(19) Europäisches Patentamt
European Patent Office
Office européen des brevets

(11) EP 1 459 669 A2

(12) EUROPEAN PATENT APPLICATION

(43) Date of publication:
22.09.2004 Bulletin 2004/39

(51) Int Cl.[7]: **A47K 3/02**

(21) Application number: **04388013.7**

(22) Date of filing: **02.03.2004**

(84) Designated Contracting States:
AT BE BG CH CY CZ DE DK EE ES FI FR GB GR HU IE IT LI LU MC NL PL PT RO SE SI SK TR
Designated Extension States:
AL LT LV MK

(30) Priority: **03.03.2003 DK 200300331**

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(54) Tub made from wooden staves and a wooden bottom plate

(57) A tub comprises a plate having a rim defining a continuous and differentiable curve having no tangential turning points. The plate is formed by one or more wooden boards, the plate defining a top side and a bottom side, the circumferential rim defines a wedge, the wedge defining a circumferential encircling notch at the top side of the plate and/or at the bottom side of the plate. The tub further comprises a plurality of oblong wooden elements or wooden staves, the elements having a front side and a rear side and defining a top part and a bottom part, each of the elements having a recess in the rear side at the bottom part. The wooden elements are arranged side by side circumferentially encircling the plate and having the wedge of the plate received in the recess of each of the elements. A groove is defined within the notch of the plate between opposite walls of the rear side of the elements and a wall of the notch facing the rear side. Still further, the tub comprises two or more bands of a corrosive resistant material, closely surrounding the wooden elements, and an elastic sealing compound sealing the junction between the plate and the wooden elements, the sealing compound being received in the groove and adhering to the opposite walls exclusively.

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Description

[0001] The present invention relates to a tub made from wooden staves and a wooden bottom plate, in particular a wooden bath tub or similar large size tub, having a height of at least 30 cm, such as 30-100 cm, e.g. 40-80 cm, 50-70 cm, or preferably 60 cm, and defining a width of the order of 70-200 cm, such as 80-160 cm, 100-150 cm. It is contemplated that the above measures may vary as a specific tub for a specific intentional application may vary from the conventional bath tub configuration still the tub is to be considered part of the present invention as defined in the appending claims.

[0002] Provided the tub is made from wooden materials such as solid oily wood material, e.g. teak, the tub has to resist the periodic exposure to moisture and may expand and contract due to variation in humidity and temperature without changing the overall configuration of the tub as the tub is made from wooden staves which are held together by means of circumferentially encircling metal bands as is well known from the old cooper technique. A problem, however, exists relating to the junction between the bottom plate of the tub and the staves of the tub as the contraction and expansion due to variation in humidity and temperature prevents a solid junction to be established between the bottom plate and the staves of the tub. A conventional sealing technique involving the provision of a circumferential recess of the staves in which recess the bottom plate is received, has proven to be an inadequate sealing technique as the contraction of the bottom plate as compared to the contraction of the staves and similarly the expansion of the bottom plate relative to the staves may give origin to geometrical variations far exceeding the capability of elastic deformation of the sealing compound which compound is therefore simply torn apart and thereby gives origin to leakage of the tub.

[0003] An object of the present invention relates to the problem of providing a lasting sealing between the bottom plate and the staves of the tub, which tub is used on a non-permanent basis, i.e. frequently allowed to be used during a short or longer period of time and frequently allowed to stay unused for an extended period of time during which the tub may dry, thereby causing extreme contraction of the staves and the bottom plate.

[0004] An advantage of the present invention relates to the fact that the novel sealing technique of sealing the bottom plate of the tub relative to the staves of the tub allows the sealing compound to accommodate even extreme contraction and expansion variation of the bottom plate relative to the staves of the tub thereby providing a permanent sealing between the bottom plate and the staves.

[0005] The above object and the above advantage together with numerous other objects, advantages and features obtained by the present invention as will be evident from the detailed below description of a presently preferred embodiment of the present invention is according to the teachings of the present invention obtained by a tub comprising

a plate having a rim defining a continuous and differentiable curve having no tangential turning points, the plate being formed by one or more wooden boards, the plate defining a top side and a bottom side, the circumferential rim defining a wedge, the wedge defining a circumferential encircling notch at the top side of the plate and/or at the bottom side of the plate,

a plurality of oblong wooden elements or wooden staves, the elements having a front side and a rear side and defining a top part and a bottom part, each of the elements having a recess in the rear side at the bottom part, the wooden elements being arranged side by side circumferentially encircling the plate and having the wedge of the plate received in the recess of each of the elements, a groove being defined within the notch of the plate between opposite walls of the rear side of the elements and a wall of the notch facing the rear side,

two or more bands of a corrosive resistant material, closely surrounding the wooden elements, and

an elastic sealing compound sealing the junction between the plate and the wooden elements, the sealing compound being received in the groove and adhering to the opposite walls exclusively.

