(54) Title: REUSABLE POLYURETHANE PROTECTION JACKET

(57) Abstract: A protective wrap (11) comprises a sheet of resilient plastics material, formed as a web of interconnected bands (12), defining a plurality of hexagonal holes (13). The wrap (11), is a generally rectangular sheet with one dimension approximately equal to the outside diameter of an elongated pipe. Edges, (14 and 15) are each provided with a plurality of terminal portions (16 and 17) respectively. The terminal portions (16) on a first edge (14) each carry a pair of tongues (18) spaced by a gap (19) while the terminal portions (17) on the second edge (15) each carry a single tongue (21) having a width allowing a close fit within the respective gaps (19) between respective pairs of tongues (18) on the first edge (14). The tongues (18, 21) are each provided with a holes (22, 23) oriented with their axes parallel to the edge (14, 15) and the holes (22) are aligned on common axes. A chord, pin or rod (25) is inserted through all of the holes to fasten the wrap around the pipe.
Published:
— with international search report
Reusable polyurethane protection jacket

Introduction
The present invention relates generally to methods of transporting elongate materials and in particular, the invention provides a protective covering, and for a method of protecting, piping for oil and gas drilling or other elongate material requiring protection from impact damage, in transit.

Background of the Invention
Typically, piping for oil and gas offshore drilling platforms is protected in transit by wooden slats, 50 x 10 mm, extending the length of each length of piping. Multiple slats are located around each length of piping and are held in place by metal bands.

The wooden slats present problems during transport and on the drilling rig because they are bulky, causing a load of piping to be bulkier than necessary and presenting problems for disposal. The wooden slats are also often damaged in transit or while being removed from the tubing, presenting a safety hazard and making re-use uneconomical.

Summary of the Invention
According to a first aspect, the present invention consists in a wrap for protecting an elongate member during transport and handling, the wrap comprising a substantially rectangular sheet of resilient flexible material provided with co-operating first and second joining means respectively carried along each of two opposed edges, whereby the first and second joining means are inter-engageable with one another when the wrap is located wrapped around the elongate member, the first and second joining means having a separation whereby when wrapped around the elongate member, the joining means can fully inter-engage without significant tension in the wrap, and a dimension of the wrap along the opposed edges carrying the joining means being greater than or equal to a length of the elongate member.

According to a second aspect, the present invention consists in a method of protecting an elongate member in transport comprising:

i) wrapping a protective wrap, as described above, about the elongate member;

ii) inter-engaging the joining means to secure the wrap.

In one embodiment the joining means are arranged to receive separate fastener means to releasably retain the joining means in inter-engagement.
However in other embodiments the joining means are self-retaining by virtue of their shape and inter-engagement.

Preferably, the wrap is formed of a resilient plastics material such as polyurethane. The wrap may be moulded by any conventional moulding technique such as injection moulding, but particularly lends itself to pour-cast moulding.

The sheet may be solid and unperforated, but is preferably provided with openings to reduce weight and manufacturing cost. In a particularly preferred embodiment, the sheet is of honeycomb structure with hexagonal openings separated by narrow moulded bands of plastics material. The bands at their narrowest point preferably have a width less than half of the width of the openings and more preferably less than one third the width of the openings and a thickness substantially equal to their width at their narrowest point.

The joining means may employ hooks or clips or a variety of other forms.

In one advantageous embodiment the joining means comprise a plurality of tongues along each of the opposed long edges of the wrap, with the tongues of each edge offset from those of the other edge to inter-engage when the wrap is wrapped around the elongate member. The tongues on each edge are preferably provided with a set of transverse holes substantially aligned on a common axis such that when the wrap is wrapped around the elongate member and the tongues are inter-engaged, the holes in the tongues of both edges are aligned for insertion of an elongate pin, wire, rod or chord, to releasably fasten the tongues of the two edges together.

In the illustrated embodiment, sets of tongues are located at spaced locations along the respective edges of the wrap with each set comprising one or more tongues on each of the opposed edges. In the preferred embodiment, each set of tongues comprises a pair of tongues on a first edge, separated by a gap equal in width to a width of a corresponding single tongue on the opposite edge and located to engage between the pair of tongues of the first edge. The sets of tongues may either be uniformly oriented with all of the pairs of tongues on the same edge and all of the single tongues on the opposite edge or, alternatively some of the pairs of tongues may be located on each edge with the single tongues similarly alternating.

