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RUBBER SLEEVE APPLICATOR

Filed June 11, 1941

2 Sheets-Sheet 1

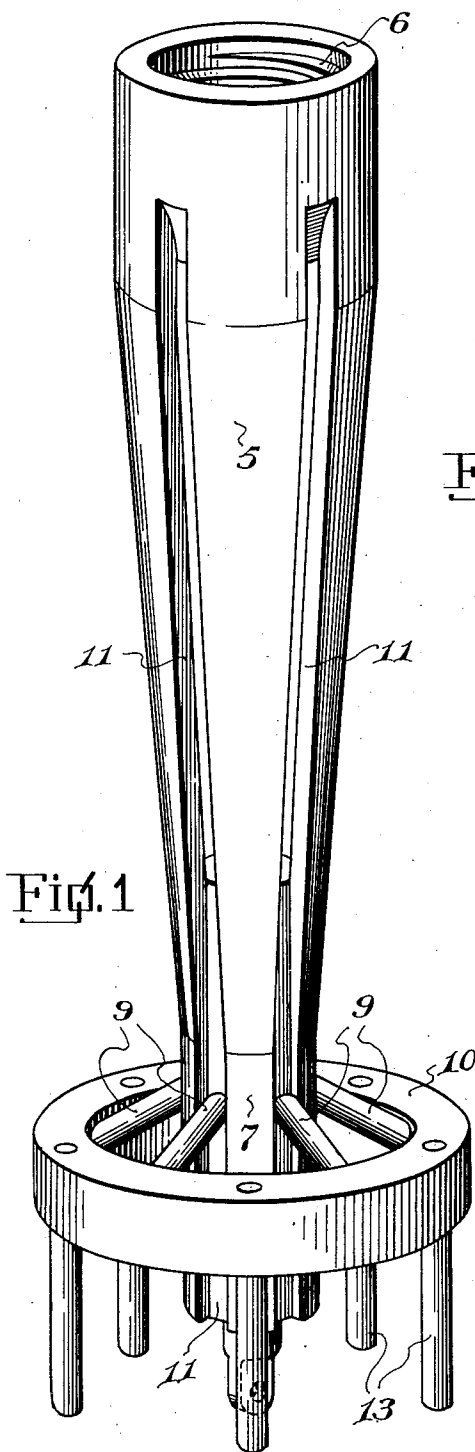


Fig. 1

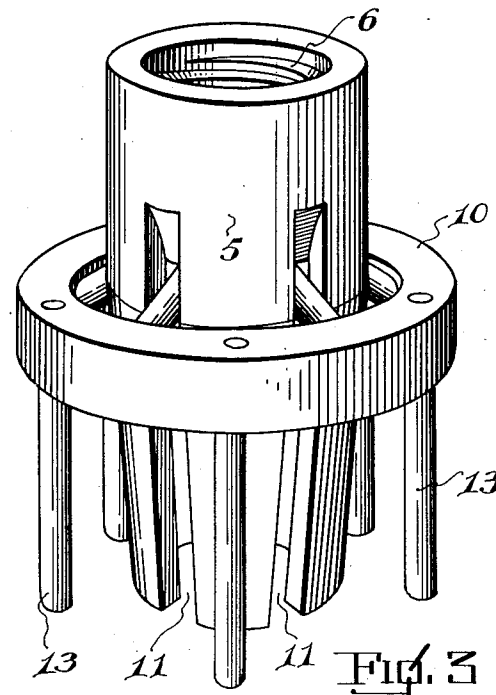
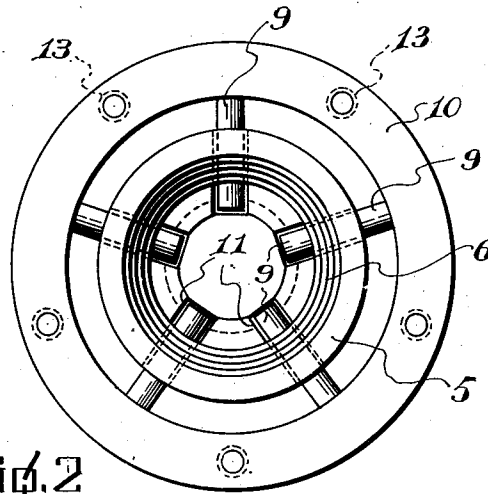


