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Invention Title: A FLOORING PANEL METHOD

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The following statement is a full description of this invention, including the best method of performing it known to me/us:

A FLOORING PANEL METHOD

The present invention relates to methods of providing a floor.

Panels for flooring are usually (but not necessarily) made of a reconstituted material which includes wood fibres. Examples include particle board, plywood and other fibre boards. Typical of such materials used as flooring panels are KOPINE™ panels of this company which is a high density particle board. Other suitable materials for such flooring may include the PYNEFLOOR™ particle board product of Fletcher Wood Panels.

Prior art flooring procedures where flooring planks or panels are to be used have involved the extensive use of nogs between the joists of the flooring frame. Such complex suspended flooring frames are time consuming and costly. Timber nogs are not without a material cost and also take time to measure, cut and nail in place.

Over a period of time nogs can give uneven support of an overlying panel owing to drying or warping, thus eventually allowing movement and squeaking.

With such complex nog including suspended floor frames it is usual to abut the edges of the panels on a joist, some peripheral timber member or a nog and to attach the panel by appropriate penetrative means (eg. nails, screws or the like) or adhesive or both.

A variant on the abutment of straight cut edge panels is a tongue and groove type insert engagement of a kind that traditionally was used with timber planks. Such arrangements however involve the exposure to potential damage (prior to fitment) of the tongues and grooves. There is also a need to match male with female edges.

The present invention recognises economies of material, time and money that can arise if there is evolved a satisfactory system using flooring panels less susceptible to panel edge damage yet which can be fixed to a suspended floor frame primarily of joists without a need or any significant need for nogs under abutments of panels which are to run perpendicular to the run of the joists. It is therefore an object of the present invention to provide panels, methods and flooring which at least provides some of the aforementioned advantages.

The present invention provides CLAIM 1

Preferred forms of the present invention will now be described with reference to the accompanying drawings in which:

Figure 1 shows a flooring panel of a reconstituted material (eg. particle board) showing how it is positioned and fixed so that its perimeter can subsequently edgewise butt adjacent panels (not shown) from a number of directions over a support element which is either a joist or a nog,

Figure 2 shows how penetrative means such as nails or screws (shown in broken outline) may be used alone or in conjunction with adhesion to fix each peripheral region of butting flooring panels to either a joist or a nog,

Figures 3A, B and C show some options for a preferred rectangular panel of the present invention, Figure 3A showing a most preferred option where two groovings of edges of the flooring panel (preferably of a suitable particle board) is provided on the longer opposed pair of sides, Figure 3B showing an alternative where there is machining only on the shorter of the opposed pair of sides, and

Figure 3C showing where there is machining all

around the panel (obviously there is the option of the provision of grooving on a single edge or a pair of adjacent edges only etc),

Figure 4 is a cross section of a preferred flooring panel showing the nature of a preferred form of the groove provided therein,

Figure 5A shows a panel of the kind depicted in Figure 4 having a bead of glue applied into the groove of that panel that has already been fixed in place (or *vice versa* also being an option) and a like panel being brought into abutment therewith,

Figure 5B shows a variant where there is an application of a bead of adhesive in the grooves of both panels prior to the creation of the abutment,

Figure 6 is the outcome of a butting together of the panel edges by a procedure of either Figure 5A or Figure 5B, the dotted lines showing adhesive that is preferably squeezed from between the panels which at least in respect of the top edge can be easily scraped away,

Figure 7 is a similar view to that of Figure 4 but showing a different form of the groove,

Figure 8 shows still a further variant reliant on multiple grooves,

Figure 9 shows still a further groove option,

Figure 10 shows panels of a kind as depicted in any of Figures 3A onwards being brought into abutment over some flooring joists without nogs underlying the line of joint, the edges being grooved,

Figure 11 shows how if desired a joist can underline mating panels which are free of any groove, the provision of an optional groove even at that line of abutment being depicted by the broken lines,

Figure 12 shows how in accordance with the present invention a suspended flooring frame primarily of joists can have a panel arranged to be fixed directly into the peripheral framing member and the joists and can present an edge for abutment along a joist and

perpendicular to the joists without a need for nogs,

Figure 13 shows the region A of Figure 12,

Figure 14 shows how a panel such as depicted in Figure 12 and Figure 13 can butt against a like panel,

Figure 15 is a similar view to that of Figure 2 which was a prior art arrangement but showing in section the same type of arrangement but this time restricted to a joist, ie. no nog being necessary, the broken lines showing this is the grooved panel form,

Figure 16 shows an arrangement whereby to provide lap a panel of a rectangular form as depicted in Figure 12 can be rotated by 90° at one part, the shorter edge in such an arrangement preferably being grooved or overlying a nog (not shown),

Figure 17 shows how if desired a joist can underlie a grooved edge of a panel in abutment with an already fixed panel,

Figure 18 shows a preferred form of flooring with the present invention a first panel having been fixed by both adhesion and screwing to present a grooved edge perpendicular to the joist run direction and a like panel being brought into abutment thereof,