While the illustrated embodiment envisages pairs of tongues on one edge and single tongues on the other, it is clearly possible to employ other
combinations such as pairs of tongues on each edge or sets of two tongues on one edge and three tongues on the other.

In another embodiment the joining means comprises a groove and projection adjacent each of the opposed edges and running along the respective edge. The projections of one edge press into and engage the groove of the other edge to provide secure joining of the edges. In this embodiment at least one co-operating groove and projection pair include co-operating detent means to retain the respective projection and groove in inter-engagement. In the illustrated embodiment the detent means comprises a ridge or recess running along the length of one of the projections and a co-operating recess or ridge running along the corresponding groove.

Throughout this specification the word "comprise", or variations such as "comprises" or "comprising", will be understood to imply the inclusion of a stated element, integer or step, or group of elements, integers or steps, but not the exclusion of any other element, integer or step, or group of elements, integers or steps.

**Brief Description of the Drawings**

An embodiment of the invention will now be described with reference to the accompanying drawings in which:

- Figure 1 is a top view and two side views of a protective wrap for an elongate member according to a first embodiment of the present invention;
- Figure 2 is a detailed view of a portion of one edge of the wrap of figure 1 and a sectional side view through the same portion;
- Figure 3 is a detailed view of another portion of an opposite edge of the wrap of figure 1 to that shown in figure 2 and a sectional side view of the same portion;
- Figure 4 is a detailed view of the portions of figure 2 and 3 when inter-engaged;
- Figure 5 is an end view of a pipe wrapped in the wrap according to a second embodiment of the present invention of figure 1; and
- Figure 6 is a detailed view of portions of two inter-engaging edges of a wrap according to a second embodiment of the present invention.

**Detailed Description of the Preferred Embodiment**

Referring to Figures 1 to 4, a protective wrap 11 according to an embodiment of the invention is illustrated in plan, side elevation and end elevation. The wrap 11 of Figure 1 comprises a sheet of resilient plastics
material, preferably polyurethane, formed as a web of interconnected bands 12, forming a repeating hexagonal pattern defining a plurality of hexagonal holes 13 in the wrap 11.

The wrap 11, when formed, is a flat sheet of generally rectangular shape with one dimension approximately equal to the outside diameter of an elongated member to be wrapped. In the preferred embodiment, the elongate member for which the protective wrap is designed, is an oil or gas drilling piping having an outside diameter of approximately 400 mm, a nominal bore of 300 mm and a length of approximately 3 meters, however, the dimensions of the wrap will vary from application to application to suit the article requiring protective wrapping.

Two longer edges, 14 and 15 of the wrap 11, which are intended to run longitudinally of the elongate member, are each provided with a plurality of terminal portions 16 and 17 respectively. The terminal portions 16 on a first edge 14, each carry a pair of tongues 18 spaced by a gap 19 while the terminal portions 17 on the second edge 15 each carry a single tongue 21 having a width allowing a close fit within the respective gaps 19, such that when the wrap is wrapped around the pipe, the tongue 21 on the second edge 15 engaged in the gaps 19 between respective pairs of tongues 18 on the first edge 14.

The tongues 18 on the first edge are each provided with a hole 22, oriented with its axis parallel to the edge 14, and all of the holes 22 are aligned on a common axis. Similarly, the tongues 21 on the second edge 15 are provided with holes 23 also oriented on a common axis parallel to the edge 15. When the wrap is wrapped around the pipe 24 (see figure 5), and the tongues 21 are inter-engaged between respective tongues 18, the holes 22 and 23 are located to be aligned with each other. While the holes 22 and 23 are aligned, a chord, pin or rod 25 is inserted through all of the holes to fasten the wrap around the pipe.

When the pipe arrives at its destination and is required to be used, the chord, pin or rod 25 is removed to permit unwrapping of the tubular. The wrap 11 is sufficiently robust to allow transport back to the point of supply of the piping, for reuse.

