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(54) **PROCESS FOR IMPROVING A WOODEN PART, AND PRODUCT OBTAINED BY SAID PROCESS.**

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Description

The invention relates to a process for improving a wooden part, comprising the detection and removal of undesirable material, filling of the opening produced with a setting plastic material, and finishing of wooden part.

Such a process is known from US-A-4,614,555. Plywood material is made by peeling logs. During the subsequent processing of the wood peelings, and in particular during bending, parts of the peeling corresponding to knots and the like fall out of the wood material. After the gluing of the different layers and the finishing sanding, undesirable openings occur in this way in the outer layers of the plywood material. The US Patent Specification describes how these openings are filled with a setting plastic material. Another finishing treatment such as sanding is subsequently carried out. The filler material used is a non-elastic, hard plastic material. Such a material is subjected to relatively low forces on further use of the plywood panels. This is because the depth is relatively small and the adhesion surface relatively large. Besides, the stresses in such a relatively rigid plywood sheet are small by comparison with parts of solid material, such as beams used to make door or window frames.

The present invention relates to the improvement of new parts such as a beam. On account of environmental considerations, the use of so-called hardwood is being banned to an increasing extent. This means that either plastic material for door and window frames and the like or woods such as pine or deal are being used. Since there are also environmental objections to plastic, there is increasing emphasis on the use of conventional wood materials. A disadvantage of these wood materials is that they have knots, resin ducts and cracks. When used outdoors, such wood materials constitute the starting point for rotting, and paint does not adhere readily to such materials. That is why various government bodies have laid down standards which must be met by wood materials. For example, knots must always be healthy and not have any black patches. Knots will form contours with the passage of time, i.e. they will come out beyond the surface of the wooden part. The paint in the transition region between knot and wooden part will consequently peel off. After a further period of time, the knot comes away from the wood, thus producing a capillary space between the wood and the knot which absorbs moisture, so that rotting occurs and the paint peels off. In addition, knots may in principle not exceed 15 mm in diameter. There are also standards as regards the number of knots per metre of wood. Most of the timber currently felled in Europe cannot meet these standards. A first alternative for still meeting these

standards is the production of laminated wood. In this case a beam is divided into different pieces, and the parts containing knots and the like are sawn out. These parts are connected to each other by means of a finger joint. It goes without saying that this involves a considerable loss of timber. Furthermore, if such an operation is being used on an industrial scale, it requires a considerable investment in machinery. Besides, this process is complex because, after sawing out and making of the finger joint, it entails bonding, drying and planing. The large number of bonds means that there is a considerable risk of bonded seams coming apart, which means that openings are produced and moisture can penetrate the wood, so that rotting cannot be ruled out.

Another technique is to drill away unhealthy knots in finished wooden parts, such as beams, and to replace them by wooden plugs. These wooden plugs are bonded to the wood in the blind opening only at the end face. During the insertion of such a plug there is a risk of the two wood structures shifting relative to each other. In the case of wooden plugs there is also the risk of capillary action described above with reference to the knots. Technically, it is not possible to provide the cylindrical walls of such plugs with adhesive. For the improvement of resin ducts, the latter are removed and shims are inserted. In the long run these shims come away at the ends, with all the consequences involved.

The object of the invention is to avoid the disadvantages described above.

This object is achieved in the process described above in that the wooden part comprises a solid part which is subjected to detection in an untreated or roughly pre-treated state, in that the removal of undesirable material comprises the making of an opening at least 1 cm deep, in that the plastic material comprises a permanently elastic plastic, and in that after setting thereof the entire part is subjected to a first finishing treatment. It has been found that for the removal of knots from solid wood material it is necessary to make an opening at least one centimetre deep. If a non-flexible filling agent is used in such an opening, during the stresses normally occurring in solid wooden parts, which are much greater than the stresses occurring in plywood sheets, it will break away from the boundary of the opening, thereby producing characteristics which are such that it can be described as a plastic "knot". Through the use of the permanently elastic material according to the invention such detachment is avoided. Besides, according to the invention, the part of solid wood is at most roughly planed beforehand, and no finishing treatment is carried out, as described in US Patent Specification 4,614,555 before the openings made

are filled with plastic material. This means that one working step is left out. In the case of the thin fillers used in plywood material, this is not possible because the forces occurring during finishing would then become so great that the hard filling agent introduced could come away from the wood. According to the invention, the wooden part is given the first finishing treatment only after at least partial setting of the plastic material.