Figure 19 showing how preferably a bead of suitable adhesive is provided on the preferably non-grooved edges for such butting over the joists,

Figure 20 shows the butting of the arrangement of Figure 19 with glue spill over which then indicates the appropriateness to then screw or nail home the panel into its fixed position,

Figure 21 shows how the overflow of adhesion from the joint is preferably removed,

Figure 22 shows how a similar grooved panel in a lapping relationship previously referred to can be fitted,

Figure 23 showing how a bead of adhesive is applied at least into the groove of the fixed and the panel then brought into the abutment to provide the effect as shown in Figures 20 and 21 for the non grooved abutment

over the joist and a like arrangement to that of Figures 20 and 21 even for the grooved arrangement which results in the outcome as depicted in Figure 6, such outcome being the provision of an adhesive jointing of the panel edges to each other and the provision of an adhesive formed spline between the panels where such panels are not supported by nogs.

Figure 1 shows the prior art method of using floor panels. In such a method a floor panel 1 is usually fixed both by adhesive and nailing at at least its periphery on the suspended floor frame 2 which comprises at least joists 3 which run in parallel. In addition nogs 4, which must be cut for length and be positioned appropriately between adjacent joists 3, underlie the abutment edge of the panel 1 with the adjacent panel. The same procedure follows throughout the whole floor.

By reference to "abutment" with adjacent panels please appreciate that this term includes actual physical abutment panel to panel as well as abutment through an adhesive medium. In some instances "abutment" may mean close proximity but preferably it does mean actual physical edgewise touching panel to panel or indirect panel to panel touching through an adhesive joint providing adhesive layer.

Figure 2 shows the arrangement of the prior art panel looking along a joist 3 with one panel 1 abutting an adjacent panel 5 and being fixed into the joist 3 by appropriate nails or screws 6. The same procedure would be shown were one to look along the axis of a nog 4.

The present invention recognises that the expense and time involved in accurately positioning nogs so that every line of abutment between adjacent panels is on the axis of a framing member (whether it be a joist or nog) can be

avoided. Since joists are preferably always present conventional abutment on the line of the joists can occur but to avoid the need for nogs preferably the jointing procedure of the present invention is adopted so as to provide for a resultant floor the requisite strength characteristics and without the likelihood of "squeaking" owing to nog shrinkage or skewing.

Flooring panels take a variety of different forms. A preferred form is that of a composite product including wood fibre typified by various commercially available panels as previously described. Within the ambit of such composite material are such products as particle board, MDF, plywood, etc.

Figure 3A through 3C shows a variety of different panels of a kind that it is envisaged can be manufactured in a factory and be supplied to a site for installation prior to there necessarily being any damage of consequence to the modified edges shown, ie. there are no easily damaged tongues.

In the panel of Figure 3A, the opposed longer edges 7 are each provided with grooving.

In the panel of Figure 3B the smaller opposed pair of sides 8 are instead grooved. Such a panel may have some application in assisting panel layout staggering to better tie a floor together.

Another form for the panel is as shown in Figure 3C where edges 9 and 10 are all grooved. Such a form of the panel however is more expensive than that of Figures 3A or 3B since routing of the opposed edges during manufacture is not as simple where routing is required only to provide two opposed pairs of grooved sides.

Obviously forms of panel in accordance with the present invention can be provided which are grooved on one side only.

Still other forms of panel may be other than rectangular or indeed even square. There may well be structures where the floor frame is framing an area other than one which lends itself to rectangular or square panel forms in which case complex panels having curved, triangulated or other edges may be utilised. Even for such arrangements however, where there is to be abutment otherwise than on the line of a joist, the procedure of the present invention is believed to have application.

Preferably the edges as depicted in Figures 3A through 3C for a panel 11 are as shown in Figure 4 as 12.

Figure 5A shows how, for example, one panel (preferably already fixed) 13 may have a bead of appropriate liquid (yet viscous) adhesive 14 applied thereto prior to the complementary edge of a panel 15 being brought into engagement therewith so as to provide the abutment arrangement as shown in Figure 6 where the complementary grooves at least substantially shape at least a partial intermittent or continuous spline like structure upon the curing, hardening or the like of the adhesive, preferably also in conjunction with an adhesive interface between the non grooved edge regions of each panel.

Figure 5B is a variant of the arrangement of Figure 5A where in this form adhesive is applied into both grooved edges prior to their being brought into the abutment substantially as shown in Figure 6.

As can be seen (Figure 6) a spline like structure 16 results in addition to preferably adhered regions 17. Overflow of the adhesive shown in dotted outline as 18 can

easily be scraped away as shown, for example, in Figure 21 which shows a scraper 19.

