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(72) Inventor: **Abraham, Arthur Graham**
Old Aberdeen AB24 1XP (GB)

(74) Representative: **Allan, James Stewart et al**
Murgitroyd & Company,
373 Scotland Street
Glasgow G5 8QA (GB)

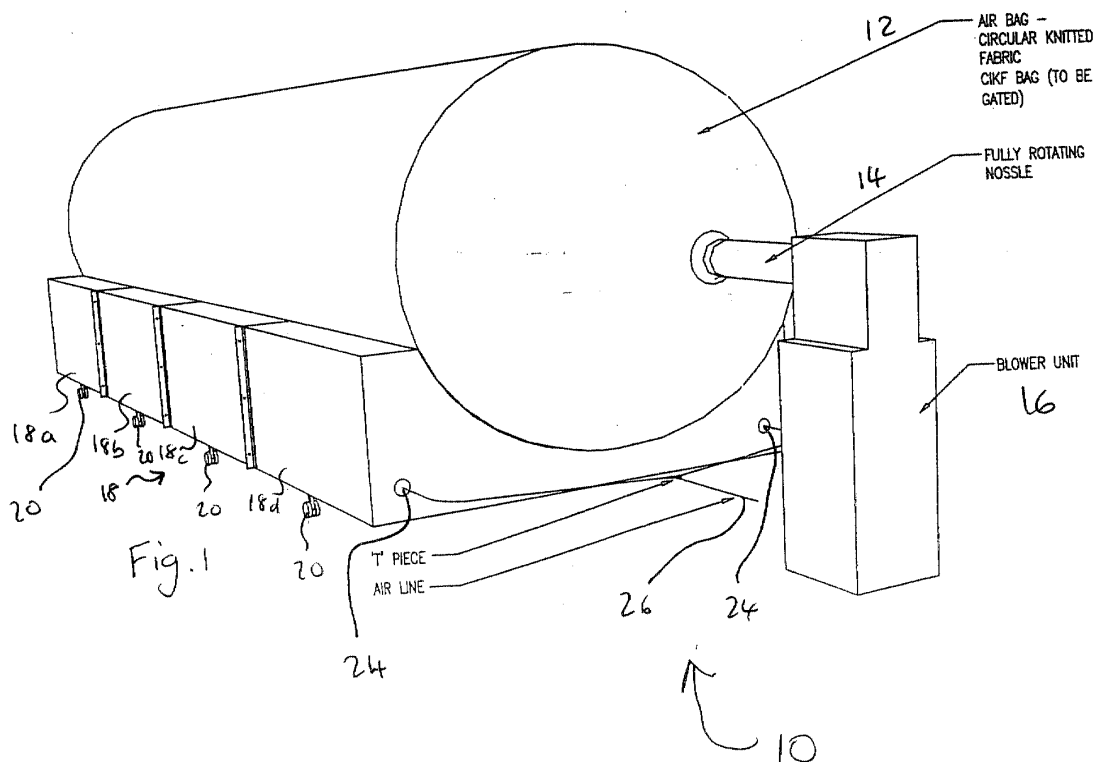
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(71) Applicant: **Prosyst Limited**
Old Aberdeen AB24 1XP (GB)

(54) **Apparatus and method for handling an object**

(57) An apparatus (10) for handling and/or supporting an object (12), such as a large area fabric (12) is described as having a support member in the form of, for instance an inflatable bag and which acts as a mandrel to support the object (12). A movement mechanism such as a motor is arranged to rotate the support member about the longitudinal axis of the support member.

A treating means for treating and curing the object (12) with, for example, water- or gas-proofing materials is also described and may have a pump and/or a heater (16) and may also include a control system to permit control of the temperature of a fluid which is passed from a fluid supply located on one side of a perforated surface (28), through the perforations (30) to the other side of the surface (28) to the location of the object (12).



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Description

[0001] The present invention relates to an apparatus and method for handling an object, and particularly, but not exclusively, relates to the apparatus and method for handling substantially cylindrical objects such as woven fabrics which require to be treated.

[0002] Conventionally, in order to make woven fabrics waterproof, the fabrics are treated with various materials such as plastics which may be PVC and/or silicon and other suitable materials. The materials are normally either spread, sprayed or painted onto the fabric and several layers or applications of material may be required to be applied to the fabric in order to provide a sufficient waterproofing and/or gas proofing thereto. However, if the fabric required to be treated is of a particularly large area, then handling the fabric is a problem since the coating, such as silicon and/or PVC is relatively tacky prior to drying, and hence dirt or other contaminants are liable to adhere to the silicon and/or PVC which may denigrate the eventual waterproofing and/or gas proofing function of fabric. The coated fabric normally requires to have the characteristics of being very strong and also gas/waterproof, and it is conventional to apply the different layers of the coatings in different colours in order to assist the persons applying the materials to view which areas of the fabric has been coated.

