Aug. 25, 1942. B. S. MINOR 2,294,042

APPLICATOR

Filed Nov. 21, 1938

Fig. 1.

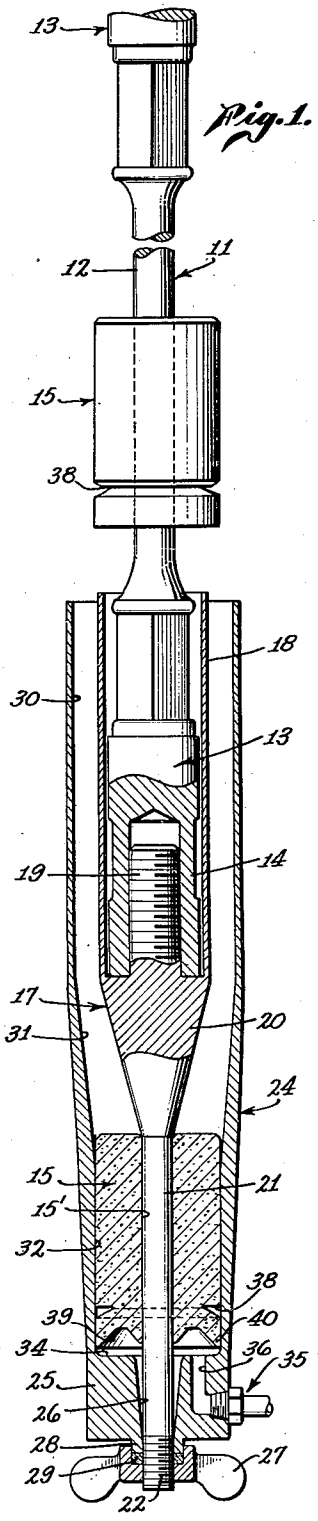


Fig. 2.

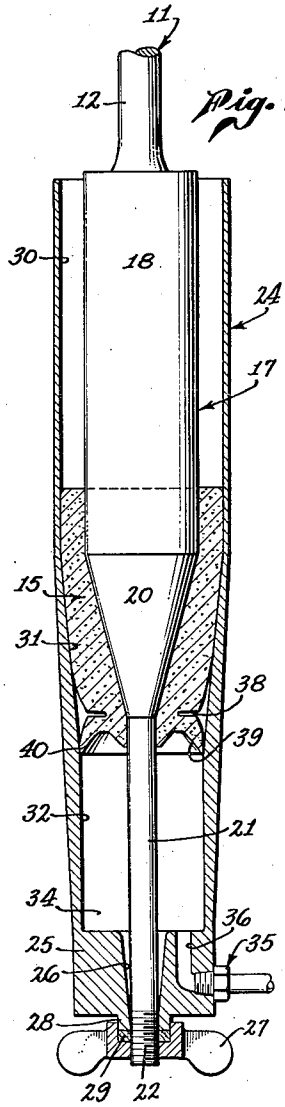
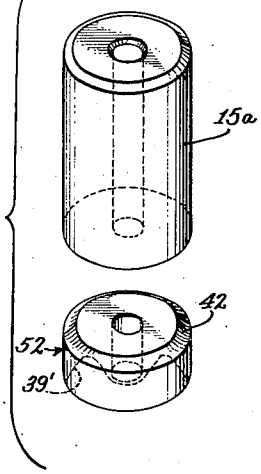


Fig. 3.



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APPLICATOR

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5 Claims. (Cl. 29—88.2)

This invention relates generally to oil well tools and more particularly to means for applying expansible collars to elongated members having enlarged end portions such as the sucker rods of oil well pumps and drill pipe.

It is the practice to utilize rubber protector members on the drill pipe during drilling of an oil well. These collars or protectors are slightly larger than the tool joints of the drill pipe and thereby serve to prevent abrasion and wear of the drill pipe and its tool joints as a result of coming in contact with the casing through which the drill pipe extends and rotates. As the tool joints of drill pipe only slightly exceed in diameter the outer diameter of the drill pipe itself, the rubber collars need only be expanded a slight amount in order to slip them over the tool joint and on to the body of the pipe.

It is an object of this invention to provide a means for protecting the sucker rods of oil well pumps by providing them with resilient collars and by providing means for applying these collars to the main body of the rods. The sucker rods are provided at each end with enlarged end portions or coupling members which may be likened to the tool joints of drill pipe except for the fact that the diameter of the enlarged end portions of the sucker rods greatly exceeds the diameter of the main body of the rod, it being nearly three times as great. It is also true that a protector or collar for sucker rods must necessarily have a bore of small diameter and an annular body of relatively great thickness. It is much more difficult, therefore, to apply such a collar, which is inherently difficult to expand, to a sucker rod than it is to apply a protector to a drill pipe. In order to apply the expansible resilient collar to a sucker rod it is necessary to expand the collar so that the bore therethrough will accommodate the enlarged end of the rod. The apparatus with which I am familiar which has been used for the application of the protectors to drill pipe is unsuitable for applying collars to the sucker rods for the reason that such devices are not designed to expand a collar of small bore to such large dimensions.

