Aug. 4, 1942. B. S. MINOR 2,291,976

AUTOMATIC TRANSFER SLEEVE

Filed Nov. 4, 1940

Fig. 1.

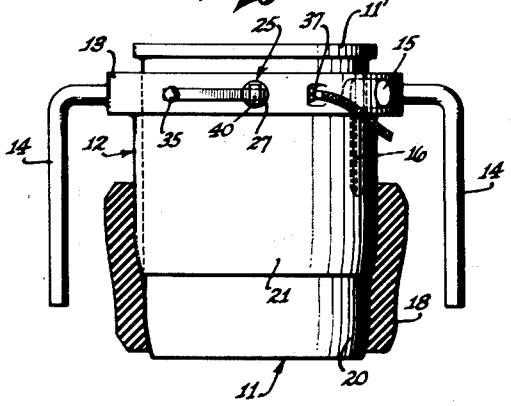


Fig. 4.

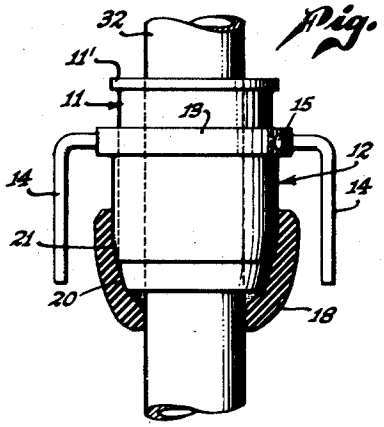


Fig. 2.

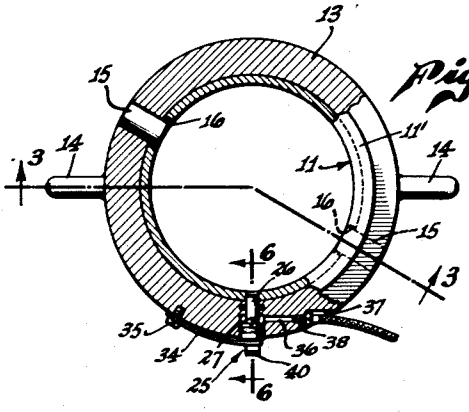
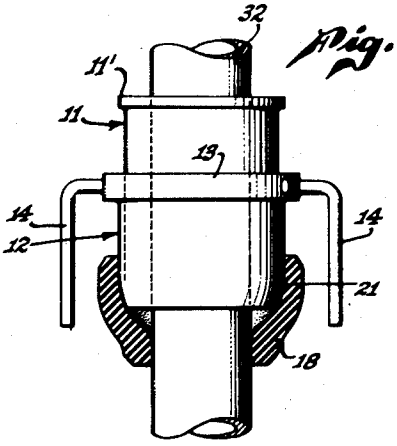


Fig. 5.



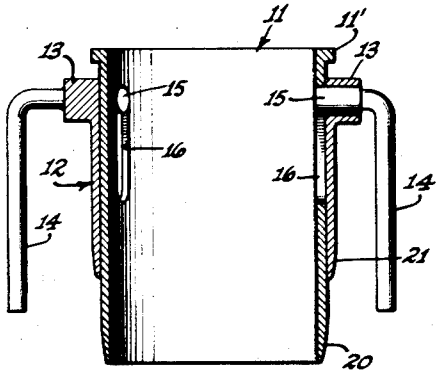


Fig. 3.

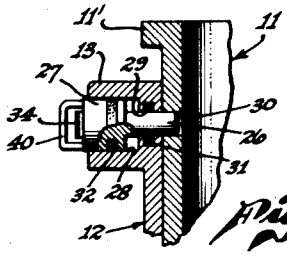


Fig. 6.

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UNITED STATES PATENT OFFICE

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AUTOMATIC TRANSFER SLEEVE

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Application November 4, 1940, Serial No. 364,254

4 Claims. (Cl. 29—88.2)

This invention relates generally to apparatus for applying rubber protectors to drill pipe and the like. The invention relates more particularly to what will be termed transfer sleeves for use in receiving an expanded rubber protector so that the protector may be transported to and placed over a drill pipe or the like at some point remote from the expanding apparatus and then removed from the transfer sleeve and applied directly to the pipe.