Fig. 3

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2 Sheets-Sheet 2

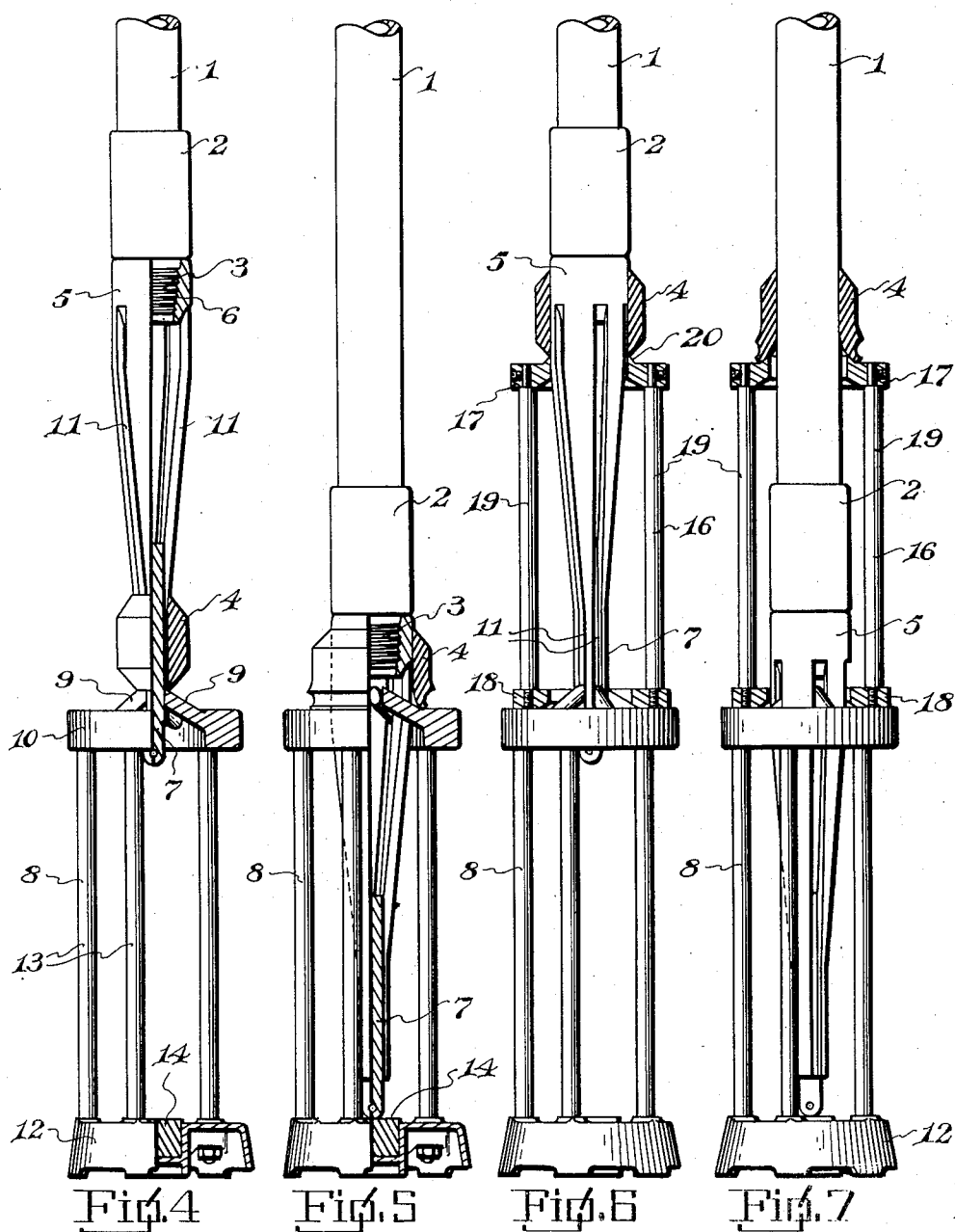


Fig. 4

Fig. 5

Fig. 6

Fig. 7

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RUBBER SLEEVE APPLICATOR

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Application June 11, 1941, Serial No. 397,637

5 Claims. (Cl. 29—88.2)

The invention relates to rubber sleeve applicators for applying rubber sleeves onto drill pipe sections, and has for its object to provide a device of this kind wherein the sleeve is forced over a tapered mandrel carried by the drill pipe section end by means of rigid members extending into elongated slots or openings in the mandrel and engaging one end of the sleeve.

A further object is to provide an applicator of this kind wherein it will not be necessary to provide a guiding means for guiding the mandrel axially in relation to the applicator and utilizing the rigid arms extending into the mandrel for normally centering the mandrel on the axis of the applicator as the sleeve is forced over the mandrel.

A further object is to provide the applicator with an annular head having inwardly extending rigid arms passing into longitudinally extending slots in the mandrel periphery for forcing the sleeve over the mandrel and at the same time preventing rotation of the mandrel in relation to the applicator and consequent distortion of the sleeve during the sleeve expanding operation.

A further object is to incline the applicator pusher arms so that they will extend into one end of the sleeve and cause said end to expand incident to pressure and the angular engagement of the arms with the sleeve thereby facilitating the movement of the sleeve over the mandrel.

