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TITLE: CONVERTIBLE STRUCTURE

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DESCRIPTION

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TECHNICAL FIELD

The invention relates to a convertible structure of the kind which can be converted between generally planar and generally cylindrical states, e.g. portable flooring of the kind used to provide a temporary decking over grass, 20 gravel, soil, sand, ice and the like and which can be rolled-up for transportation and storage.

BACKGROUND ART

Portable flooring is known for use, for example, to provide temporary flooring in tents and marquees and for 25 turf protection in stadia. It is known to provide such temporary portable flooring as a plurality of small treads of moulded plastics material which can be fixed together lengthwise and widthwise by integral snap fasteners to form



larger areas and which include "living", i.e. integral, hinges whereby an assembly of the treads can be formed into a roll for storage and for laying.

It is an object of the invention to provide a robust
5 portable flooring which can be formed into a roll for storage and for laying.

It is a particular object of the invention to provide portable flooring consisting of a plurality of planks or laths which are hinged together to form a decking. A
10 potential problem with such flooring is that gaps formed between the adjacent laths may form traps, e.g. finger traps, on relative movement of the planks or laths in use and it is an object of the invention to prevent or mitigate such dangers.

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DISCLOSURE OF INVENTION

According to the invention, a convertible structure, e.g. portable flooring, comprises a plurality of planks or laths (hereinafter laths) and means hinging the laths together edge to edge such that they can be formed into a
20 roll, wherein each lath is of constant cross-section and has opposed upper and lower faces adapted to form a floor face and a ground engaging face respectively, and opposed side edges extending between the upper and lower faces and which taper inwardly towards the lower face, rounded
25 corners being formed between the side edges and the upper face, the rounded corners being of substantially constant radius, hinge means comprising hinge supports on the laths and disposed concentrically with the said rounded corners.

The hinge supports may be integral with the laths. In this way on hinging movement of the laths relative to one another, any gap between them will not vary substantially in width. Preferably the gap will be maintained at a constant small size, e.g. 0.5mm. Also by this means the angle through which one lath may be hinged with respect to an adjacent lath may be more than 180°.

By tapering the side edges of the laths, the laths can be hinged relative to one another in both directions out of a common plane to allow the laths to be formed into a roll for storage and to facilitate laying and to allow the laths to conform to undulations or other irregularities in the ground surface over which they are laid. Also the gap thus formed at the corners between the lower faces of the laths and the edges will prevent unintended gripping of the ground surface.

The hinge supports may comprise part cylindrical cavities in the laths and adapted to receive hinge pins. The part cylindrical cavities may be defined by lugs integral with the laths. Hinge links may be mounted on respective hinge pins to span between two adjacent laths to connect them together. Transverse slots may be formed in the laths to receive the hinge links. The hinge links may have respective bores adapted to receive the hinge pins supported in the respective laths to hinge the laths together. Thus the hinge means may comprise two adjacent pivot axes in the edges of the adjacent laths.

The laths may be formed as box-section extrusions,

e.g. of metal or plastics.

BRIEF DESCRIPTION OF DRAWINGS

The invention is diagrammatically illustrated, by way of example, in the accompanying drawings, in which:-

5 Figure 1 is a cross-sectional end view of a lath for portable flooring in accordance with the present invention;

Figure 2 is a plan view of a series of the laths of Figure 1 hinged together side by side to form a portable floor;

10 Figure 3 is a plan view similar to that of Figure 2 and showing a plurality of laths joined together side by side and end to end to form a portable floor;

Figure 4 is a sketch showing hinging together of Figure 1;

15 Figures 5a and 5b are respectively a plan view and an end view of fixing means for joining laths together end to end;

Figure 6 is a partial plan view showing the positioning of fixing means as shown in Figure 5 to join
20 laths together end to end;

Figure 7 is a sketch showing fastening means for securing the fixing plate of Figure 5 to laths;

Figure 8 is a side view of a hinge pin;

Figure 9 is a side view of a hinge link;

25 Figure 10 is a perspective sketch illustrating the assembly of hinge means relative to laths;

Figure 11 is a scrap plan view showing hinge means assembled in laths;

Figure 12 is a side view of a readily removable hinge pin;

Figures 13 and 14 are respective enlarged respective end views of the hinge pin of Figure 12;

5 Figure 15 is a perspective sketch illustrating the removal and insertion of the hinge pin of Figure 12, and

Figures 16a and 16b illustrate mechanical handling of portable flooring using lifting means.