Referring to Figure 6, a portion of a second embodiment is illustrated. In this embodiment the two longer edge portions, 26 and 27 of the wrap 11 correspond to the edges 16 and 17 of the first embodiment, which are intended
to run longitudinally of the elongate member. The edges 26 and 27 of the second embodiment are provided with long grooves 28, 31 and projections 29, 33, which inter-engage in a zipper-like action when pressed together. A ridge 30 on the edge of the projection 29 co-operates with a recess 32 within the groove 31 to retain the projection 29 in the groove 31 thereby reducing the risk of unwanted opening of the edge fastener. This embodiment while not as securely fastened as the first embodiment has a compensating advantage that it is easier to fasten and does not rely on a separate part which will be easily lost in the field.

The preferred wrap 11 is manufactured from a pour-castable, thermosetting polyurethane material and the holes 22 and 23 are formed by placing removable inserts in the mould prior to casting and removing the inserts from the cast wrap after partial or complete curing.

It will be appreciated by persons skilled in the art that numerous variations and/or modifications may be made to the invention as shown in the specific embodiments without departing from the spirit or scope of the invention as broadly described. The present embodiments are, therefore, to be considered in all respects as illustrative and not restrictive.
CLAIMS:
1. A wrap for protecting an elongate member during transport and handling, the wrap comprising a substantially rectangular sheet of resilient flexible material provided with cooperating first and second joining means respectively carried along each of two opposed edges, whereby the first and second joining means are inter-engageable with one another when the wrap is located wrapped around the elongate member, the first and second joining being separated by a distance whereby when wrapped around the elongate member, the joining means can fully inter-engage without significant tension in the wrap, and a dimension of the wrap along the opposed edges carrying the joining means being greater than or equal to a length of the elongate member.
2. The wrap of claim 1, wherein the wrap is formed of a resilient plastics material such as polyurethane.
3. The wrap of claim 2, wherein the wrap is formed of polyurethane.
4. The wrap of claim 1, 2 or 3, wherein the sheet is solid and unperforated.
5. The wrap of claim 1, 2 or 3, wherein the sheet is provided with openings.
6. The wrap of claim 5, wherein the sheet is of honeycomb structure with hexagonal openings separated by narrow moulded bands of plastics material.
7. The wrap of claim 6, wherein the bands at their narrowest point have a width less than half of the width of the openings.
8. The wrap of claim 6, wherein the bands at their narrowest point have a width less than one third the width of the openings.
9. The wrap of claim 6, 7 or 8, wherein the bands at their narrowest point have a thickness substantially equal to their width at their narrowest point.
10. The wrap as claimed in any one of claims 1 to 9, wherein the joining means are arranged to receive separate fastener means to releasably retain the joining means in inter-engagement.
11. The wrap of claim 10, wherein the joining means comprise a plurality of tongues along each of the opposed long edges of the wrap, with the tongues of each edge offset from those of the other edge to inter-engage when the wrap is wrapped around the elongate member.
12. The wrap of claim 11, wherein the tongues on each edge are provided with a set of transverse holes substantially aligned on a common axis such that when the wrap is wrapped around the elongate member and the tongues are inter-engaged, the holes in the tongues of both edges are aligned for insertion.
of an elongate pin, wire, rod or chord, to releasably fasten the tongues of the two edges together.

13. The wrap of claim 11 or 12, wherein sets of tongues are located at spaced locations along the respective edges of the wrap with each set comprising one or more tongues on each of the opposed edges.

14. The wrap of claim 13, wherein each set of tongues comprises a pair of tongues on a first edge, separated by a gap equal in width to a width of a corresponding single tongue on the opposite edge and located to engage between the pair of tongues of the first edge.

15. The wrap of claim 14, wherein the sets of tongues are uniformly located with all of the pairs of tongues on the same edge and all of the single tongues on the opposite edge.

16. The wrap of claim 14, wherein the sets of tongues are located with some of the pairs of tongues on each edge and the single tongues similarly alternating.

17. The wrap of claim 13, wherein each set of tongues comprises pairs of tongues on each edge and located to engage between the pairs of tongues of the opposing edge.

18. The wrap of claim 13, wherein each set of tongues comprises sets of three of tongues on one edge and a pair of tongues on the other and located to engage between the three tongues of the first edge or sets of two tongues.

19. The wrap as claimed in any one of claims 1 to 9, wherein the joining means self-retaining by virtue of their shape and inter-engagement.

20. The wrap of claim 19, wherein the joining means comprises a groove and cooperating projection adjacent each of the opposed edges and running along the respective edge, the projection of one edge shaped to be able to be pressed into and engage with the groove of the other edge to provide secure joining of the edges.

