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54 **Bitumen containers.**

57 There is provided a bitumen container having on the interior surface a radiation cured acrylate-based bitumen release coating. Such release coatings can be applied to the web substrate from which the container is formed easily and economically using conventional printing techniques.

BITUMEN CONTAINERS

The present invention relates to containers for bitumen, in particular to containers for hot-filled blown bitumen and to a method for the preparation of such containers.

Blown bitumen is often transported in bitumen kegs. These kegs conventionally are supplied in the form of flattened, open-ended, heavyweight tubes (hereinafter called bitumen keg tubes), e.g. of kraft paper, onto which a metal base is seamed before the resulting keg is hot-filled with the bitumen. To allow ready release of the solid bitumen from the filled kegs, the bitumen keg tubes are provided on their interior surface with a silicone-based release coating.

The conventional silicone release coatings, which are capable of withstanding the temperatures involved in the hot filling of the kegs and which provide adequate release characteristics, may be applied to the substrate webs from which the tubes are formed by routine coating techniques. However the drying time of conventional silicone release coating materials limits the production rate for the bitumen keg tubes, or more generally for the blanks from which the tubes are formed.

We have now surprisingly found that certain radiation-curable varnishes, in particular acrylate-based varnishes, are capable when cured not only of providing a good release surface for solid bitumen but also of withstanding the temperatures experienced in the hot filling of bitumen containers with blown bitumen. The use of such radiation-curable varnishes in the manufacture of bitumen containers has the major advantage that the varnishes may be applied and cured rapidly, for example using offset litho printing techniques. Furthermore the varnish printed web substrate can readily be formed into a one-piece liquid-tight container by simple folding and adhering procedures avoiding the need to stock further components such as the metal bases referred to above and the need to seam the bases to release-coated tubes.

Viewed from one aspect, the present invention thus provides a bitumen container having provided on the interior surface thereof a release coating, characterised in that said coating is a radiation cured acrylate-based bitumen release coating.

The bitumen container of the present invention may conveniently have as the substrate material to which the acrylate-based release coating is applied a paper, card, board or laminate web material, of a thickness and strength adequate to retain the weight of bitumen to be filled into the container. Clay-coated, sized or well-finished paper or board and laminates including laminae chosen for example from metal (e.g. aluminium) foils, plastics webs

and cellulosic webs are particularly preferred. As in the conventional bitumen kegs, the substrate may of course be kraft paper. Preferably however the substrate used will be clay-coated kraft paper as this retains the release coating particularly well.

The radiation-cured acrylate-based release coating is formed by coating the web substrate, preferably whilst still in the form of a continuous web or of discrete sheets, with a radiation-curable acrylate-based varnish and by then exposing the coated substrate to curing radiation. If, as would generally be the case, the substrate receiving the varnish is in sheet or continuous web form, the substrate bearing the cured coating will then, if necessary after first being cut into sections of the desired size, be formed into liquid-tight containers with the coating on the interior surfaces, or alternatively into open-ended bitumen keg tubes with the coating on the interior surfaces which, as with conventional bitumen keg tubes, may have a metal base seamed onto one end to form a liquid-tight bitumen keg. The substrate web from which such containers or kegs are formed preferably includes a fold down closure portion which can be folded down to cover and prevent contamination of the bitumen in the finished and filled containers.

Viewed from another aspect therefore, the present invention provides a method of preparing a bitumen container comprising: applying to a surface of a web substrate a radiation-curable, acrylate-based varnish; exposing the varnish carrying surface of said substrate to curing radiation to cure the varnish to form a bitumen release coating; if required, cutting the bitumen release coating carrying substrate into sections of a desired size; and forming the bitumen release coating carrying substrate into a liquid-tight container having the bitumen release coating on the interior surface thereof.

The varnish used according to the present invention is conveniently a UV-curable or electron beam-curable varnish, preferably a polyester acrylate-based varnish. The varnish may, if desired, contain a photo-initiator to assist cross-linking of the curable polymer component on exposure of the varnish to radiation. In this respect, conventional radiation-curable, acrylate-based varnishes such as 600201 available from Shackell Edwards may for example be used. Such varnishes, which in their conventional use are applied to a printed surface to enhance its gloss and to protect the print from rubbing and scuffing, have in the present invention the particular advantage that they are operator acceptable materials from the health and safety point of view.

