

1

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TERMINAL FOR ARMORED HOSE

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ABSTRACT OF THE DISCLOSURE

A cup having a frusto-conical bore and flanged ends receives sequentially a sleeve extending through the smaller end of the bore, a lead tube, second and third sleeves. All sleeves have shoulders and walls tapering in thickness away from the shoulder. A hose end extends through the bore of the first sleeve and lead tube. The wall of the second sleeve extends between the outer armor layer and a plastic, tubular liner of the hose. The wall of the third sleeve extends into the liner. The telescoping terminal is assembled by forcing a plate axially against the larger bore end of the cup. Hose lengths are joined by bolting these terminals together. Gripping is enhanced by slotting the ends of the first sleeve and by forcing an adhesive between the cup and lead tube through radial holes in the cup.

This invention relates to an improved telescoping terminal for a hose. More particularly it relates to a terminal for a hose which comprises a tubular liner and an armor layer therearound.

An object of the invention is to provide a terminal for high-pressure hose including a cup in which the hose end is secured by means which separately grip the tubular liner and the armor layer.

Yet another object of the invention is to provide a terminal adapted to reduce appreciably the risk of cracking to which the tubular liner is subject.

A further object of the invention is to provide a terminal having an adhesive mass impregnating the outermost surface of the armor layer within the cup.

Our invention which achieves the foregoing and further objects will become apparent from the following specification when read in conjunction with the attached drawings, wherein:

FIGURE 1 is a longitudinal sectional view, partly in elevation, through the axis of the terminal of our invention;

FIGURE 2 is a vertical section taken on line II-II of FIGURE 1;

FIGURE 3 is a longitudinal sectional view through the axis of a shouldered sleeve forming part of the terminal; and

FIGURE 4 is a longitudinal sectional view, partly in elevation, through the axis of a second shouldered sleeve, also a part of the terminal.

Referring more particularly to the drawings, the terminal of our invention, adapted to form part of a coupling or to be secured to an anchorage, includes a cup 10 having a frusto-conical bore 11, an internal flange 12 at the smaller end of the bore and an external flange 13 at the larger end thereof. Flange 12 is dimensioned to receive a hose end 14 inserted therethrough. Flange 12 preferably has a conical bore 15. Circumferentially spaced bolts 16 through flange 13 serve to attach the terminal to any suitable part, for example, a means 17 which may be a blind flange useful in assembling the terminal as will be described hereinafter. Such a blind flange may be retained on the terminal after assembly. If hose lengths are to be coupled, means 17 may be a duplicate of cup 10.

Hose 14 comprises a tubular liner 18 and an armor

2

layer 19 therearound. Liner 18 may be made of any suitable material, preferably a plastic, for example, a polyvinyl chloride resin. Armor layer 19 comprises one or more layers of flexible material, i.e. wire or ribbon of metal or other suitable material.

A sleeve 20 has an external shoulder 21 seated against flange 12 and bore 11. The sleeve has a generally frusto-conical wall 22 tapering in thickness inwardly away from shoulder 21 and fitting snugly the exterior of armor layer 19. The outer tapered surface 23 of wall 22 engages conical bore 15 and extends inwardly therebeyond. The inner surface of sleeve 20 preferably comprises a conical bore 24 and a cylindrical bore 25, said bores intersecting at a circle 26, as shown in FIGURE 3. To provide an enhanced, resilient grip or clamping means on hose 14, sleeve 20 preferably has circumferentially spaced radial slots 27, 28 extending partially through the sleeve from the respective ends thereof. Preferably, the slots are diametrically spaced from each other and are substantially equal in length. Sleeve 20 may be provided only with inwardly extending slots 27 and slots 27 may out-number slots 28.

A spacer tube 29, preferably frusto-conical in shape, has its outer surface 30 and its inner bore 31 fitting snugly the cup bore 11 and armor layer 19, respectively. The inner end 32 of tube 29 is seated against shoulder 21 of sleeve 20. Preferably, the inner bores 24, 31 of sleeve 20 and tube 29, respectively, should be substantially on a straight-line, as seen in section in FIGURE 1. Tube 29 is substantially non-resilient and is preferably made of lead.

A second sleeve 33 has an external shoulder 34 seated against the other end 35 of tube 29 and cup bore 11. The sleeve has a generally frusto-conical wall 36 tapering in thickness inwardly away from shoulder 34 and extending between armor layer 19 and tubular liner 18. An outer tapered surface 37 of wall 36 engages the inner surface 38 of armor layer 19. The inner surface of sleeve 33 preferably comprises a conical bore 39 and a cylindrical bore 40, said bores being joined at a circle 41, as shown in FIGURE 4. Circumferentially spaced, tapped holes 42 in shoulder 34 are used for a purpose to be described.

A third sleeve 43 has an external shoulder 44 seated against the external shoulder 34 of sleeve 33. An outer tapered surface 45 of sleeve 43 extends into and engages the inner surface 46 of liner 18. The inner, cylindrical surface 47 of sleeve 43 has an internal diameter substantially the same as that of hose 14. Circumferentially spaced tapped holes 48 and a circumferential groove 49 in shoulder 44 are used for purposes to be described. In the above description some of the described elements have conical bores and exterior surfaces. The slope or taper thereof may vary between about 2° and 4°. A uniform slope throughout of about 3° is preferred.