BEST MODES FOR CARRYING OUT THE INVENTION

10 In the drawings there is shown a convertible structure in the form of portable flooring for use for example to provide a temporary cover over grass and the like and which can be moved between a generally flat position of use and a rolled-up position for storage and transportation.

15 Figure 1 is a sectional end view of a lath 2 for portable flooring 1, see Figures 2 and 3, the flooring being composed of a series of such laths arranged side by side, and/or end to end.

Each lath comprises an upper generally flat face 3
20 forming a floor surface, a lower ground engaging generally flat face 4 and opposed generally flat side edges 5 which taper inwardly towards the lower face 4.

The upper face 3 is formed with a series of raised projections 6 to improve its non-slip properties. The
25 laths are hollow and may be formed as extrusions e.g. of aluminium or plastics. Strengthening webs 7 are formed internally of the laths to span the upper and lower faces of the lath.

The junctions or corners 8 between the upper face 3 and the side edges 5 are rounded about a substantially constant relatively large radius for the reason appearing more fully below. The side edges each taper inwardly 5 towards the lower face at an included angle of substantially 77° with respect to the upper face. The junctions or corners 9 between the side edges and the lower face are rounded with a relatively small radius. Internally at positions adjacent to the upper junctions 8 10 the lath is formed with lugs 10 defining part as semi-cylindrical grooves or cavities 11 disposed concentrically with the upper junctions 8, and which form hinge supports as appears from the following description.

Figure 2 is a plan view of portable flooring 1 15 composed from a series of the laths of Figure 1 hinged together side by side by hinge means 12 more fully described below.

Figure 3 is a plan view similar to that of Figure 2 and showing a plurality of the laths of Figure 1 joined 20 together side by side by hinge means 12 and end to end by fixing means 13 more fully described below to form portable flooring 1.

Figure 4 is a sketch showing how the laths 2 of the present invention are hinged together by the hinge means 12 25 and are shaped at their edges to prevent, in use, the formation of gaps at the junctions between their respective upper faces e.g. to mitigate the risk of injury to users of the portable flooring.

Thus one lath 2 is shown in full lines and an adjacent second lath is shown in dotted lines and hinged thereto by the hinge means 12, not shown, whereby the lath shown dotted can be moved through substantially more than 180° 5 with respect to the said one lath, e.g. through 205°, that is to say from a position in which the two laths are disposed one laying flat on the other, to a position as shown in which the lath shown dotted is inclined downwardly at an angle of around 25° with respect to the said one 10 lath. It is to be noted that the geometry of the laths and associated hinge means is such that the upper junctions 8 of the respective laths remain substantially in contact, or at least the gap between them remains constant during such hinging movement.

15 Figures 5a and 5b are respectively a plan view and end view of a plate 14 forming the fixing means 13 for joining the laths together end to end, and Figure 6 is a partial plan view showing the positioning of the plate 14 to join the laths 2 together end to end. As shown in Figure 7 20 fastening means 15 is used to secure the fixing plate 14 to the laths.

Referring to Figures 5 to 7, the fixing means 13 comprises a plurality of plates 14 which are generally rectangular and flat and formed with apertures 16 for 25 receiving the fastening means 15 which in turn are received in corresponding receptors 17 in the laths whereby the plates can join the laths together end to end. The fasteners 15 may be of the quick fixing and release kind

which are well known per se and which are operated by a quarter turn. The upper face of each plate 14 may be formed with raised projections 18 to improve the non-slip properties of the plate surface in the interests of safety 5 for users of the portable flooring.