The varnish may be coated onto one entire surface of the substrate web, or alternatively may be coated onto only that part of the surface which is to form the interior surface of the finished container. In this way unvarnished areas are left which may readily be bonded to other unvarnished surfaces of the substrate in the final step of folding and adhesive bonding the substrate blanks to form the finished containers or the bitumen keg tubes. The adhesive used should preferably be selected from those capable of withstanding the temperatures encountered during the filling of the containers with bitumen and of withstanding the steam which may be released from the container substrate during the filling operation. In this regard Superlok 60, 61 and 62 adhesives (available from National Adhesives and Resins) are considered suitable. Where no unvarnished areas are left on the substrate then an adhesive capable of bonding to the varnished surfaces will need to be used.

A particular advantage of the present invention lies in the ease and rapidity with which the bitumen release coating may be formed on the substrate web. Thus, while conventional coating techniques may be used, the method of the present invention is particularly suited to the use of printing techniques, and especially offset litho printing techniques, to form the release coating. The acrylate-based varnish may therefore be printed onto the substrate to cover as much or as little of the substrate surface as is desired. Conventional printing apparatus, for example offset litho printing apparatus supplied by M.A.N. Roland Druckmaschinen AG, may readily be provided with curing radiation sources arranged to direct curing radiation onto the varnish-coated surface of the substrate after application of the varnish to the substrate at the or a printing station of the apparatus. The precise positioning of the curing radiation sources is not critical; it is only necessary that the radiation sources direct sufficient radiation onto the varnish-coated substrate surface to cause curing to take place.

Viewed from a further aspect, the invention thus provides a bitumen container blank comprising a web substrate sheet provided on at least the bitumen contact surface with a radiation cured acrylate based bitumen release coating and provided with a plurality of fold lines.

Viewed from a still further aspect, the invention also provides the use of a container according to the invention for containing bitumen.

One embodiment of the present invention will now be described by way of example with reference to the accompanying drawings, in which:-

Figure 1 shows a schematic side elevation of a printing apparatus arranged to apply a bitumen release coating to substrate sheets which can subsequently be formed into bitumen containers according to the invention;

Figure 2 shows a plan view of a substrate sheet from which a bitumen container according to the invention may be formed;

Figure 3 shows a perspective view of a bitumen container according to the present invention formed from the sheet of Figure 2; and

Figure 4 shows a plan view of a further substrate sheet from which a bitumen container according to the invention may be formed.

Referring to Figure 1, there is shown an offset litho printing apparatus 1 having a sheet supply unit 2 arranged to supply substrate sheets 3, for example sheets of paper or card, to a printing station 4 at which a UV-curable acrylate-based varnish is printed onto the upper surface of the sheets by print roll 5 which is itself supplied with the varnish by ink roll 6. Sheets leaving the printing station are engaged by gripper bars 7 attached to a conveyor 8 and are transported thereby past a curing station 9 to sheet receiving and stacking unit 10. At the curing station 9, the varnish coated surfaces of the sheets are exposed to UV radiation from an array of UV-emitting lamps 11 disposed transversely to the sheet transport direction. Typically, the curing lamps will extend for at least the full width of the sheets and will be provided with reflectors 12 to increase the radiation intensity directed at the sheets.

Where 600201 varnish is applied to the surface of 1 metre square sheets passing through the apparatus at a rate of 4 - 5,000 sheets per hour, the UV-curing array might suitably comprise three UV-emitting lamps, each 56" (142 cm) long and each rated at 250 Watts/inch, i.e. a total of 42kW.

As an alternative to the conventional 600201 varnish, use may instead be made of varnishes based on UV-curable acryl modified siloxanes.