[0006] According to the basic teachings of the present invention, a lasting sealing between the wooden bottom plate and the wooden elements or wooden staves of the tub is provided as the sealing is established between two opposite walls defined by a circumferential groove between the bottom plate and the adjacent inner wall of the wooden elements in which groove the sealing compound is prevented from adhering to the horizontal wall of the groove rather adhered to the opposite walls of the grooves, exclusively thereby allowing the sealing compound to expand and contract within the groove without adhering to the horizontal wall joining the two opposite walls of the groove.

[0007] It is to be realised that the sealing compound would inevitably be torn apart provided the sealing compound was allowed to adhere to the horizontal wall as e.g. a contraction of the wooden bottom plate relative to the circumferentially encircling staves would tear the sealing compound from the inner side of the wooden staves as the shear force needed for separating the sealing compound from the horizontal wall far exceeds the peeling force needed for peeling off the sealing compound from one of the opposite walls of the groove.

[0008] The tub according to the present invention may be made in any geometrical configuration such as an overall circular elliptical or other curved configuration. The tub itself may similar to a conventional tub have a conical sloping wall defined by the wooden elements or wooden staves and is preferably made from hard oily

wood material, preferably teak tree, alternatively oak tree or birch tree as the plate and the wooden elements are preferably made from one and the same material or alternatively made from two different materials.

[0009] The sealing compound may be constituted by any high elastic sealing compound such as an asphalt or preferably a silicone-based material.

[0010] The tub according to the present invention includes at least two bands of corrosive resistant material, preferably three or more bands which are preferably made from stainless steal, copper, anodised steel, alternatively a plastics material such as a fibre reinforced, in particular glass fibre reinforced or carbon reinforced plastics materials such as epoxy etc., alternatively a combination of a metal and a plastics material such as a metal coated steel band.

[0011] The individual wooden elements of wooden staves may be positioned in the side by side arrangement having co-operating tongues and grooves. Alternatively, the one wooden element or wooden stave may include tongues and the adjacent element include co-operating grooves. According to the presently preferred embodiment of the tub according to the present invention, each of the wooden elements has two additional sides joining the front side and the rear side and one or more tongues being provided at one of the additional sides whereas correspondingly the same number of grooves are provided at the other additional side for joining the two wooden elements together in the side by side arrangement.

[0012] The invention is to be explained in the following with reference to the drawings in which

Fig. 1 is a perspective view of a first embodiment of a tub according to the present invention of an overall conical configuration,

Fig. 2 is a partly cross-sectional and perspective view similar to the view of Fig. 1 of the first embodiment of the tub illustrating in greater details a junction feature of the tub,

Fig. 3 is a vertical cross-sectional view of a wooden side wall stave and a wooden bottom stave of the tub, and

Fig. 4 is a sectional view of two wooden side wall staves having interconnecting grooves and tongues.

[0013] In Fig. 1 and 2 the preferred embodiment of the tub according to the invention is shown. The tub is designated the reference numeral 10 in its entirety. Basically, the tub is composed of a number of wooden staves, one of which is designated the reference numeral 20 in Fig 2, a total of three metal bands for holding the wooden staves together circumferentially encircling a bottom plate at the bottom of the tub. The three metal bands are designated the reference numeral 12, 14 and 16 and the wooden staves together define an outer wall designated the reference numeral 18. The bottom plate is designated the reference numeral 22.

[0014] As is evident from Figs. 1 and 2, the tub defines a predominantly conical shape and an elliptical contour. Alternatively, the tub 10 may have a circular contour or any other geometrical configuration defined by a continuous and differentiable curve not including any tangential turning point. The wooden staves are made from a hard oily sort, such as teak tree, oak tree, elm tree or beech, alternatively another hard oily sort of wood with a low resin content.

[0015] The metal bands 12, 14 and 16 are of different perimeter, as the top band 12 defines a larger perimeter as compared to the middle band 14, which middle band further defines a larger perimeter as compared to the bottom band 16. The metal bands 12, 14 and 16 are preferably made from corrosion resistant material, such as stainless steel, copper, anodised steel, aluminium or alternatively a plastics material, such as fibre reinforced, in particular glass fibre reinforced or carbon fibre reinforced plastics material, e.g. epoxy etc. or alternatively a combination of a metal and a plastics material, such as a plastic coated steel band.