In assembling the terminal, the armor layer 19 on the outer end of the hose is cut off so that liner 18 protrudes somewhat as shown in FIGURE 1. Cup 10, with the first sleeve 20 and lead tube 29 therein, is placed over the outer end of the hose. The armor layer 19 is then separated from liner 18 and second sleeve 33 is inserted therebetween. A plug or mandrel, not shown, may then be inserted in the hose to expand liner 18, after heating the latter to about 150° F. to avoid the cracking thereof. Third sleeve 43 is then inserted in expanded liner 18. A blind flange 17 is then bolted to flange 13 after positioning a liquid-sealing ring 50 in groove 49 and a corresponding circumferential groove 51 in flange 17. The resulting axial pressure over the area of cup bore 11 tends to press the second and third sleeves 33 and 43, respectively, into liquid-sealing engagement with the liner 18 of the hose end. The first sleeve is thereby tightened against the outside surface of the armor layer. When cut in the ends of this sleeve, the slots 27, 28 close appreciably,

more particularly slots 27. The axial force also compresses lead tube 29 to fill the interstices in the outer surface of the armor layer to provide gripping action. Blind flange 17 may remain in place or have substituted therefor, for example, a terminal assembled as described above or an equipment facility such as a tank, pump, well-head casing or another coupling.

Thereafter, spaced circumferential openings 52 may be drilled to extend radially inwardly through cup 10 and tube 29. The outer ends 53 thereof may be tapped to receive high-pressure fittings 54. A pump, not shown, may then be used to force any suitable adhesive mass, for example, an epoxy resin into openings 52 and then around the armor layer to impregnate at least the outermost surface thereof to provide additional resilient gripping action. Pumping is discontinued when resin is extruded from slots 28 of sleeve 20. From four to six openings have been found adequate to impregnate the outer surface of the armor layer in the cup.

In disassembly, cap screws, not shown, are inserted in holes 48 and turned until the pressure of the screws on shoulder 34 extracts sleeve 43 from the cup. A plate, not shown, may then be bolted to the outer end of shoulder 34 by means of bolts also inserted into holes 42. The terminal is then anchored and the plate attached to extracting means, for example, a winch, to extract the plate and sleeve 33. It is thereafter relatively simple to remove the other components of the terminal.

It will be evident from the above description that our invention has a number of novel features and advantages. The hose is particularly useful for high-pressure service, for example, in oil lines. Such lines must be cleaned periodically of paraffin deposits on the walls thereof, for example, by passing a ball or mandrel therethrough. This terminal does not restrict the bore in any way. It is particularly suited for a hose utilizing a plastic liner which has a smooth surface and is resistant to chemical attack. The plastic liner, however, is more rigid and brittle. One of the more important advantages of our terminal is that it has been designed to reduce appreciably the risk of cracking a plastic liner when clamped or gripped. Some conventional terminals or couplings provide rather abrupt shoulders inwardly of a hose end that would favor liner cracking. Our slotted sleeve 20 produces a tight clamp, yet maintains a gradual change in diameter outwardly of the clamping members, namely, the first and second sleeves, from the unsecured or exposed portion of the hose. More particularly, the outer armor layer is snugly held by cylindrical bore 25 and conical bore 24 of the first sleeve and conical bore 31 of tube 29. The inner armor layer is snugly held by the frusto-conical wall 36 of the second sleeve which preferably should extend inwardly so that a transverse vertical plane would pass through the end thereof and circle 26 of sleeve 20. Clamping pressure, with appreciable resilience to prevent cracking of the plastic liner, is provided by slotted sleeve 20, lead tube 29, and the epoxy resin forced into the outer surface of the armor layer.

A corresponding, gradual change in diameter of the plastic liner is provided by the inner cylindrical surface 40 and inner conical surface 39 of sleeve 33, the latter providing clamping engagement of the liner with the outer, tapered surface 45 of sleeve 43. The inner end of sleeve 33 is preferably spaced some distance outwardly of circle

41 of sleeve 33, whereby the diameter change is quite gradual. Preferably, the gradual diameter changes are effected by means of the described conical bores and tapered surfaces having a slope of about 3°. Additional clamping support is provided by the tapered frusto-conical wall 36 of the second sleeve 33 being coextensive longitudinally with at least a portion of the first and third sleeves.

Although we have disclosed herein the preferred telescoping hose terminal of the invention, we intend to cover as well any change or modification therein which may be made without departing from the spirit and scope of the invention.

We claim:

1. A telescoping terminal for the end of a hose including a tubular liner and an armor layer therearound comprising a cup having a frusto-conical bore, an internal flange at the smaller end of the bore and an external flange at the larger end thereof, said internal flange being dimensioned to receive said hose end, a shouldered sleeve extending through and seated against said internal flange and fitting snugly the exterior of said armor layer, a spacer tube in said cup having one end seated against the shoulder of said sleeve, the bore of said tube fitting snugly the exterior of said armor layer, a second shouldered sleeve in said cup seated against the other end of said tube, said second sleeve having a frusto-conical wall tapering in thickness away from its shoulder and extending between the armor layer and liner at the hose end, a third shouldered sleeve in said cup seated against the shoulder of said second sleeve and extending into said liner, whereby force applied axially over the area of said first-mentioned bore tends to press said second and third sleeves into the hose end.

2. A terminal as defined in claim 1 characterized by spaced circumferential openings extending radially inwardly through said cup and tube and an adhesive mass filling said openings and impregnating at least the outermost surface of said armor layer in said cup.

3. A terminal as defined in claim 1 characterized by said first sleeve having circumferentially spaced radial slots extending inwardly partially through said sleeve from one end thereof.

4. A terminal as defined in claim 1 characterized by the tapered frusto-conical wall of said second sleeve being coextensive longitudinally with at least a portion of said first and third sleeves.

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