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London, WC1N 2DD(GB)(54) **Liquid coating apparatus for cylindrical object.**

(57) An apparatus for applying a liquid coating to a cylindrical object (22) comprising substantially circumferential conduits (12) containing one or more inwardly placed apertures (32).

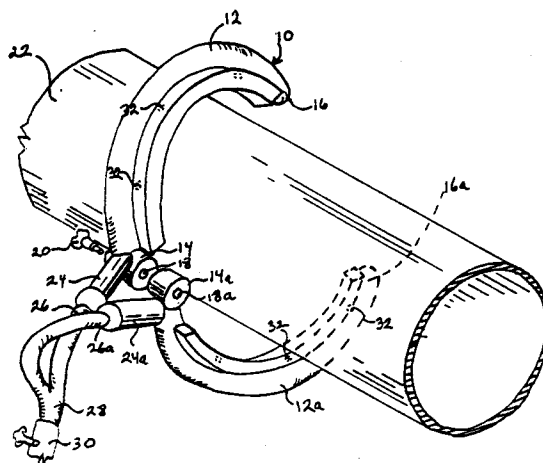


FIG. 1

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The present invention relates in general to apparatus' and methods of applying liquid coatings onto cylindrical objects, and specifically to pipelines.

To offer protection against corrosion and other degradative forces, it is well known in the art to provide inground pipes with a protective outerwrap. An illustrative efficacious protective outerwrap comprises a rubber-based adhesive on the pipe surface and an outer tough corrosion and weather-resistance film overlying the adhesive layer. Typically, the weather-resistant film is a polyolefinic backing. However, it is most advantageous to first apply a primer coating to the pipe surface in order to increase adhesion so as to assure a complete seal thereby preventing environmental contact with the pipe surface to inhibit if not completely alleviate corrosion.

Pipes intended for inground application are either prepared for inground implantation in the aforementioned manner in a plant or on site. If the preparation is performed in a plant, the pipe is segmented to facilitate transportation and consequently requires joining on site. If the preparation occurs at the site, however, the protective wrap is applied in a continuous uninterrupted fashion. Given the magnitude of pipeline programs, numerous apparatus have been developed to facilitate in-plant or on-site pipewrapping techniques.

Usually such apparatus are multifunctional. Thus, for instance, one may wrap and prime, and in the on site operation given environmental contamination one may clean, prime and wrap. Illustrative of such apparatus is Evans Pipeline Company (CRC) cleaning, priming and wrapping machine.

Given the primary objective of priming, namely a uniform application, the application techniques vary between in-plant and on-site preparation. With in-plant preparation, even application and distribution of primer is easily accomplished by rotating the pipe while applying the primer. The primer can be applied manually or by machine via brushing, spraying or rugging, i.e., saturating a piece of cloth or other absorbent material and applying it to the pipe surface.

In contrast, with on-site preparation an even distribution is problematic since the pipe is not segmented and thus cannot be rotated. Consequently, an alternate technique for applying the primer evolved. The most widely used technique works on the principle of flushing the pipe with primer and recycling the excess. This is mechanically accomplished by inserting the beginning of a pipeline into an apparatus having an opening slightly larger than the diameter of the pipe, one or more spray nozzles and one or more supply tanks. Usually the primer apparatus itself is a shoe which during operating is full of primer so that the pipe is

in a sense completely immersed in a batch of primer. Typically one or more ring type brushes are secured on either side of the priming shoe to promote even distribution of the coating, while the machine moves along the surface. Finally, to further assure even distribution of the primer the apparatus is usually equipped with a piece of material, which moves along behind the primer dispensing means and completely surrounds and is attached to the dispensing means, so as to evenly distribute the dispensed primer onto the pipe surface. Said material is known in the art as a drag sock.

The aforementioned apparatus which successfully accomplished an even distribution of primer, is either a free standing machine or is part of a multifunctional machine such as the clean, prime and wrap machines which rapidly advances along the enormous lengths of pipelines. Notably while such machines are highly successful, their use is limited to pipes which have free ends. This limitation is not problematic with new pipelines, however when reconditioning pipelines, it necessitates a free end and hence mandates stopping the pipeline in operation, making this technique highly undesirable given its economic implications.