Figures 8 to 11 show hinge means 12 for connecting the laths 2 together side by side while permitting relative hinging therebetween as discussed above, the means 12 comprising a hinge pin 19 and hinge links 20. Figure 7 is 10 a side view of the generally cylindrical hinge pin 19 and showing knurling 22 at a central position between opposed ends of the pin to allow the pin to be engaged frictionally with the hinge link 20 shown in Figure 9.

As can be seen from Figure 9, hinge link 20 is in the 15 form of a plate formed with a pair of apertures or bores 21 for receiving respective pins 19 and in which the knurled portions 22 thereof are frictionally engaged. As shown in Figure 10 the assembly of the hinge pins and hinge links relative to the laths to connect the laths together 20 comprises inserting the pins in the hinge supports defined by the grooves 11 in the laths and inserting the pins into the bores 21 in the links 20 whereby the knurled portions 22 engage the links to hold the assembly together. The links themselves are received in cut-outs 23 formed in the 25 laths, as shown in Figure 11. Each pair of laths may be joined by a respective pair of the hinge means. Preferably more than one pair of hinge means may join each pair of laths. Thus four hinge means may be provided between each

pair of laths

In Figures 12 to 15 there is shown a readily removable hinge pin 24 for use instead of the pins 19 as shown in Figure 8 to enable sections of the portable flooring e.g. 5 of 3 metres length, to be readily connected together and disassembled as required, e.g. on site. Figures 13 and 14 are respective enlarged end views of the removable hinge pin of Figure 12 and show that one end 24 of the pin is formed to engage a bore in a respective link 20 and the 10 other end 26 is arranged to be engaged by an extractor (not shown) whereby the pin 24 can be removed where desired. Such removal and insertion of the hinge pin is illustrated in Figure 15.

Figures 16a and 16b illustrate how the hinge links 20 15 projecting from a lath defining an end of a flooring section can be engaged by lifting means comprising a shaft 27 connected between a pair of the hinge links and connected via straps 28 to means (not shown) to facilitate mechanical handling of the portable flooring, e.g. the 20 coiling of lengths of the portable flooring onto a drum (not shown).

INDUSTRIAL APPLICABILITY

The invention thus provides temporary portable flooring which mitigates against problems associated with 25 some known temporary flooring systems. It will be appreciated that although the invention has been described with reference to portable flooring, it would be possible to employ the convertible structure in other ways, e.g. by

standing the structure upright for use as temporary fencing or walling.

CLAIMS

1. A convertible structure, e.g. portable flooring, comprising a plurality of laths and means hinging the laths
5 together edge to edge such that they can be formed into a roll, characterised in that each lath is of constant cross-section and has opposed upper and lower faces adapted to form a floor face and a ground engaging face respectively, and opposed side edges extending between the upper and
10 lower faces and which taper inwardly towards the lower face, rounded corners being formed between the side edges and the upper face, the rounded corners being of substantially constant radius, the hinge means comprising hinge supports on the laths and disposed concentrically
15 with the said rounded corners whereby the hinge means comprises respective adjacent parallel pivot axes.

2. A convertible structure according to claim 1, characterised in that the hinge supports are integral with the laths.

20 3. A convertible structure according to claim 1 or claim 2, characterised in that the support means comprises part cylindrical cavities in the laths and adapted to receive hinge pins.

4. A convertible structure according to claim 3,
25 characterised in that the hinge means comprise links pivoted on respective hinge pins on respective laths.

5. A convertible structure according to claim 4, characterised by transverse slots in the laths to receive



the hinge links.

6. A convertible structure according to any preceding claim, characterised in that the laths are formed as box-section extrusions.

5 7. Portable flooring structure according to claim 1, characterised by a convertible structure as claimed in any preceding claim.



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