[0003] According to a first aspect of the present invention there is provided an apparatus for handling and/or supporting an object, the apparatus comprising a supporting member to support the object and a treating means for treating the object.

[0004] According to a second aspect of the present invention there is provided a method of treating an object, the method comprising supporting the object with a support member and treating the object.

[0005] Typically, the supporting member is shaped to substantially correspond with the shape of the object and/or to act as a mandrel. Preferably, the object is arranged around the support member such that at least a portion of the outer surface of the support member is in contact with, and thereby supports, the object to be treated.

[0006] Preferably, where the object is substantially cylindrical in cross section, the support member is substantially cylindrical in cross section, and more preferably, the support member is inflatable or expandable such that it may be inflated or expanded e.g. to form a cylinder. Typically, the support member is inflated or expanded whilst it is substantially located within the object.

[0007] Typically, a movement mechanism is also provided to move the support member, and preferably, where the support member comprises a longitudinal axis, the movement mechanism is arranged to rotate the support member (and the object when supported by the member) about the longitudinal axis of the support member. Preferably, the longitudinal axis of the support member is arranged substantially horizontally.

[0008] Preferably, the treating means facilitates the drying of materials applied to the object, and the method comprises applying a material to the object. Preferably, the treating means comprises applying heat to the object, and/or applying a flow of fluid to the object. More preferably, the treating means comprises applying a flow of (preferably relatively heated) fluid, which is most preferably air, across the surface of the object. Typically, the treating means comprises a pump and a heater, and preferably, the treating means further comprises a control system to permit control of the temperature of the fluid.

[0009] Typically, the treating means comprises a fluid supply mechanism which is preferably arranged to be in close proximity to at least a portion of the object. Preferably, the fluid supply mechanism comprises a perforated surface, whereby fluid passes from a fluid supply located on one side of the surface, through the perforations and to the other side of the surface to where the object is typically located. Preferably, where the object is substantially cylindrical, the surface is at least partially cylindrical.

[0010] Embodiments of the present invention will now be described, by way of example only, with reference to the accompanying drawings, in which:-

Fig. 1 is a perspective view of an apparatus in accordance with the present invention; and

Fig. 2 is a perspective view of a portion of the apparatus in accordance with the present invention.

[0011] Fig. 1 shows an apparatus for treating a woven or knitted fabric in accordance with the present invention, where the apparatus is generally designated at 10 and the fabric is generally at 12. The fabric 12 is intended to subsequently used a circular air bag which can be utilised to provide buoyancy to objects required to be raised, sunk or moved in water, such as oilrig structures and the like. However, it should be noted that the invention is not limited to the use of the apparatus with such an air bag.

[0012] The apparatus 10 comprises a tubular support member which is in the form of an airtight air bag (not shown) and in Fig. 1, the air bag is located underneath the fabric 12. The air bag in effect acts as a mandrel to support the fabric 12. Hence the mandrel in Fig. 1 is substantially "sausage" shaped. The one end of the mandrel is coupled to a nozzle 14, where the nozzle 14 is further coupled at its other end to an air supply unit 16 via rotatable joint, and is arranged such that the air supply unit supplies air via the nozzle into the interior of the mandrel, where the air bag and nozzle 14 are rotatable via a motor (not shown) located in the air supply unit 16.

[0013] The apparatus 10 further comprises an air bed 18 which, for transporting and storage purposes, is conveniently provided in four sections 18A,B,C,D, where each section 18A,B,C,D is provided with castors 20 to aid movement of the air bed 18. Each of the sections

18A,B,C,D are secured to one another via joints 22 and suitable fastening means such as screws, etc..

[0014] At least one of the sections 18A,B,C,D is provided with air inlets 24 which are coupled via any suitable means such as a hose 26 to a warm air supply unit which may be the same as the air supply unit 16 or alternatively may be a separate unit (not shown).

[0015] Suitable conduits within the sections 18A,B,C,D may be provided to route a portion of the air supply into each separate section 18A,B,C,D. As can be seen in Fig. 2, the uppermost surface of the air bed 18 is provided with a part cylindrical portion 28, where this portion 28 is intended to have the same or slightly greater radius as the mandrel and hence fabric 12.

[0016] Operation of the apparatus 10 will now be described. The fabric 12 is pulled over the partially inflated mandrel to its full extent. The mandrel is then fully inflated, where the full inflation is predetermined to match the intended in-use size of the fabric 12.