Surprisingly, it has been found that only a little effort is needed to remove the undesirable material in the roughly planed part. All that is important here is that all the undesirable material is removed. Removing too much or the shape of the opening obtained by the machining operation are not important. For the plastic inserted will adapt to all shapes and will not just adhere to the bottom face of the opening, but also to the side walls, as a result of which a very good attachment is obtained. During subsequent finishing of the wooden beam by, for example, planing, which treatment is still needed, the finishing of the plastic material can be provided simultaneously, so that finishing of the beam is obtained in the same working step.

The philosophy on which the invention is based is first to upgrade the wood and only then to work it further.

According to an advantageous embodiment, the machining treatment for the removal of material involves milling. It has been found that drilling does not give a sufficient guarantee of all the undesirable material being removed. In practice, undesirable pieces of wood do not extend as cylindrical columns, but have a more random shape, which can be removed particularly well by milling.

In order to avoid the inclusion of gas bubbles in the inserted plastic during or after insertion, use is made of a process for the removal thereof, which can involve vibration. The plastic used is preferably a plastic on an epoxy resin base. Epoxy material has a particularly good adhesive strength and provides a particularly good seal, so that the capillary action of knots and plugs described above cannot occur. The elastic properties make it readily possible to provide fixing means in the epoxy material without this leading to bursting or cracking. Epoxy material can be burned without damage to the environment and, if it is machined, many applications of the waste material obtained in the process are possible, because epoxy material is not toxic. In order to make the finishing treatment by planing easier and to increase the service life of the equipment used for it, the epoxy material preferably contains no fillers and the like. It is preferably of such a colour that after setting of the plastic the colour difference from the wooden part is slight. Applying the plastic in the form of a paste means that it is not necessary for the shaped opening to

be bounded by wood on all sides. The plastic compound in paste form does not flow away. The vibration will make the plastic compound become thinner temporarily and locally, as a result of which optimum filling of the opening takes place. The invention is particularly advantageous in the case of shaped beams because, aside from the costs, little or no technical improvement can be made to these by the methods according to the state of the art. The treatment is particularly suitable for parts of wood material which are visible, and thus are subject to weathering.

The invention also relates to a shaped product, such as door or window frames, in which a wooden part is used, and which is obtained by the process described above.

The invention will be explained in greater detail below with reference to an example of an embodiment shown in the drawing, in which:

Fig. 1 shows a view of a roughly planed wooden beam with undesirable parts;

Fig. 2 shows the beam according to Fig. 1, in which these parts are removed by milling;

Fig. 3 shows the beam according to Fig. 2, in which the openings produced are provided with plastic; and

Fig. 4 shows the finished beam.

In Fig. 1 a beam part is indicated by 1. This beam is roughly planed and contains a number of undesirable flaws, such as a knot 2, a resin duct 3 and a crack 4. According to the invention, these undesirable parts 2 - 4 are removed by milling, and openings 5, 6 and 7 respectively are thereby produced. According to the invention, milling is used, for example with a wood-milling cutter having a diameter of 10 mm, because a recess better adapted to the unpredictable shape of the undesirable part can thereby be obtained. This, on the one hand, guarantees that the undesirable part is fully removed and, on the other, ensures that as little healthy wood as possible is removed. The depth of the shaping is at least 1 cm, and preferably lies between 1.5 and 3 cm. This depends on the wood used. Any kind of wood has in fact knots and similar flaws of a certain average depth. This depth can be detected if necessary.

Fig. 3 shows the situation after filling of the openings 5, 6, 7 with a two-component material, such as permanently elastic epoxy resin. This epoxy material preferably contains no fillers, in order to ensure that its machineability is kept essentially the same as that of the wood. An example of such a permanently elastic epoxy material is epoxy resin based on a bisphenol A/S and/or epichlorohydrin.