The reconditioning industry has therefore taken a step back in time so as to apply primers manually with rolls and brushes, etc. While manual application is conceivable for small areas requiring reconditioning, the disadvantages are readily apparent when considering major reconditioning projects.

Notably, the pipeline reconditioning industry has engaged in some automation, namely a hydro-cleaning machine and a heating machine, but a primer coating machine is not known to the present applicant.

Canadian Ultra Pressure Services (CUPS) has developed a Pipeline Hydro Cleaning Machine which removes corrosion products by means high-pressure water jets. In operation the pipe is lifted out of its bed by using a side boom which in turn stabilizes the machine and pulls the high pressure waterjets along the line of travel. The cleaning machine is self-propelled for line travel and self-compensating to allow for dents and out-of-ground pipe. Moreover, the machine comprises opening means which enables one to attach it directly to a midsection of pipe, thereby eliminating the need for a free end.

Likewise, the aforementioned heating machine eliminates the need for segmentation and is fully described in U.S. Patent No. 4,780,158 hereby incorporated by reference, and issued to the present application. Said machine advantageously comprises a pair of semi-circular fuel conduits, thereby eliminating the necessity for a free end.

The advantages of being able to apply a pipeline conditioning apparatus midway, can be summarily identified as not necessitating interruption of the pipeline operation. In other words, pipelines need not be taken out of operation and disassembled so that a reconditioning apparatus can be placed over a free end and moved along to pipe until the area to be reconditioned is reached.

Consequently, it is a primary objective of this invention to recondition pipe without taking the pipeline out of operation. Moreover, the objective is to apply the apparatus at the exact point where reconditioning is required and not at a pipeline joint and then moving said apparatus to the reconditioned area. Although it may appear trivial at which point to attach an apparatus, given the size and length of pipe segments as well as the expense and time of undigging the segments, a difference of 10 versus 20 feet, matters.

The task of the present invention, simply stated is to provide for an evenly distributing liquid coating means which is operable without interrupting pipeline operation. The present invention solves this task in an elegant and efficient fashion by providing for a liquid coating means which comprises hinged preferably extendable conduit sections which allow for encircling of the pipe and hence coating without disrupting pipeline operations.

The invention may be put into practice in various ways and one specific embodiment will be described by way of example to illustrate the invention with reference to the accompanying drawings, in which:

Figure 1 is a perspective view illustrating the novel coating dispenser and the manner of its placement over the pipe to be coated; and

Figure 2 is a similar view to Figure 1 showing the dispenser in placement around the pipe.

Figure 1 illustrates the manner of applying the novel circumferential liquid coating means, 10, to an operational pipeline. As shown, the novel coating means comprises two conduit sections 12, 12(a) which combined allow for total surrounding of the circumference of the pipe (22). Conduit sections 12 and 12(a) have hinged ends 14 and 14(a) and opposed (distal) closed ends 16 and 16(a) respectively. The hinged ends 14 and 14(a) are provided with central coaxial holes 18 and 18(a) through which an axial pin 20 is positioned to afford a pivot so that the ends 14 and 14(a) are pivotally engaged in order that the opposed ends 16 and 16(a) are free to swing from an open position, thereby enabling the coating means to be placed around the pipe, to a closed position when dispensing coating. To facilitate use with pipes of varying circumferential diameter, the conduit sections 12 and 12(a) may be extendable (not shown).

By way of illustration and not limitation, extendability may be accomplished by incorporating a telescoping mechanism into the conduits 12 and 12(a).

The conduit sections 12 and 12(a) are each provided with feed arms 24 and 24(a) adjacent their hinged ends for connection to a source of the liquid coating. As shown, the feed arms 24 and 24(a) are connected to the leading ends 26 and 26(a) of a bifurcated hose, 28, the trailing end of which (not shown) is connected to a liquid supply source (also not shown). The liquid coating may be fed into the hose 28 by per se known means, e.g. pumping means, gravity feed or the like. A shut-off valve 30 of per se known construction is provided to control delivery of the liquid coating material.