Various types of apparatus have been devised for expanding the sleeves and recently various forms of so called transfer sleeves have been developed. In certain types of transfer sleeves heretofore developed the expanded protector is forced off of the sleeve by the application of either mechanical or hydraulic pressure to an end of the sleeve. Due to the fact that the rubber protectors engage the sleeve very tightly having a great tendency to contract to their original size, considerable force is necessary to remove a protector from the ordinary types of transfer sleeves.

Therefore, it is a primary object of this invention to provide a new and improved type of transfer sleeve for use in installing protectors on drill pipe or the like which operates automatically to release or remove the protector from the sleeve and does not require the application of any force to an end of the sleeve. In this connection it is an object to provide apparatus which utilizes the stored up energy in the expanded protector for operating the sleeve to permit release of the protector therefrom.

It is also an object of this invention to provide a highly portable transfer sleeve which may be easily and safely operated for installing the protectors on drill pipe regardless of the position of the pipe, that is, the sleeve may be easily operated either where the pipe is lying horizontal on racks or is substantially vertically disposed in the well derrick.

It is a further object to provide a transfer sleeve which operates to quickly release the protector therefrom and thereby accomplishes the saving of considerable time in installation operations.

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

Fig. 1 is an elevation view of the transfer sleeve of this invention with a protector shown in section thereon;

Fig. 2 is a sectional plan view of the apparatus of Fig. 1;

Fig. 3 is a sectional elevation of the transfer sleeve taken on line 3—3 of Fig. 2;

Fig. 4 is an elevational view of the transfer sleeve with the parts shown in the position they assume shortly after the release of the parts to permit release of the protector sleeve, the transfer sleeve being shown associated with a drill pipe and a protector being shown in section at an intermediate stage of release from the sleeve;

Fig. 5 is an elevational view of the transfer sleeve with the parts shown in the position they assume shortly after the position in which they are shown in Fig. 4, the transfer sleeve being shown associated with the drill pipe and the protector being shown in section; and

Fig. 6 is an enlarged fragmentary section on line 6—6 of Fig. 2.

More particularly describing the invention, the so-called transfer sleeve includes an inner sleeve 11 which accommodates an outer sleeve 12. The outer sleeve as indicated in the drawing is shorter in length than the inner sleeve and is slidably mounted relative to the inner sleeve. The outer sleeve is provided with a ring or flange 13 formed as a part of the sleeve. If desired a separate ring can be utilized and welded to the sleeve as an alternate construction. A pair of handles 14 are mounted on the flange in any suitable manner.

In order to limit the relative axial movement between the two sleeves the outer sleeve is provided with oppositely disposed pins 15 mounted in the flange 13 and extending through the body of the sleeve 12 and into longitudinal slots 16 in the inner sleeve. In Fig. 1 the sleeves are shown in the normal position for receiving a protector indicated by 18, that is, with the outer sleeve positioned as near the flange 11' at one end of the inner sleeve as the pins and slots 15, 16 permit. In Fig. 5 the sleeves are shown extended to the limit of permissible movement in relatively opposite directions.

The inner sleeve 11 is provided with a tapered surface 20 at one end. Preferably, this tapered surface should extend an appreciable proportion of the distance between the end of the inner sleeve and the corresponding end of the outer sleeve when the parts are in the position shown in Figs. 1 and 3. It has been found that it is desirable to have the tapered surface 20 extend approximately one-half of the distance between the end of the inner sleeve and the end of the

outer sleeve. The end of the outer sleeve is also provided with a tapered surface indicated at 21. In the operation of the device it is contemplated that any suitable means may be used for expanding the protector 18 and positioning it on the transfer sleeve to the approximate position in which it is shown in Fig. 1.