[0016] In Fig. 2, a cross-sectional view of the tub 10 of Fig. 1 is shown, disclosing the tub 10 has a bottom plate 22. The bottom plate 22 may constitute a solid plate, a plate made from plywood, or a plate composed of a number of staves, preferably of the same sort as the wooden staves of the side wall 18 of the tub 10, alternatively another hard oily sort of wood with a low resin content.

[0017] In Fig. 3, a horizontal, cross-sectional view of the stave 20 and the bottom plate 22 is shown. The bottom plate 22 defines a tongue 26 constituting a circumferentially extending rim part behind which a notch is defined by a hoirizontal wall 30 and a vertical wall 32 at the bottom side of the plate 22. The stave 20 defines a recess 24 at the lower end of its rear side or inner side, i.e. the side defining the interior of the tub 10. Within the recess 24, the tongue 26 is received optionally within a sealing compound, however, preferably merely received in the mechanical joint between the recess and the tongue.

[0018] At the lower side of the plate 22, a sealing compound 28 is received within a groove defined between opposite walls of the plate 22, i.e. the wall 32 of the plate defining the notch and the rear or inner side of the stave 20 at its lowermost end. The sealing compound is adhered to the opposite walls exclusively, and prevented from adhering to the horizontal wall 30 of the plate i.e. the horizontal bottom side of the plate defining the tongue 26. By the provision of the sealing compound 28 adhering to the opposite walls of the stave 20 and the circumferential wall 32 of the plate defining the notch, exclusively, the sealing compound is allowed to accommodate any expansion and contraction of the bottom

plate 22 relative to the stave 20 and to provide a permanent elastic sealing between the bottom plate 22 and the outer wall 18.

[0019] In Fig. 4 is shown two side wall elements having grooves 34 and tongues 36 for preventing horizontal displacement of the elements, there may be one or more grooves on the short side of the element and one or more tongues on an opposing short side of the element.

Example:

[0020] A prototype of the preferred embodiment of the tub shown in Figs. 1-4 is to be constructed having an oval cross-section and a overall conical shape, the length of the tub being 147.5 cm and the width being 84.3 cm in the top section of the tub, the ratio between the bottom and the top by 90% meaning that the length of the tub in the bottom in the preferred embodiment is 132.75 cm and the width is 75.87 cm. The total number of staves used in the prototype of the tub is 56, including 19 staves on each of the two long arches and nine staves on each of the two short arches. The width of each stave in the long arch is at the top 6.489 cm and 5.840 cm at the bottom, the staves in the short arch is 6.990 cm at the top and 6.291 cm at the bottom. The height of the tub is 60 cm. The plate and teh staves are made from teak and the sealing material is Sikaflex 221.

Claims

1. A tub comprising:

a plate having a rim defining a continuous and differentiable curve having no tangential turning points, said plate being formed by one or more wooden boards, said plate defining a top side and a bottom side, said circumferential rim defining a wedge, said wedge defining a circumferential encircling notch at said top side of said plate and/or at the bottom side of said plate,

a plurality of oblong wooden elements or wooden staves, said elements having a front side and a rear side and defining a top part and a bottom part, each of said elements having a recess in said rear side at said bottom part, said wooden elements being arranged side by side circumferentially encircling said plate and having said wedge of said plate received in said recess of each of said elements, a groove being defined within said notch of said plate between opposite walls of said rear side of said elements and a wall of said notch facing said rear side,

two or more bands of a corrosive resistant material, closely surrounding said wooden elements, and

an elastic sealing compound sealing the junction between said plate and said wooden elements, said sealing compound being received in said groove and adhering to said opposite walls exclusively.

2. A tub according to claim 1 wherein said plate is a solid plate or is composed of two or more wooden elements, said wooden elements being of a hard oily sort, preferably teak tree, alternatively oak tree, alternatively beech tree.

3. A tub according to any of the claims 1-2, wherein said wooden elements are of a hard oily sort, preferably teak tree, alternatively oak tree, alternatively beech tree.

4. A tub according to any of the claims 1-3, wherein said sealing compound is a silicone based material.

5. A tub according to any of the claims 1-4, wherein said bands are of a corrosive resistant metal such as stainless steel, copper, anodised steel, alternatively a plastic material such as fibre reinforced, in particular glass fibre reinforced or carbon fibre reinforced plastics material, such as epoxy etc, alternatively a combination of a metal and a plastics material, such as a plastic coated steel band.

6. A tub according to any of the claims 1-5, wherein each of said wooden elements has additional sides joining said front side and said rear side, one or more tongues being provided at one of said additional sides, and correspondingly the same numbers of grooves being provided at the other additional side for joining two wooden elements in said side by side arrangement.