In order to assure that the coating means is equally spaced from the pipe along the entire pipe circumference, spacing means (not shown) may be provided at spaced intervals along the inner surface of the sections 12 and 12(a). In a preferred embodiment the spacing means consist of one or more roller (s) (not shown) which advantageously facilitate uniform application as well as pipeline travel along the pipe during operation. Notably said spacing means may be adjustable so as to be employed with varying pipe diameters.

As shown, the conduits 12, 12a are provided with a plurality of apertures 12, which may be uniformly spaced along the inner surface of the arcuate segments 12 and 12(a). Alternatively, the segment 12 may have one centrally disposed aperture, which in operation dispenses a coating from atop the pipe and the coating is evenly distributed by use of gravitational force. In using a plurality of spaced apertures, the coating is even more evenly distributed than by the use of gravitational force. In addition an even distribution may be further enhanced by use of a sock (not shown) which may be attached to one or both segments 12 and 12(a) in a manner which allows for it dragging behind the line on which the coating means 10 travels while dispensing liquid coating material.

In still a further embodiment, coating means, 10, may be mounted on a movable base (not shown), such as rollers, conveyor belt or tracks, etc., to facilitate pipeline travel.

Lastly, the coating means 10 may be joined with the novel heating means disclosed in U.S. Patent No. 4,780,158 issued to the present applicant and/or other pipeline conditioning machines to allow for a complete reconditioning unit which is functional without disrupting the pipeline operation.

Since certain changes may be made without departing from the scope of the invention herein described, it is intended that all subject matter heretofore described shall be interpreted as illustrative and not in a limiting sense.

Claims

1. An apparatus for applying a coating to the surface of a substantially cylindrical article comprising:
 - (a) a pair of substantially circumferential conduits, each of said conduits having one or more apertures spaced there along and adapted for emitting a liquid coating for coating the said article, the said conduits being articulated together at one of their respective ends whereby the opposed ends of the said conduits are movable from a spaced apart position for placement around the circumference of the said cylindrical article to a closed position wherein the said opposed ends are substantially in juxtaposition to encircle the said cylindrical article with said aperture(s) directed toward the surface of said article; and
 - (b) means for introducing a liquid coating into the said conduits.
2. Apparatus as claimed in Claim 1, characterised in that the cylindrical article is a pipeline.
3. Apparatus as claimed in Claim 1 or Claim 2, characterised in that it further comprises adjustable spacer means engaging the surface of the said cylindrical article to position each of the said apertures substantially equidistant from the said surface.
4. Apparatus as claimed in Claim 3, characterised in that the spacer means comprise rollers.
5. Apparatus as claimed in Claim 1, 2, 3 or 4, characterised in that it further comprises a movable base upon which the apparatus is mounted.
6. Apparatus as claimed in Claim 5, characterised in that the base contains at least one roller.
7. Apparatus as claimed in any one of Claims 1 to 6, characterised in that it further comprises a sock positioned on the circumferential conduits so as to encircle the cylindrical article; the said sock being attached in the opposite direction to the movement of the said apparatus, so as to drag behind the said apparatus when the apparatus is dispensing liquid coating material.
8. Apparatus as claimed in any one of Claims 1 to 7, characterised in that the said conduits are extendable to vary the circumferential dimensions of each of the said conduits.
9. A method for applying a coating to a pipeline or other cylindrical article, comprising the steps of:
 - (a) encircling the said pipeline with an apparatus as claimed in any one of Claims 1 to 8;
 - (b) introducing liquid coating into the said apparatus to coat the circumference of at least a portion of the said pipeline or other cylindrical article.
10. A method as claimed in Claim 9, further comprising the step of traversing the said apparatus along the said cylindrical article to evenly dispense liquid coating on the surface thereof.