A bitumen container blank in the form of a sheet 3 having a cured release coating 13 and with corner portions 14 removed is shown in plan in Figure 2. To produce the finished bitumen container, as shown in Figure 3, an adhesive (such as for example Superlok 60) is applied along the uncoated margins 15 and 16 of sheet 3. The sheet may then be folded first along line A-A' then along line B-B' and finally along line C-C' to bring the adhesive into contact with unvarnished surfaces of the sheet and thereby form a liquid tight bitumen container.

A further bitumen container blank, i.e. a substrate sheet from which the container may be formed, is shown in Figure 4. The sheet 3 is provided with a cured release coating 13 (shaded

in the figure) leaving uncoated side and base margins 16 and 15 to which adhesive may be applied. The sheet, suitably after provision of the release coating, is provided with fold lines 18 shown as broken lines in the figure. These fold lines are creases, lines of weakness, or lines along which the substrate has been compressed which facilitate folding of the sheet to form the container in its desired shape. The sheet includes a closure portion 17 which in the finished container will serve as a fold-down closure to prevent contamination of the bitumen within the container, the closure portion folding down along fold lines F to provide a substantially flat upper surface to the finished and filled container.

It will be appreciated that while the present invention has been described with particular reference to liquid-tight bitumen containers and their preparation, the scope of the invention also includes bitumen keg tubes having provided on their interior surface a radiation-cured acrylate-based bitumen release coating as well as the preparation of such bitumen keg tubes. Viewed from a further aspect, the invention thus also provides a bitumen keg tube provided on its interior surface with a release coating, characterised in that said coating is a radiation cured acrylate-based bitumen release coating.

Claims

1. A bitumen container having provided on the interior surface thereof a release coating (13), characterised in that said coating is a radiation cured acrylate-based bitumen release coating.

2. A container as claimed in claim 1 wherein said release coating is of an ultraviolet-or electron beam-cured polyester acrylate based varnish.

3. A container as claimed in either of claims 1 and 2 which comprises a substrate sheet (3) coated on at least part of one surface with said release coating (13) and folded and adhered to produce a liquid tight container.

4. A container as claimed in claim 3 wherein said substrate sheet (3) is provided with a fold-down closure portion (17).

5. The use of a container as claimed in any one of claims 1 to 4 for containing bitumen.

6. A bitumen keg tube provided on its interior surface with a release coating (13), characterised in that said coating is a radiation cured acrylate-based bitumen release coating.

7. A keg tube as claimed in claim 6 wherein said release coating is of an ultraviolet-or electron beam-cured polyester acrylate based varnish.

8. A method of preparing a bitumen container comprising: applying to a surface of a web substrate (3) a radiation-curable, acrylate-based varnish; exposing the varnish carrying surface of said substrate to curing radiation to cure the varnish to form a bitumen release coating (13); if required, cutting the bitumen release coating carrying substrate into sections of a desired size; and forming the bitumen release coating carrying substrate into a liquid-tight container having the bitumen release coating on the interior surface thereof.

9. A method as claimed in claim 8 wherein said varnish is used an ultraviolet-or electron beam-curable polyester acrylate based varnish optionally containing a photoinitiator.

10. A method as claimed in either of claims 8 and 9 wherein said varnish is applied to at least that part of the surface of said web substrate which is to form the interior surface of the finished container.

11. A method as claimed in any one of claims 8 to 10 wherein said varnish is printed onto sheets (3) of said web substrate.

12. A method as claimed in any one of claims 8 to 11 wherein said web substrate is provided with fold lines (18) along which said web substrate may be folded to form said liquid-tight container.

13. A method as claimed in claim 12 wherein said web substrate includes a fold-down closure portion (17) provided with further fold lines (F) along which said web substrates may be folded to close said liquid-tight container.

14. A bitumen container blank comprising a web substrate sheet (3) provided on at least the bitumen contact surface with a radiation cured acrylate based bitumen release coating (13) and provided with a plurality of fold lines (18).