[0017] The material to be applied to the fabric 12, such as PVC, silicon or other material, can then be either spread, sprayed or painted or otherwise applied on to the outer surface of the fabric 12. Preferably, the motor is operated at a relatively slow speed such that the fabric 12 rotates about its longitudinal axis as the material is being applied thereby achieving an even application of material. Optionally, brushes or seals 32 can be provided at the junction between the part cylindrical portion 28 and the horizontal uppermost face of the air bed sections 18A,B,C,D, such that when the mandrel and hence fabric 12 are rotated, the seals 32 can be used to scrape away excess treatment material, thus helping to ensure an even treatment of material being applied to the fabric 12. Alternatively, the brushes or seals 32 can be used to help retain the flow of air within the semi-circular annulus between the air bed 28 and lower half of the fabric 12.

[0018] In order to aid a faster curing time of the material being applied, air of a controlled temperature is introduced into the hose 26 and hence into the air inlets 24. A heater with associated control system can be provided, along with suitable sensors, to enable the temperature of the air to be controlled and monitored. The part cylindrical portion 28 is provided with a vast plurality of perforations 30 therein such that the controlled temperature air escapes from the interior of the air bed 18 through the perforations until it flows across the outer surface of the fabric 12, thereby reducing the curing time of the material.

[0019] The invention has the advantage that the fabric 12 is elevated from the floor and hence the risk of dirt and other contaminants making contact with the material once it has been applied to the fabric 12 is vastly reduced. In addition, the inflation of the mandrel provides a standard size of the fabric 12 to be coated, and since the mandrel can be deflated, greatly eases the removal of the treated fabric 12 from the mandrel. In addition, the operation of the air bed 18 greatly reduces

the curing time of the treatment material.

[0020] Modifications and improvements may be made to the embodiments without departing from the scope of the invention.

Claims

1. An apparatus for handling and/or supporting an object, the apparatus comprising a support member to support the object and a treating means for treating the object.
2. An apparatus according to claim 1, characterised in that the support member is shaped to substantially correspond with the shape of the object and/or to act as a mandrel.
3. An apparatus according to either of claims 1 or 2, characterised in that the object is arranged around the support member such that at least a portion of the outer surface of the support member is in contact with, and thereby supports, the object to be treated.
4. An apparatus according to any preceding claim, characterised in that where the object is substantially cylindrical in cross section, the support member is substantially cylindrical in cross section.
5. An apparatus according to any preceding claim, characterised in that, the support member is inflatable or expandable.
6. An apparatus according to claim 5, characterised in that the support member is inflated or expanded whilst it is substantially located within the object.
7. An apparatus according to any preceding claim, characterised in that a movement mechanism is also provided to move the support member.
8. An apparatus according to claim 7, characterised in that the support member comprises a longitudinal axis, and the movement mechanism is arranged to rotate the support member, and the object when supported by the member, about the longitudinal axis of the support member.
9. An apparatus according to either of claims 7 or 8, characterised in that the longitudinal axis of the support member is arranged substantially horizontally.
10. An apparatus according to any preceding claim, characterised in that treating means are further provided to facilitate the drying of materials applied to the object.

11. An apparatus according to claim 10, characterised in that the treating means comprises a pump and/or a heater.
12. An apparatus according to claim 11, characterised in that the treating means further comprises a control system to permit control of the temperature of a fluid. 5
13. An apparatus according to either of claims 11 or 12, characterised in that the treating means comprises a fluid supply mechanism which is arranged to be in close proximity to at least a portion of the object. 10
14. An apparatus according to claim 13, characterised in that the fluid supply mechanism comprises a perforated surface, whereby fluid passes from a fluid supply located on one side of the surface, through the perforations to the other side of the surface to the location of the object. 15
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15. An apparatus according to claim 14, characterised in that the surface is at least partially cylindrical.
16. A method of treating an object, the method comprising supporting the object with a support member and treating the object. 25
17. A method according to claim 16, further characterised in that the supporting member is shaped to substantially correspond with the shape of the object and/or to act as a mandrel. 30
18. A method according to claim 17, further characterised in that the treating means facilitates the drying of materials applied to the object, and the method comprises applying a material to the object. 35
19. A method according to either of claims 17 or 18, further characterised in that the treating means comprises applying heat to the object, and/or applying a flow of fluid to the object. 40
20. A method according to claim 19, further characterised in that the treating means comprises applying a flow of relatively heated fluid across the surface of the object. 45
21. A method according to claim 20, further characterised in that the treating means comprises a pump and a heater. 50
22. A method according to any of claims 19 to 21, further characterised in that the treating means further comprises a control system to permit control of the temperature of the fluid. 55
23. A method according to any of claims claim 19 to 22,
- further characterised in that the treating means comprises a fluid supply mechanism which is arranged to be in close proximity to at least a portion of the object.
24. A method according to claim 19, further characterised in that the fluid supply mechanism comprises a perforated surface, whereby fluid passes from a fluid supply located on one side of the surface, through the perforations and to the other side of the surface to a location at which the object is located.