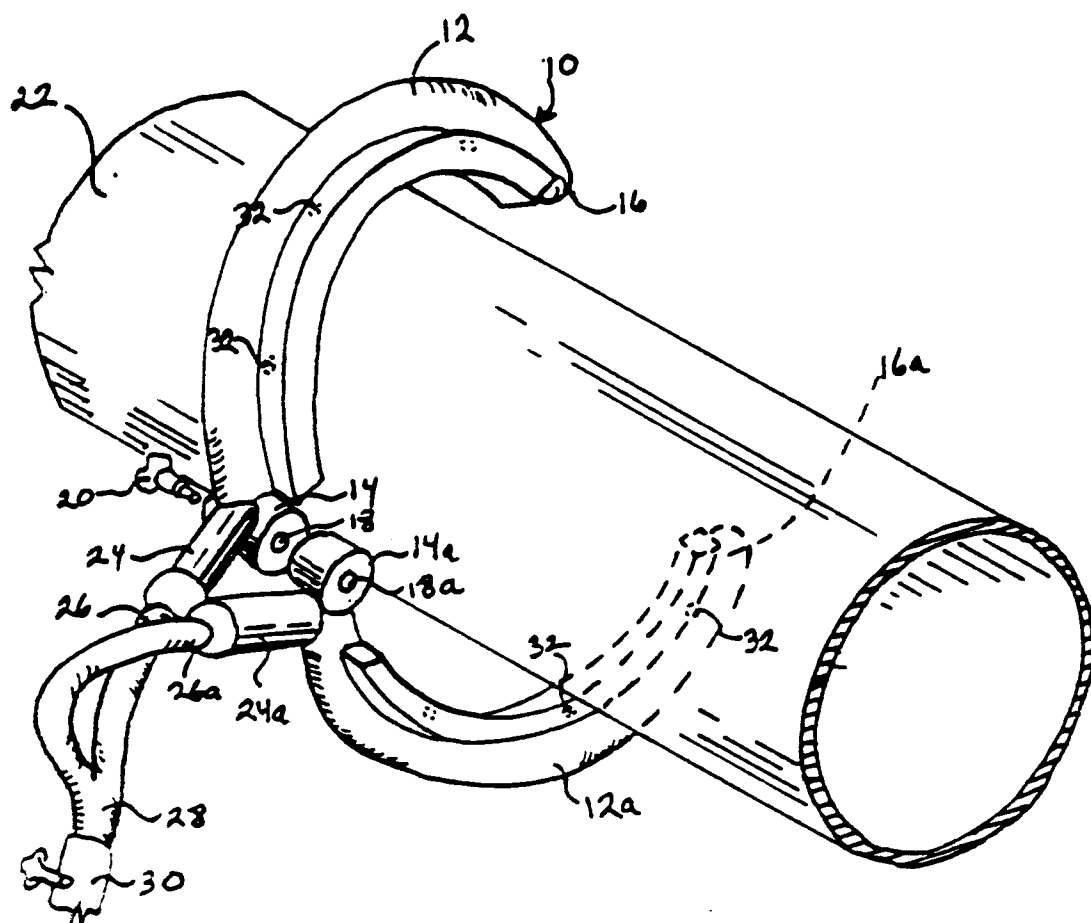


FIG. 1

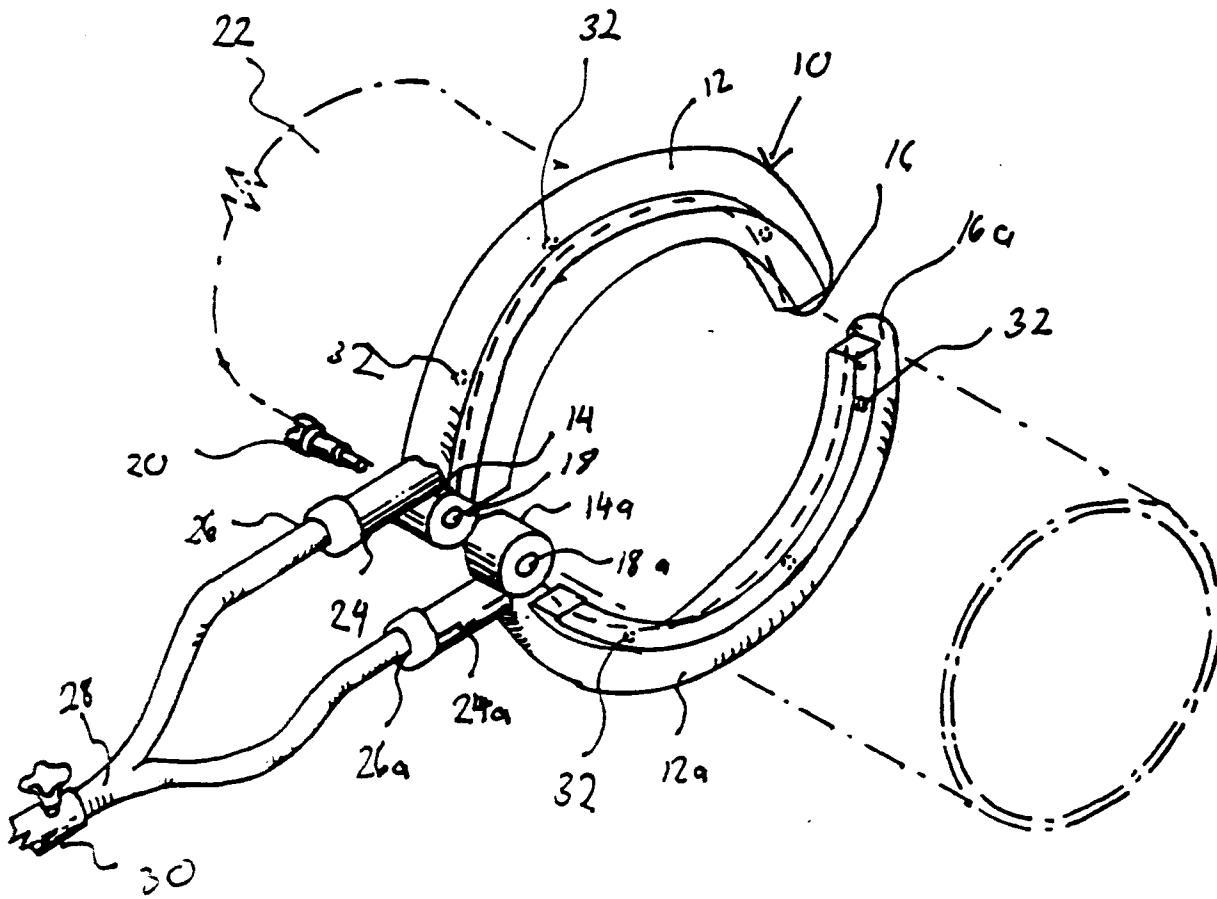


FIG. 2



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EUROPEAN SEARCH REPORT

Application Number

EP 90 31 3634

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int. Cl.5)
X	US-A-4 076 175 (BERT) * Abstract; figure 1; column 1, lines 8-10,22-27; column 2, line 23 - column 3, line 18 *	1,2,5,8 -10	B 05 B 13/02
Y		3,4,7	
A		6	
D,Y	US-A-4 780 158 (THOMAS) * Claims 1-3 *	3,4	
Y	GB-A-1 344 475 (ICI) * Fig.; page 2, column 1, lines 15-49 *	7	
A	EP-A-0 307 527 (LESIEUR) * Abstract; figure 1 *	1	
A	EP-A-0 200 983 (FOSECO) * Figure 3; page 8, line 22 - page 9, line 26 *	1	
			TECHNICAL FIELDS SEARCHED (Int. Cl.5)
			B 05 B
The present search report has been drawn up for all claims			
Place of search THE HAGUE		Date of completion of the search 15-07-1991	Examiner GUASTAVINO L.
CATEGORY OF CITED DOCUMENTS X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document			