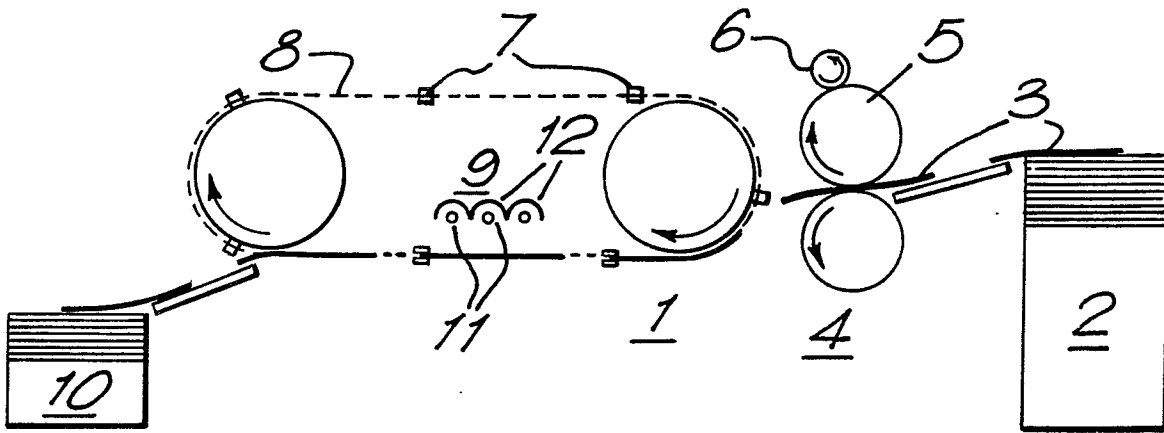


FIG. 1.

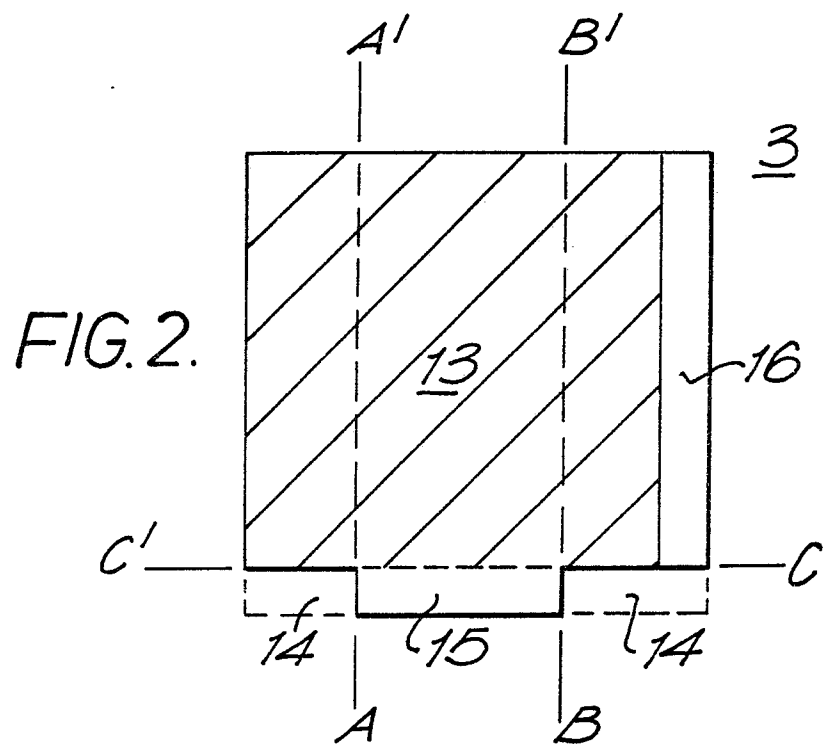


FIG. 2.

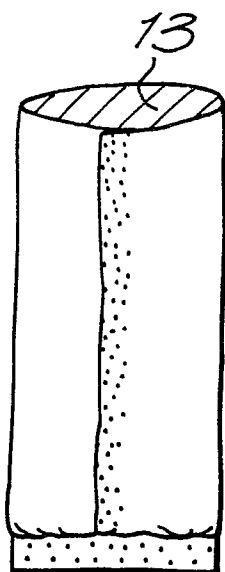


FIG. 3.