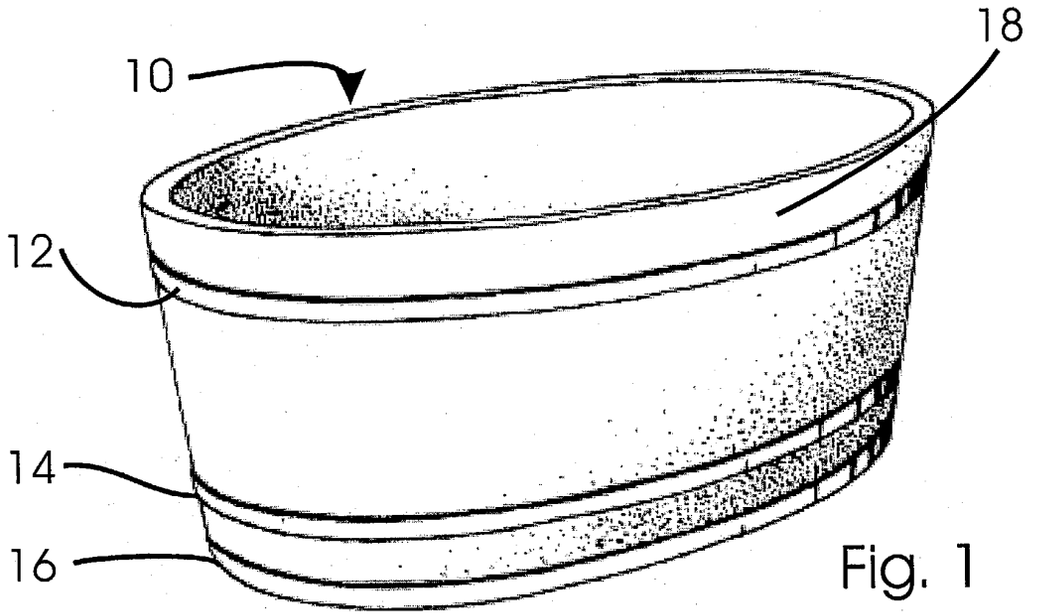

Fig. 1

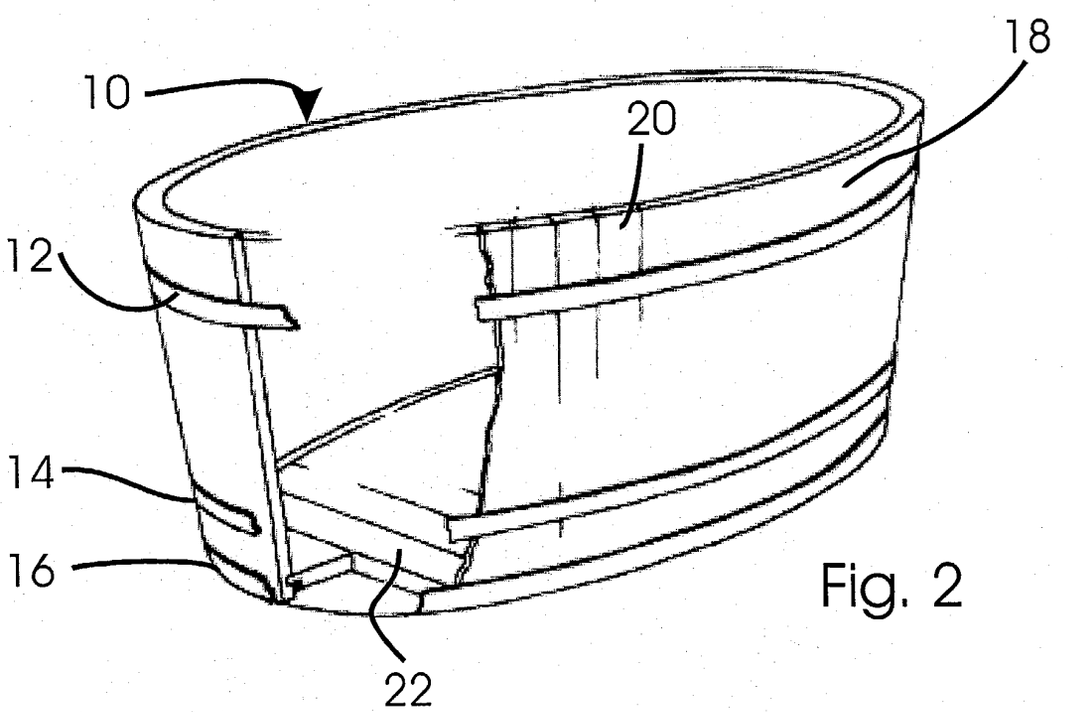

Fig. 2