A further object is to provide a sleeve applicator having rigid members extending into longitudinally extending guide slots in a mandrel, and to utilize the slots for reducing the frictional engaging area between the mandrel and inner periphery of the sleeve or protector, thereby allowing the sleeve to be applied with the minimum amount of power.

A further object is to chamber the mandrel as well as slot the same for the reception of the rigid applicator arms and to rigidly connect the outer ends of the applicator arms and to brace the same against collapse when a protector sleeve is forced thereover.

A further object is to provide a pusher member adapted to be interposed between the head of the applicator and the protector sleeve for forcing the protector sleeve over the drill pipe section joint and onto the section.

A further object is to provide the pusher member with an annular frusto conically shaped seat for one end of the protector sleeve and adapted to spread the adjacent end of the sleeve for

facilitating the sliding movement of protector on the drill pipe section.

A further object is to provide a protector sleeve applicator which may be used in any position, for instance vertical or horizontal positions.

A further object is to form the pusher arms of applicator substantially round in cross section and with polished surfaces to facilitate the spreading of the protector sleeve at its pushed end and to reduce the frictional engagement between said arms and sleeve to a minimum.

A further object is to form the longitudinally extending slots in the mandrel slightly wider than the pusher arms to reduce the frictional engagement of said arms within said slots to a minimum and at the same time prevent excessive rotative movement of the applicator and mandrel during a sleeve applying operation. Also to chamber the mandrel so that the arms will not have any end bearing engagement with the mandrel on the final movement of the protector over the mandrel.

With the above and other objects in view the invention resides in the combination and arrangement of parts as hereinafter set forth shown in the drawings, described and claimed, it being understood that changes in the precise embodiment of the invention may be made within the scope of what is claimed without departing from the spirit of the invention.

In the drawings:

Figure 1 is a perspective view of the mandrel and pusher arm carrying end of the applicator, showing the mandrel in position to enter the applicator.

Figure 2 is a top plan view of the mandrel and applicator.

Figure 3 is a detail perspective view of the upper portion of the mandrel and the upper portion of the applicator, showing the mandrel after it has passed into applicator.

Figure 4 is a view in side elevation of the mandrel and applicator showing the mandrel in a starting position for entering the applicator; parts being shown in section to better illustrate the structure.

Figure 5 is a view similar to Figure 4 showing the mandrel after it has entered the applicator and after the protector sleeve has been forced to the large end of the mandrel.

Figure 6 is a side elevation of the applicator and mandrel showing a pusher member interposed between the protector sleeve on the large end of the mandrel and the applicator for forc-

ing the protector sleeve over the drill pipe joint and onto the drill pipe.

Figure 7 is a view similar to Figure 6, but showing the sleeve forced onto the drill pipe section beyond the joint.

The invention hereinafter set forth may be used in a vertical position as shown and the weight of the tube section used for forcing the protector sleeve over the mandrel, or it can be used in a horizontal position as shown in other applicator patents.

Referring to the drawings, the numeral 1 designates the body of a drill pipe section and 2 the enlarged joint at one end thereof. The enlarged joint is provided with a tapered threaded pin 3 used for coupling the drill pipe sections together. When it is desired to apply the rubber protector sleeve 4 to the drill pipe a tapered mandrel 5 is threaded at 6 onto the threaded pin 3. During this operation the drill pipe section is preferably supported from the derrick structure. The mandrel 5 has its upper end cylindrical, and the protector sleeve is forced onto the cylindrical portion as shown in Figure 6. The lower end of the mandrel 5 terminates in a straight cylindrical portion 7 on which the protector sleeve is placed at the starting of the expanding operation. After the protector sleeve 4 is placed in position, the sleeve applicator 8 is placed below the mandrel 5 and the mandrel and drill pipe section 1 are lowered so the rigid fingers 9 carried by the applicator head 10 will be received in the guide channels 11 in the periphery of the mandrel 5 and cylindrical portion 7 thereof. The guide channels 11 are preferably slightly wider than the width of the rigid applicator fingers or arms 9 so that said arms will not bind therein, and at the same time the mandrel and arms are maintained in their relative position against partial rotation so that the protector sleeve 4 will not be distorted as it is forced over the mandrel onto the drill pipe end. It will be noted that the rigid arms 9 incline upwardly and inwardly for engagement with the lower end of the protector sleeve 4, and as the ends terminate within the lines of the mandrel they will slightly spread the lower end of the sleeve as the sleeve is forced over the mandrel thereby reducing the frictional and surface engagement of the sleeve with the mandrel and facilitating the movement of the mandrel through the sleeve. This frictional engagement is further decreased by the use of the elongated channels of the mandrel which eliminates a substantial amount of mandrel surface which would otherwise engage the inner periphery of the protector sleeve. The main body of the mandrel 5 is chambered and the rigid arms 9 extend into this chamber, therefore there is no binding of the arms incident to axial alinement of the applicator and mandrel during a sleeve applying operation, as is now the common difficulty with devices of this general type where the mandrel and applicator are provided with mandrel guide means for maintaining the parts in axial alinement.

