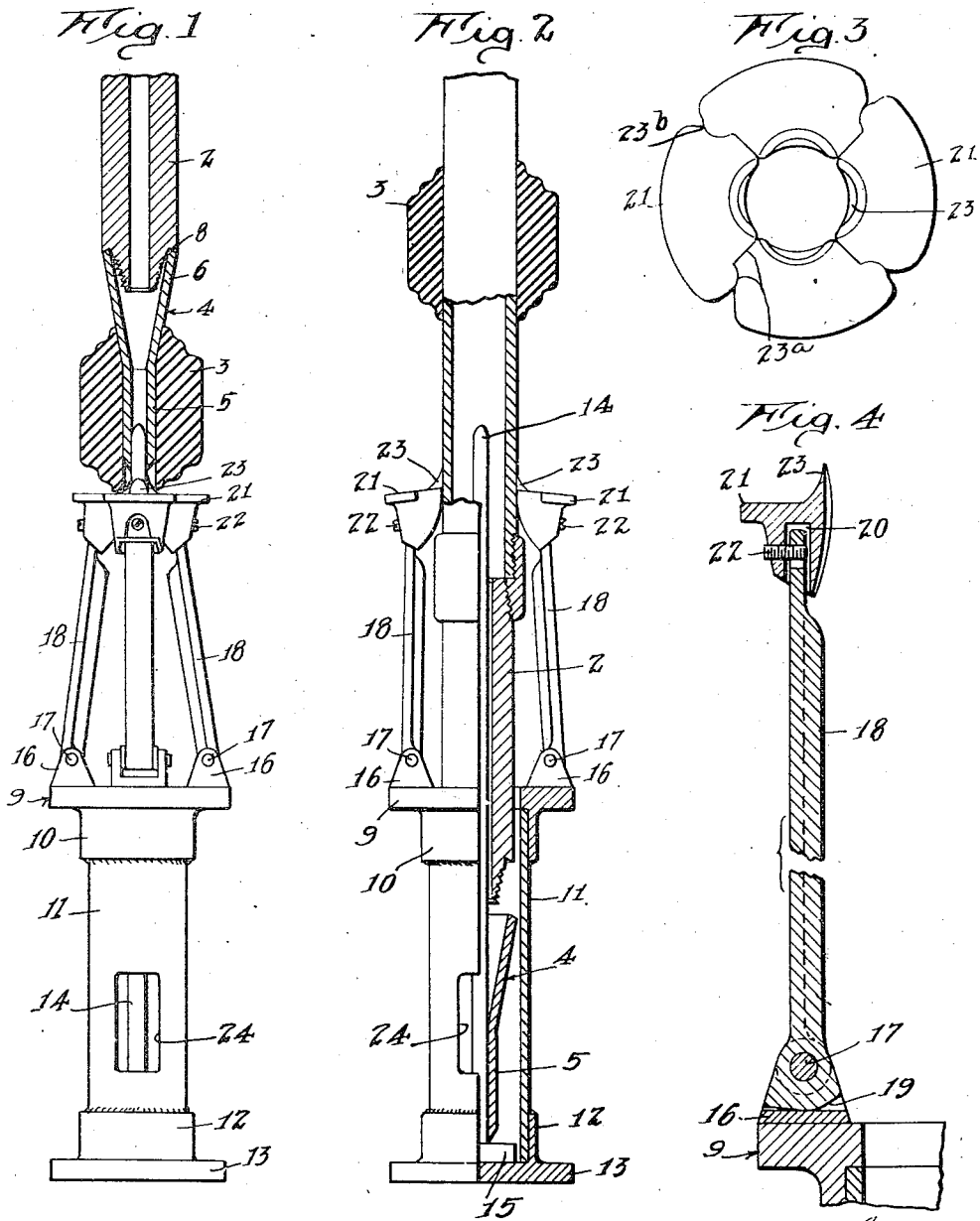
Oct. 21, 1947.

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2,429,341

SUPPORT FOR DRILL PIPE PROTECTORS

Filed April 17, 1944



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UNITED STATES PATENT OFFICE

2,429,341

SUPPORT FOR DRILL PIPE PROTECTORS

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Application April 17, 1944, Serial No. 531,349

2 Claims. (Cl. 29—236)

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This invention relates to an expander for drill pipe protector. In the art of drilling oil wells by the rotary method, a drill pipe is used to transmit power to the bit at the end of the drill pipe. The drill pipe operates inside of a casing known as a well casing. In order to prevent the drill pipe from rubbing and wearing against the casing, it is common practice to place upon the drill pipe a heavy rubber sleeve known as a protector. These protectors are in the form of a seamless rubber ring, the internal diameter of which, before installation on the drill pipe, is considerably less than the outer diameter of the drill pipe on which the protector is to be installed. The elastic properties of the protector when expanded and stretched to position on the drill pipe are relied upon for holding the protector in position. In order to install these protectors upon the drill pipe, it is necessary that they be expanded not only sufficiently to pass over the drill pipe, but also sufficiently to pass over the tool joint on the end of the drill pipe. For this purpose devices known as expanders are employed and very heavy loads are placed on these expanders.

The expanders now commonly employed in the art are subject to numerous defects in that parts of the expanders may become bent so that the expanders do not properly function. The general object of the present invention is to provide an expander of an improved type which will better withstand the loads encountered in expanding the protectors and which is not readily subject to being bent in operation.

In the expanders commonly employed for installing protectors on drill pipes, there is employed a center shaft which serves as a guide for the drill pipe and mandrel of the expander while the drill pipe is being lowered relative to the expander. These center shafts have heretofore been fixed to the base of the expander with the result that where the drill pipe is held at a slight tilt relative to the expander the center shaft frequently becomes bent. To obviate these difficulties in the present invention the expander is provided with a hollow cylindrical extension of the base and the center shaft is fixed to a disc which loosely rests at the bottom of the base extension, the disc having a very loose fit with the cylindrical base so as to permit tilting of the drill pipe and center shaft with reference to the base of the protector without bending the center shaft.