It is therefore an object of this invention to provide a device which is particularly designed for applying expansible collars to sucker rods which utilizes fluid pressure for expanding the collar and moving it in expanded form over the enlarged end portion of the rod.

It is also an object of this invention to provide a device of the type indicated which is portable and which is adapted to utilize gas under pressure such as may be generated by a small cylinder of liquid CO_2.

While it is a particular object of this invention to provide a device which is designed to apply expansible collars to sucker rods, it is a further object of this invention to provide such a device which may be utilized for the application of expansible collars to drill pipe or the like.

These and other objects will be apparent from the drawing and the following description thereof. Referring to the drawing, which is for illustrative purposes only;

Fig. 1 is a sectional elevation of the device of this invention mounted on the lower end of a sucker rod;

Fig. 2 is a sectional elevation of the device showing an expansible collar being applied to a sucker rod; and

Fig. 3 is a perspective view of a collar and follower member.

More particularly describing the invention, reference numeral 11 generally indicates a sucker rod of an oil well pump. Such rods are ordinarily about thirty feet long and are provided at each end with enlarged end portions generally indicated by reference numeral 13. These enlarged end portions may comprise coupling members such as the internally threaded coupling or box 14 shown at the lower end of the rod. Some rods are provided with a box at each end, some with a pin at each end while other rods are provided with a box at one end such as 14 and a pin at the other end. In all cases, however, an enlarged end portion is provided which greatly exceeds the diameter of the main body of the rod 12 in order to insure strength at the region of juncture with an adjacent rod.

For the purpose of illustration, a protector or expansible collar 15 is shown in place upon the main body of the rod 12. The collars are preferably formed of an oil resistant-synthetic rubber or the like. It may be desirable to mount two or three of these collars along the length of the rod in order to prevent the rod from coming in to contact with the oil well tubing in which it reciprocates.

The device of this invention for applying the collars 15 to the rods comprises a mandrel generally indicated by reference numeral 17. This mandrel has a hollow upper end portion 18 which is cylindrical in outer diameter and which is adapted to receive the enlarged end portion 13 of the rod 11. Interiorly of the hollow end portion 18 there is provided a threaded stud 19 which is adapted to threadedly engage in the

box 14, thereby providing means for removably securing the mandrel upon the rod. The mandrel is provided with an intermediate tapered portion 20, substantially frustro-conical in shape, which converges to a stem 21. This stem 21 is designed to slidably accommodate the protector or collar 15, which has a bore 15' therethrough of substantially the same diameter as the diameter of the stem. The end of the stem is threaded at 22 for a purpose which will later be described.

Cooperating with the mandrel is a barrel member 24 which is provided with a closed lower end 25. This closed lower end 25 is provided with a longitudinal inwardly diverging bore 26 which is adapted to receive the outer end of the stem 21 of the mandrel. With this construction the barrel may be mounted on the mandrel and secured thereto by means of a wing nut 27. In order to seal the lower end of the barrel a lip 28 is provided surrounding the bore 26. This lip cooperates with the nut 27 and packing member 29 to effectively seal the opening through the lower end of the barrel.

The barrel member is provided with an upper cylindrical internal wall section 30 opposite the upper hollow portion 18 of the mandrel. Below the wall section 30 is a downwardly converging or tapered interior wall section 31 which terminates in a second cylindrical inner wall section 32. With this construction there is provided an annular space between the mandrel and the barrel, the cross-sectional area of the space being substantially equivalent to the cross-sectional area of the annular body of the collar 15. In the region of the interior wall section 32 the space between this wall and the stem 21 of the mandrel is greater than it is in the region between the interior wall portion 30 and the upper hollow end 18 of the mandrel although the cross-sectional area of the space remains substantially the same at all points throughout its length.

In operation the mandrel is first secured to the lower end of the sucker rod by threading the mandrel into the box at the end of the sucker rod as shown in Fig. 1. A protector or collar 15 is then slid on to the stem 21 and the barrel slipped over the end of the mandrel until it occupies the position in which it is shown in Fig. 1. The wing nut 27 and packing means 29 are placed on the end of the stem 21 and threaded thereon to close the lower end of the barrel. The collar 15 then cooperates with the barrel to form what may be termed a pressure chamber 34 between the lower end of the collar and the lower end 25 of the barrel. Fitting 35 and passageway 36 are provided for admitting pressure fluid into the chamber 34.

When the wing nut 27 has been firmly secured in place pressure fluid is admitted to the chamber 34. This fluid forces the collar 15 outwardly over the intermediate portion 20 of the mandrel as shown in Fig. 2, thereby expanding the collar and forcing it over and beyond the hollow end portion 18 of the mandrel until the collar is forced on to the main body of the sucker rod as shown in Fig. 1 at the upper portion of the drawing.