With this construction, and because of the tremendous force exerted by the protectors which tend to contract to their normal size, a protector mounted on the sleeve as shown in Fig. 1 tends to cause relative movement of the inner and outer sleeves so as to force the inner sleeve through the outer sleeve to a position shown in Fig. 4 and finally to the position shown in Fig. 5. In order to prevent premature movement of the parts and to hold the inner and outer sleeves in the relative position in which they are shown in Figs. 1 and 3, a latch means generally indicated at 25 is provided.

Referring to Figs. 2 and 6, this latch means 25 comprises a pin 26 provided with a flange or piston portion 27 receivable in a bore 28 of the flange 13. A further bore 29 is provided to receive the smaller end of the pin 26 which in the latching position extends into an opening 30 in the inner sleeve. A suitable packing ring 31 is mounted the flange 13 surrounding the pin and a second packing ring 32 is mounted in the piston portion of the pin.

In order to provide means for yieldably urging the pin into a latching or locking position with relation to the inner sleeve a spring 34 is provided which bears against the outer end of the pin and may be mounted on the flange in any suitable manner as by means of a bolt 35. A passage way 36 is provided in the flange which communicates with the inner end of the bore 28 which is in effect a cylinder and terminates at its outer end at the periphery of the flange in an enlarged opening 37 and threaded portion 38. Any suitable conduit means may be connected to the flange to communicate with this passage 36 to provide means for introducing fluid under pressure into the bore 28. It is apparent that with this construction by introducing fluid pressure into the bore 28 the pin 26 will be forced outwardly to release or disengage from the inner sleeve thereby permitting relative axial movement of the inner and outer sleeves.

The pin 26 may be provided with an extension or a tool receiving portion 40 so that the same may be manually operated if desired.

In operation of the device, a transfer sleeve such as shown in Fig. 1 with the rubber protector mounted thereon and with the latch 25 in position to lock the inner and outer sleeve against relative movement, is transported to a drill pipe such as 32 and moved thereover to the point where it is desired to install the protector. The latch 25 may then be released from the sleeve 11 thereby permitting the resiliency and compressive force of the protector to cause relative movement of the sleeves so that the inner sleeve moves through the outer sleeve to the approximate position in which the parts are shown in Fig. 4, the extreme end of the protector contracting about the pipe. In this position approximately the middle half of the protector is disposed on the two tapered surfaces 20 and 21 of the respective sleeves and the tendency of the protector is to slide off of the sleeves and to further move the inner sleeve relative to the outer sleeve until the parts are in the position shown in Fig. 5. When the parts are in this position approximately only one-half of the protector is left on the sleeve and due to the fact that the portion of the protector engaging the pipe is only slightly less than the portion of the protector left on the sleeve and due to the fact that the protector inherently tends to creep off of the sleeve by reason of the tapered surface 21, the protector itself continues to contract and creep off of and force the sleeve out from under it until the protector entirely engages the pipe.

It is to be understood that relative movement between the protector and sleeve is facilitated by a suitable lubricant, such as soapy substance, which is applied to the bore of the protector and the sleeves before the protector is expanded on to the transfer device.

Preferably the tapered surfaces 20 and 21 of the two sleeves are proportioned substantially as shown with respect to the protector. However, these surfaces may be increased or decreased relative to the protector and the transfer sleeve will still function automatically to release the protector after the latch 25 has been released.

In the operation of the transfer sleeve after the latch 25 has been released to permit relative axial movement of the inner and outer sleeves, the removal or release of the protector from the sleeves actually takes place in stages. In the particular form of sleeve shown there are two major stages in the release or removal of the protector from the sleeve. The first stage after release of the latch is the contractive tendency of the protector exerting sufficient force against the tapered surface of the inner sleeve to cause movement of that sleeve from the position in which it is shown in Fig. 2 through the position shown in Fig. 4 to the extreme position of Fig. 5. During this first stage the end of the protector moves off of the inner sleeve to engage the drill pipe.