A further defect of the expanders commonly used resides in the ease with which the customary spring arms are bent in operation. In order to

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overcome these difficulties in the expander of the present invention, the arms which support the protector, contacting pads or dogs, are rigidly constructed and possess no appreciable spring action. These rigid arms are pivoted to the base at one end and at their other end have a slight pivoting connection with the pads or dogs which are intended to contact the protectors. A further improvement in the expander of the present invention resides in the form of the pads or dogs employed in contacting the protectors. These pads or dogs are provided with lips on their upper interior faces which are intended to be wedged in the bore of the protectors, facilitating the expansion of the protectors.

The expander of the present invention, together with various other advantageous features of the same, will be fully understood from a description of a preferred form or example of an expander embodying the invention. For this purpose I have hereafter described, with reference to the accompanying drawings, the preferred example of an expander embodying my invention.

In the drawings:

Figure 1 is an elevation partially in vertical section, showing the expander connected with a cone and drill pipe protector just before the act of applying the protector to the drill pipe.

Figure 2 is a similar view, after the completion of the operation.

Figure 3 is a plan view of the dog or pad.

Figure 4 is a fragmentary vertical section mainly through one of the arms of the device.

Referring to the drawings, I have indicated at 2 the lower end of the tool joint of the drill pipe over which a protector 3 is to be expanded. For this purpose the protector 3 is mounted upon a cone 4 which has a reduced lower sleeve 5 upon which the protector is to be mounted before the expanding operation. The cone is provided with an expanding portion 6, the end of which is adapted to engage the shoulder 8 of the tool joint 2.

The expander of the present invention comprises a base member 9 which is in the form of a ring having a depending cylindrical flange 10. The depending flange 10 is fixed to a hollow cylindrical member 11 which forms an extension of the base. The cylinder 11 in turn is fixed to the flange 12 of the subbase 13. A center shaft 14 is provided for the expander, which center shaft is attached at its lower end to a disc 15 which rests loosely on the subbase 13. The center shaft 14 is thus capable of tilting with

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reference to the base extension, as hereafter described.

On the base 9 there is provided bifurcated ears 16 which support pins 17 pivotally mounting arms 18. Four of the arms 18 are shown, although various numbers of arms may be employed. These arms have squared lower ends 19 shaped to engage the members 16 to limit the outer pivoting of the arms to substantially the upright position as exhibited in Figure 2, the inner lower faces of the arms being curved to permit the arms to swing inwardly, as desired.

The upper ends of the arms extend into pockets 20 in the lower ends of dogs or pads 21. These pockets fit the upper ends of the arms 18 loosely in order that the dogs may be provided with a slight pivotal or universal movement with respect to the upper end of the arms. Set-screws 22 pass through the dogs 21 and into the arms 18 for holding the dogs to the arms. The openings for the set-screws 22 in the dogs 21 are drilled somewhat larger than the set-screws so as not to interfere with the slight intended universal movements of the dogs with respect to the arms.

The upper faces of the dogs 21 are substantially flat, except at the interior of the dogs, where there are provided upwardly curving lips 23 which are intended to wedge within the bore of the protector 3 at the start of the expanding operation.

The side walls of the dogs 21 extend radially for a distance and each dog 23 is provided with one side having a locking shoulder 23a adapted to engage a complementary recess 23b on the adjacent dog. These shoulders provide a frictional lock to prevent radial movement of the dogs when the dogs are in the position indicated in Figure 3, and are of great assistance in holding the apparatus in intended position previous to the expanding operation and assist in setting up the apparatus in position for operation.

In the operation of the expander of the present invention, the expander is normally placed in suitable position in the well derrick, such as on the drilling table at one side of the opening thereof. The rubber protector sleeve 3 is then placed on the cone 4 in the position indicated in Figure 1, and the cone placed over the center shaft 14 until the protector 3 engages the lips 23 of the dogs 21 as indicated in Figure 1. The drill pipe on which the protector is to be positioned is then lowered down the derrick until contact is made between the shoulder of the joint of the drill pipe and cone. Subsequent lowering of the

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drill pipe then forces the protector 3 to move up the cone, to be expanded and forced into position upon the drill pipe. When the protector has been forced off of the expander, the cone 4 falls to the bottom of the base extension 11. Preferably an opening 24 is provided in the cylindrical base extension for the insertion of the hands of the operator in order to facilitate raising the cone 4 from the base extension at the completion of the operation.

While the particular form of the expander herein described is well adapted to carry out the objects of the present invention, it is to be understood that various modifications and changes may be made, and this invention is of the scope set forth in the appended claims.

I claim:

1. A support for a drill pipe protector which comprises a base including an upper base member, a base extension of hollow cylindrical form and a subbase at the lower end of said extension, a disc resting on the subbase, a centering shaft secured to said disc, a plurality of rigid arms pivoted to the base for limited outward pivoting movement, said arms extending upwardly and adapted to be pivoted toward the centering shaft, and a protector-contacting pad hinged to each of said arms.

2. A support for a drill pipe protector which comprises a base including an upper base member, a base extension of hollow cylindrical form and a subbase at the lower end of said extension, a disc resting on the subbase, a centering shaft secured to said disc, a plurality of rigid arms pivoted to the base for limited outward pivoting movement, said arms extending upwardly and adapted to be pivoted toward the centering shaft, a protector-contacting pad hinged to each of said arms and means included in the hinged connection between the arms and pad for permitting a limited universal movement of said pads relative to said arms.

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