Other forms of groove which adapt to complementary panels are those depicted in Figures 7 through 9. In each instance it is to be seen that irrespective of whether or not there is one or two grooves (indeed there might even be more) preferably the positioning of the grooves is such that does not matter which way up the panel is positioned. Should however a particular composite material have a surface that must be uppermost this symmetry of the groove provision is not mandatory. In such arrangement asymmetric positioning of a single or multiple grooves can be provided knowing that they will match and complement a similarly configured panel which likewise must also have a predetermined face uppermost.

Figure 10 shows an arrangement where parallel joists 3 support a first panel 20 thereon with its grooved edge 21 substantially normal to the run of the joists 3. Panel 20 is to be abutted with a similar panel 22 which will move in the arrowed direction so as to bring its grooved edge into abutment (preferably through an interface of adhesive).

Figure 11 however shows how that edge 23 of a floor panel 20 need not be grooved although the broken lines in Figure 11 show that optionally (where a panel embodiment as shown, for example, 3C is used) that edge may also be grooved. In such a form as shown in Figure 11 despite nails, screws or the like preferably being used preferably also there is an application of adhesive between the complementary faces 23 and 24 much in the conventional way.

Thus Figure 12, in a manner as shown in Figure 1, shows the joists 3 are preferably not provided with any nogs and the vertical support for the panels on their grooved edges 25 and 26 is as described by reference to Figure 10 and as

disclosed with reference to Figure 11.

Figure 13 shows how preferably a plurality of nails, screws or the like 27 are preferably provided along the periphery in conjunction with any application of adhesive on to the frames much in the conventional way.

Figure 14 in a manner similar to Figure 13 shows how an abutment of the kind referred to in Figure 11 results. Figure 15, looking along the joist 3, shows how the adjacent panels 20 and 28 are fixed by screws, nails or the like into the joist 3.

Figure 16 shows how, if desired, a panel 29 of the kind depicted in Figure 3B or 3C can be utilised with its major axis aligned differently the major axes of other panels (eg. panels 20 and 28) so as to ensure a panel yet to be laid with its major axis parallel to the major axes of panels 20 and 28 will lap over the joint region 30 if desired.

Figure 17 is a close up of the region 31 of Figure 16.

The preferred form of the present invention will now be described with respect to the installation sequence of Figures 18 through 23.

By way of example, KOPINE Ultralock™ particle board floor panels of this company of sheet size of either 2400 x 1200 x 20 mm or 3600 x 1200 x 20 mm are preferably used. KOPINE Ultralock™ particle board is a reconstituted wood panel manufactured by bonding pine wood particles with a melamine urea formaldehyde resin using a combination of heat and pressure. Such a particle board has average values when tested to AS/NZS 4266:1995 as follows;

- Density kg/m3 710

• Internal Bond	kPa	900
• Modulus of Rupture	MPa	22
• Modulus of Elasticity	MPa	3000
• Moisture Content	%	8
• Water Adsorption (one hour soak)	%	4
• Thickness Swell (one hour soak)	%	2

Surface - Flake finish.

The adhesive preferably used in the procedure is any compatible spline forming adhesive preferably providable in a convenient cartridge size to fit a glue gun. An example of an appropriate adhesive is Fuller's Sturdibond™ Adhesive which is available in New Zealand. The adhesive is a solvent mastic type formulation with a synthetic rubber base and it is compatible with the KOPINE Ultralock™ composite panel.

The panels are designed with the grooving as depicted to be laid across joists and glued together at the edges. The continuous glue bond of the edges that do not overlie the axis of a joist eliminates the need for further edge support such as timber nogging.

Preferably all end joints (ie. of the opposed preferably ungrooved shorter edges) are made over the axis of a joist and are glued together.

Preferably joists are no more than 600 mm apart. For even greater strength and stiffness however joists may be set at a spacing of, for example, 400 or 450 mm.

Preferably the panels are laid in a staggered brick like pattern as described such that there is lapping to tie the floor/floor frame as a racking resistant structure.

The application of the preferred glue is to the single groove of the preferred panel and it is supplied as a

continuous run of about 5 mm bead diameter. The bead size is correct when the adhesive squeezes out of the joint (top and bottom) as the panels are pushed together. This is preferably the case whether or not one is applying adhesive to the joist supported edges or the edges preferably normal to the run of the joists. Preferably however more adhesive is to be available for the splined joints (which preferably run normal to the run of the joists).

It is desirable that the panels be fixed by appropriate nailing or screwing within 15 minutes of the adhesive being applied.

Appropriate screws are 8-gauge x 50 mm Sure-fast™ type countersunk screws. Appropriate nails (if to be hand driven) are 60 x 2.8 mm hot-dipped galvanised particle board nails. Power driven nails may also be used.

Adhesive fastening of the panels to the joists may be used alone or in conjunction with the penetrative fixing. If there is to be such adhesion down on to the framing members preferably a 10 mm bead of Fuller's Sturdibond™ is applied to the joists and a 5 mm bead to the panel edges prior to the panels being positioned.

Persons skilled in the art will appreciate how the flooring thus laid after an appropriate setting time can then be finished to appropriate standard.