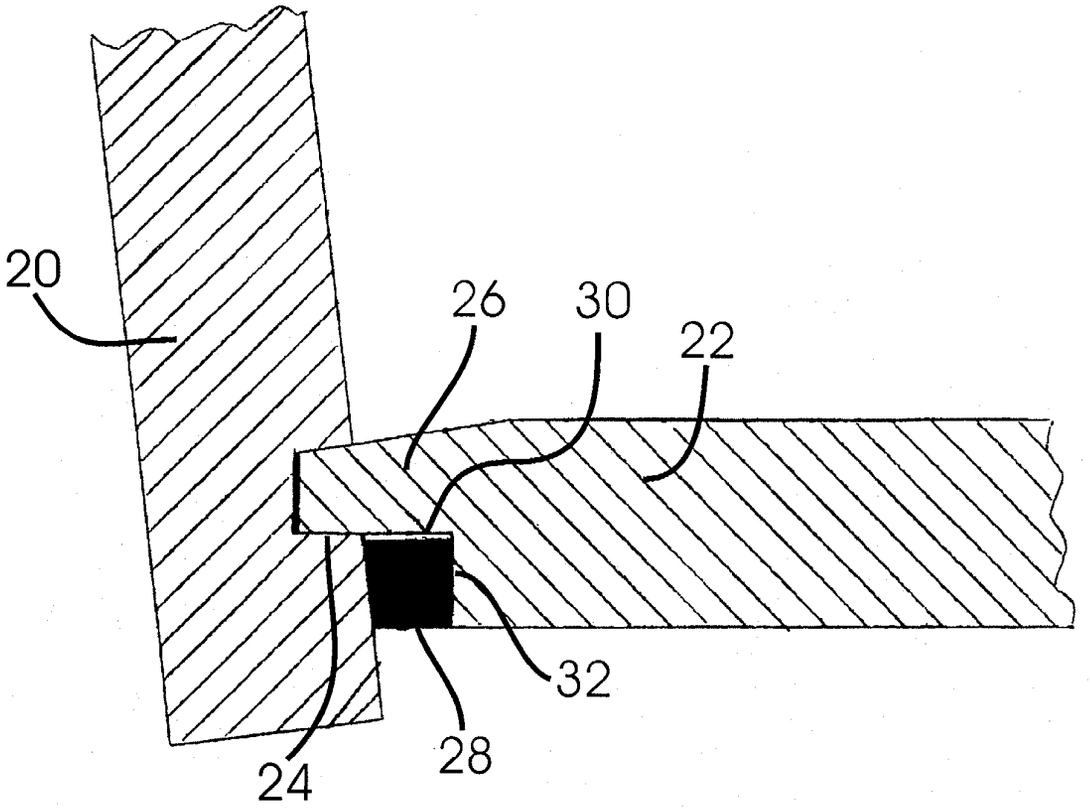

Fig. 3

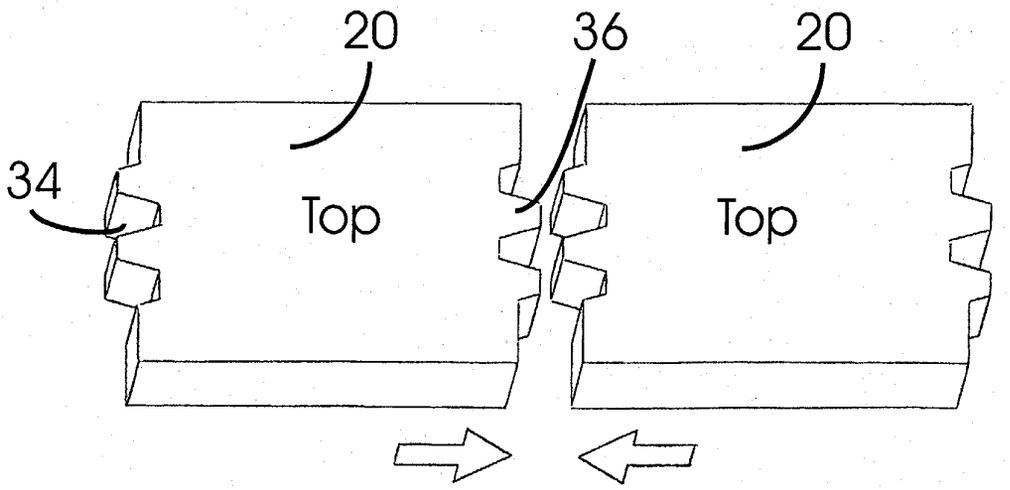

Fig. 4