The rigid arms 9, by inclining upwardly and inwardly and being connected to the annular head 10 of the applicator at a point outside the diameter of the upper end of the mandrel, cause a centering of the mandrel and a spreading of the lower end of the protector sleeve to a diameter where it will not bind on the mandrel. Arms 9 are preferably formed of polished steel so that the sleeve edge will easily slide down the same, and at the same time the lower end of the sleeve

will not be damaged incident to rough surfaces as in devices now in use having roughened gripping surface. This is an important point as it is particularly desirable to have a perfect sleeve in position on the drill pipe section which will not cause eddies in the flow of mud in the well. The annular head 10 of the applicator is connected to a base 12 by means of rods 13, and the base is preferably provided with a yieldable shock absorbing member 14 in a chamber 15 thereof, and adapted to be engaged by the lower end of the mandrel when the protector sleeve 4 is forced onto the enlarged end 5 of the mandrel as shown in Figure 5.

After the protector sleeve has assumed the position shown in Figure 5 it is necessary to force the same over the joint 2 onto the drill pipe section 1 to a position as shown in Figure 7. To accomplish this result a pusher 16 is provided. This pusher 16 comprises upper and lower annular members 17 and 18, connected together by means of rods 19. The pusher member 16 is placed on top of the applicator 8, and then the mandrel 5, with the protector sleeve 4 in position thereon, is lowered through the pusher 16, and with the rigid arms 9 in the channels 11 for forcing the protector sleeve 4 over the joint 2. The upper pusher ring 17 is provided with an upwardly extending annular flange 20 V-shaped in cross section and having an interior diameter substantially the same as the upper end of the mandrel 5 and the joint 2, therefore it will be seen, referring to Figures 6 and 7, that as the mandrel is lowered for passage through the pusher the lower end of the protector sleeve 4 will be expanded as shown in Figure 7, and the joint 2 will easily pass through the ring.

After the sleeve has been applied it will only be necessary to hoist the drill pipe section 1 for removing it and the mandrel from the applicator and pusher and then the mandrel can be unscrewed at 6 and the device as a whole utilized for applying protector sleeves to other drill pipe sections.

From the above it will be seen that a sleeve applicator is provided which is simple in construction, one wherein all of the sleeve engaging elements are rigid, and one wherein axial guiding means is eliminated, and at the same time constructed in a manner whereby the sleeve will not be damaged in the application thereof. Where the device is used in a horizontal position any desired pushing or pulling means may be used for either the applicator or drill pipe section or both.

The invention having been set forth, what is claimed as new and useful is:

1. A device for applying elastic protector sleeves on the ends of drill pipe sections, said device comprising an applicator frame, a tapered mandrel carried by the end of the drill pipe section and adapted to pass axially into the applicator frame, longitudinally extending channels in the periphery of the tapered mandrel, said applicator frame having a plurality of inwardly extending rigid fingers in radial planes, the extreme outer ends of said fingers extending into longitudinally extending channels in the mandrel and adapted to engage one end of the protector sleeve on the mandrel and force the same towards the large end of the tapered mandrel as the mandrel passes axially through the frame, said rigid fingers being in a fixed nonmovable position, said fingers being of a length whereby their outer ends will be disposed in the channels of the mandrel

throughout the length of the channels and mandrel as the mandrel is axially moved into the frame and from the frame.

2. A device as set forth in claim 1 wherein the plurality of inwardly extending rigid fingers incline upwardly and inwardly in relation to the axis of the mandrel and terminate in the channels.

3. A device as set forth in claim 1 wherein the lower end of the mandrel adjacent the applicator is solid, said channels extending through said solid portion of the mandrel, the body of said mandrel being chambered.

4. A device as set forth in claim 1 including an applicator head carried by said frame and having a mandrel receiving opening therethrough, said inwardly extending rigid fingers being carried by said head, a base carried by said applicator and a shock absorber carried by said base in the path of the mandrel.

5. A device for applying elastic protector sleeves on the end of a drill pipe section, said device comprising a vertically disposed applicator frame, said frame having a head provided with a mandrel receiving opening therethrough, a tapered mandrel carried by a drill pipe section above the frame, longitudinally extending channels in the periphery of said mandrel, a plurality of upwardly and inwardly inclined rigid protector sleeve engaging fingers carried by the applicator head and terminating in the longitudinally extending channels in the periphery of the mandrel and adapted to engage the lower end of a sleeve on the mandrel and incident to their upward inclination spread the same as the mandrel is passed downwardly through the applicator.

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