21. The wrap of claim 20, wherein at least one cooperating groove and projection pair includes cooperating detent means to retain the respective projection and groove in inter-engagement.

22. The wrap of claim 21, wherein the detent means comprises a ridge or recess running along the length of one of the projections and a cooperating recess or ridge running along the corresponding groove.

23. A method of protecting an elongate member in transport comprising:
i) wrapping a protective wrap, about the elongate member, for protecting an elongate member during transport and handling, the wrap comprising a substantially rectangular sheet of resilient flexible material provided with cooperating first and second joining means respectively carried along each of two opposed edges, whereby the first and second joining means are inter-engageable with one another when the wrap is located wrapped around the elongate member, the first and second joining being separated by a distance whereby when wrapped around the elongate member, the joining means can fully inter-engage without significant tension in the wrap, and a dimension of the wrap along the opposed edges carrying the joining means being greater than or equal to a length of the elongate member;

ii) inter-engaging the joining means to secure the wrap.

24. The method of claim 23, wherein the joining means comprise a plurality of tongues along each of the opposed long edges of the wrap, with the tongues of each edge offset from those of the other edge to inter-engage when the wrap is wrapped around the elongate member, and the joining step comprises pressing the respective tongues into inter-engagement.

25. The method of claim 24, wherein the tongues on each edge are provided with a set of transverse holes substantially aligned on a common axis such that when the wrap is wrapped around the elongate member and the tongues are inter-engaged, the holes in the tongues of both edges are aligned and the joining step comprises insertion of an elongate pin, wire, rod or chord, to releasably fasten the tongues of the two edges together.

26. The method of claim 24 or 25, wherein sets of tongues are located at spaced locations along the respective edges of the wrap with each set comprising one or more tongues on each of the opposed edges.

27. The method of claim 26, wherein each set of tongues comprises a pair of tongues on a first edge, separated by a gap equal in width to a width of a corresponding single tongue on the opposite edge and located to engage between the pair of tongues of the first edge.

28. The method of claim 27, wherein the sets of tongues are uniformly located with all of the pairs of tongues on the same edge and all of the single tongues on the opposite edge.

29. The method of claim 27, wherein the sets of tongues are located with some of the pairs of tongues on each edge and the single tongues similarly alternating.
30. The method of claim 26, wherein each set of tongues comprises pairs of tongues on each edge and located to engage between the pairs of tongues of the opposing edge.

31. The method of claim 26, wherein each set of tongues comprises sets of three of tongues on one edge and a pair of tongues on the other and located to engage between the three tongues of the first edge or sets of two tongues.

32. The method of claim 23, wherein the joining means comprises a groove and cooperating projection adjacent each of the opposed edges and running along the respective edge, the projection of one edge shaped to be able to be pressed into and engage with the groove of the other edge to provide secure joining of the edges, and the joining step comprises pressing the projections into inter-engagement with the respective grooves.

33. The method of claim 32, wherein at least one cooperating groove and projection pair includes cooperating detent means to retain the respective projection and groove in inter-engagement.

34. The method of claim 33 wherein the detent means comprises a ridge or recess running along the length of one of the projections and a cooperating recess or ridge running along the corresponding groove.
INTERNATIONAL SEARCH REPORT

A. CLASSIFICATION OF SUBJECT MATTER

Int. Cl.?:
B65D 59/04, 81/127, 85/20, F16L 57/00

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

REFER TO ELECTRONIC DATA BASE CONSULTED BELOW

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

DWPI IPC B65D 59/04, 57/00, 57/18, 57/16, 57/00 and keywords: WRAP, PROTECT, JOIN, COUPLE, ENGAGE, FLEXIBLE, RESILIENT, TONGUE, RECESS, PIPING, TRANSPORT and similar terms

C. DOCUMENTS CONSIDERED TO BE RELEVANT

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[X] Further documents are listed in the continuation of Box C  [X] See patent family annex

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Date of the actual completion of the international search  
24 May 2002

Date of mailing of the international search report  
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This Annex lists the known "A" publication level patent family members relating to the patent documents cited in the above-mentioned international search report. The Australian Patent Office is in no way liable for these particulars which are merely given for the purpose of information.

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