To insure the collar effectively sealing the space between the mandrel and the inner wall of the barrel at all points along its travel through the length of the barrel, it is preferable to provide the collar with an annular groove 38 which is positioned in spaced relation with the lower end of the collar. An annular recess 39 is provided in the lower end of the collar thereby forming an annular lip 40. The recess 39 and groove 38 permit the expansion of and deflection of lip 40 of the collar 15 out beyond the main body of the collar as shown in Fig. 2 into engagement with the barrel and thereby insures the sealing of the space and the prevention of pressure fluid escaping past the collar.

After the protector has been mounted upon the sucker rod, the lower end portion below the groove 38 may be removed by cutting the same from the main body of the collar if desirable.

As indicated above, fluid pressure is utilized to secure the necessary power for applying the collars to the rods. In this connection it should be pointed out that the device of the invention is particularly adaptable for operation by gas under pressure, such as CO_2. The use of CO_2 gas is advantageous for the reason that it is portable as a liquid in cylinders and thereby eliminates the necessity for a pump capable of providing a liquid at the necessary pressure where it is desired to use the applicator. Furthermore, after use the gas escapes into the air and does not contaminate the derrick floor and surrounding objects as would be the case where a pressure liquid is used.

In Fig. 3 there is shown a protector or collar 15*a* which is not provided with any groove or recess at its lower end. This collar may be best applied to the sucker rod by utilizing a follower member 52. This follower is provided with a recess 39' in all respects similar to the recess 39 of the collar 15 and is provided with an upper bevelled face 42. In operation the follower member is positioned on the stem 21 immediately below the collar 15' and takes the place of the lower end portion of the collar 15.

While I have shown and described my invention as designed in its application for a particular purpose, it is understood that it is intended that the scope of the invention is not to be so limited but shall include such modifications as come within the scope of the appended claims.

I claim as my invention:

1. An applicator for mounting an annular expansible collar on an elongated member having an enlarged end, comprising: a mandrel adapted to fit over the enlarged end of said member, said mandrel having a collar receiving portion and an intermediate divergent portion to expand the collar; a barrel removably attached to and surrounding said mandrel, said barrel cooperating with said mandrel to form a sleeve-like piston chamber varying in size but of approximately the same cross sectional area at all points along its length through which the collar may move in the act of expanding the same; and means for introducing fluid under pressure into said barrel behind a collar on said collar receiving means to cause said collar to move like a piston in the act of expanding the collar and applying it to the elongated member.

2. An apparatus for applying protectors to drill pipes comprising an inner guide member having a tapered portion adapted to expand the protector to clear the enlargement of the drill pipe and having a further portion for carrying the same to the desired position, an outer member cooperating with said guide member to form a piston like chamber through which the protector may move in the act of applying the same to the drill pipe, and means for introducing fluid pressure below a protector in said piston chamber causing the protector to move like a piston in

the act of expanding the protector and applying the same to the drill pipe.

3. An apparatus for applying a protector sleeve to drill pipe, comprising guide means having a central expanding portion, an upper cylindrical portion of increased diameter and a lower cylindrical portion of reduced diameter, said guide means being adapted to be fitted over the lower end of the drill pipe and extend over the enlargement thereof, means detachable from said guide member and adapted to cooperate therewith to form a sleeve-like piston chamber for the protector, and means for applying fluid pressure to the protector sleeve within said piston chamber.

4. An apparatus for applying expansible annular protectors to an elongate member having enlargements at its ends comprising an inner guide means including a mandrel having a hollow cylindrical section to receive and fit over the enlargement at one end of the elongate member, having a protector accommodating portion of reduced diameter, and having an intermediate tapered protector expanding portion; an outer barrel cooperating with said guide means to form a sleeve-like chamber through which the protector may move in the act of expanding and applying the same to the elongate member; means for detachably securing the barrel to the guide means, said means being remote from the member to which the protector is to be applied; and means for applying fluid pressure to a protector on said protector accommodating portion of said mandrel to cause the protector to move like a piston through said sleeve-like chamber and be expanded and applied to the elongate member.

5. An apparatus for applying expansible annular protectors to an elongate member having enlargements at its ends comprising an inner guide means including a mandrel having a hollow cylindrical section to receive and fit over the enlargement at one end of the elongate member, having an intermediate tapered protector expanding portion, and having a stem beyond said intermediate portion of sufficiently reduced diameter to accommodate an unexpanded protector thereon; an outer barrel cooperating with said guide means to form a sleeve-like piston chamber through which the protector may move in the act of expanding and applying the same to the elongate member, said barrel being open at one end and having its other end closed except for an opening of limited size to receive the outer end of the stem of the mandrel; cooperative means on said stem and said barrel for detachably securing the parts together and sealing the adjacent end of the barrel; and means for applying fluid pressure between the sealed end of the barrel and a protector on said stem to cause the protector to move like a piston through said chamber and be expanded and applied to the elongate member.

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