In the second and final stage the protector further exerts compressive force against the outer sleeve to move it and the inner sleeve as a unit out from under the end of the protector, the protector exerting a cam-like action against the tapered surface of the outer sleeve. It is apparent that the apparatus embodies a principle of operation which may be utilized as a basis for constructing other transfer sleeves adapted principally for use in automatically releasing or removing annular rubber collars of greater length. Thus, a transfer sleeve embodying a plurality of sleeves could be constructed and each sleeve would extend beyond the next outermost sleeve a sufficient distance to provide a straight or cylindrical portion and a tapered or conical portion of approximately the same axial extent. With such a transfer sleeve it is apparent that there would be a plurality of stages in the operation of the sleeve as each consecutive inner sleeve would be caused to move relative to the next adjacent outer sleeve by the compressive force of the annular rubber member. In other words, beginning with the innermost sleeve, the sleeves would successively telescope.

It is contemplated that various changes and modifications may be made without departing from the scope of the invention and it is intended to cover such changes as come within the claims.

I claim as my invention:

1. A device for applying a resilient annular protector to drill pipe, including an inner sleeve provided with a tapered end, an outer sleeve mounted on said inner sleeve and slidable ax-

ially thereof, said outer sleeve being shorter than said inner sleeve and having a tapered end at the end thereof corresponding to the tapered end of said inner sleeve, and releasable means for holding said sleeves against relative axial movement in either direction with the tapered end of said inner sleeve extending outwardly of and spaced from the tapered end of said outer sleeve, said sleeves being proportioned to receive an expanded protector in position to overlie the tapered end portions of both sleeves and said taper as well as said spacing being so proportioned that said protector, through its inherent resiliency, tends to move said sleeves axially and to slide off said device when said sleeves are released for relative axial movement.

2. A device for applying a resilient annular protector to drill pipe, including an inner sleeve provided with a tapered end, an outer sleeve mounted on said inner sleeve and slidable axially thereof, said outer sleeve being shorter than said inner sleeve and having a tapered end at the end thereof corresponding to the tapered end of said inner sleeve, fluid operable releasable means for holding said sleeves against relative axial movement in either direction with the tapered end of said inner sleeve extending outwardly of and spaced from the tapered end of said outer sleeve, said sleeves being proportioned to receive an expanded protector in position to overlie the tapered end portions of both sleeves and said taper as well as said spacing being so proportioned that said protector, through its inherent resiliency, tends to move said sleeves axially and to slide off said device when said sleeves are released for relative axial movement; and means for limiting the extent of possible relative axial movement of said sleeves.

3. A device for applying a resilient annular protector to drill pipe or the like comprising an inner sleeve, an outer sleeve slidable on said inner sleeve, said outer sleeve being shorter than said inner sleeve, said sleeves each having a tapered surface at corresponding ends, means for releasably holding said sleeves against relative axial movement in either direction and so spaced that said sleeves are adapted to receive an expanded protector positioned partly on each sleeve and the tapered surfaces thereof, said spacing and taper being so proportioned that said protector is effective to cause its own removal from said sleeves when said releasable holding means is released by causing said inner sleeve to telescope into said outer sleeve and permit a portion of said protector to engage the drill pipe and subsequently to force the two sleeves as a unit out from the remainder of the protector.

4. A device for applying a resilient annular protector to drill pipe, including an inner sleeve provided with a tapered end, an outer sleeve mounted on said inner sleeve and slidable axially thereof, said outer sleeve being shorter than said inner sleeve; means for limiting the extent of possible relative axial movement of said sleeves, and releasable means for holding said sleeves against relative axial movement in either direction with the tapered end of said inner sleeve extending outwardly of and spaced from the corresponding end of said outer sleeve, said sleeves being proportioned to receive an expanded protector in position to overlie the tapered end portion of the inner sleeve and the adjacent end of the outer sleeve; and said taper as well as said spacing being so proportioned that said protector, through its inherent resiliency, tends to initially move said inner sleeve axially and tends to slide off said device when said sleeves are released for relative axial movement.

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