In order to obtain a colour corresponding to that of wood, only very low quantities of colourants need be added. Any material still present in the openings 5, 6, 7 is moistened by the epoxy resin,

and a particularly good adhesion is obtained both in the bottom and the longitudinal edges of the opening. The plastic material used is so paste-like that it does not flow out of opening 6. In order to avoid gas bubbles in the epoxy resin material vibrations are used during or after the insertion of the plastic material, for example with a high-frequency vibrating needle. After setting, a surface which is not completely flush with that of the remaining parts of the wood is generally obtained. This is not important because, as shown in Fig. 4, the beam 1 is subjected to a further finishing planing treatment, in which, for example, 1 to 2 mm of material is removed. Through the use of the epoxy material a watertight seal with particularly good adhesion to the surrounding wood material is obtained. The epoxy material can if necessary be set with the aid of ultraviolet or infrared rays. After the planing operation, preservation can take place, for example in vacuum conditions. The epoxy parts do not affect the characteristics of painting the wood with all known types of paint, such as water-bearing paints and alkyl-based paints. Nor have problems been found with the fitting of fixing means and glazing, because the epoxy resin is permanently elastic. If the moisture content in the wood increases and decreases, this has no effect at all on the epoxy part.

Example

A laminated wood product described in the first part of the application, based on deal or pine, in the case of which a continuous beam is obtained by means of a finger joint, requires a very expensive lamination plant. A wood loss of approximately 25% is produced during the processing.

Hardwood, such as meranti, is 20% cheaper, if it may be used.

Beam material according to the present invention costs about half the price of the laminated wood product and no appreciable wood loss occurs during the improvement.

Although the invention is described above with reference to a preferred embodiment, it must be understood that numerous modifications can be made to it without going beyond the scope of the present application.

Claims

1. Process for improving a wooden part, comprising the detection and removal of undesirable material, filling of the opening (5,6,7) produced with a setting plastic material, and finishing of the wooden part, characterized in that the wooden part comprises a solid wooden part (1) which is subjected to detection in an untreated

or roughly pre-treated state, in that the removal of undesirable material comprises the making of an opening (5,6,7) at least 1 cm deep, in that the plastic material comprises a permanently elastic plastic, and in that after setting thereof the entire wooden part is subjected to a first finishing treatment.

2. Process according to Claim 1, in which the machining treatment for the removal of material involves milling.
3. Process according to any of the preceding claims, in which during or after insertion of the plastic material a process for the removal of gas bubbles from it is used.
4. Process according to Claim 3, in which the gas bubbles are removed by vibration.
5. Process according to any of the preceding claims, in which an epoxy-based plastic is used.
6. Process according to any of the preceding claims, in which a plastic which after setting is of a colour corresponding to that of the wooden part is used.
7. Process according to any of the preceding claims, in which the plastic used is paste-like.
8. Formed product, in which a wooden part (1) obtained by the process according to any of Claims 1 - 7 is used.

Patentansprüche

1. Verfahren zum Ausbessern eines Holzteils, umfassend das Auffinden und Entfernen von unerwünschtem Material, das Füllen der erzeugten Öffnung (5,6,7) mit einem abbindbaren Kunststoffmaterial, und die Fertigbearbeitung des Holzteils, **dadurch gekennzeichnet**, dass das Holzteil einen massiven Teil (1) aus Holz umfasst, das dem Auffinden in einem unbehandelten oder roh vorbehandelten Zustand unterzogen wird, dass das Entfernen von unerwünschtem Material das Anbringen einer mindestens 1 cm tiefen Öffnung (5,6,7) umfasst, dass das Kunststoffmaterial einen dauerhaft elastisches Kunststoff umfasst, und dass nach dessen Abbinden das gesamte Holzteil einer ersten Fertigbearbeitungsbehandlung unterzogen wird.
2. Verfahren nach Anspruch 1, bei welchem die Bearbeitungsbehandlung zum Entfernen von

Material ein Fräsen umfasst.

3. Verfahren nach irgendeinem der vorangehenden Ansprüche, bei welchem während oder nach dem Einsetzen des Kunststoffmaterials ein Verfahren zum Entfernen von Gasblasen daraus verwendet wird. 5
4. Verfahren nach Anspruch 3, bei welchem die Gasblasen durch Vibrieren entfernt werden. 10
5. Verfahren nach irgendeinem der vorangehenden Ansprüche, bei welchem ein Kunststoff auf Basis von Epoxy verwendet wird. 15
6. Verfahren nach irgendeinem der vorangehenden Ansprüche, bei welchem ein Kunststoff verwendet wird, der nach dem Aushärten eine Farbe hat, welche derjenigen des Holzteils entspricht. 20
7. Verfahren nach irgendeinem der vorangehenden Ansprüche, bei welchem der verwendete Kunststoff pastenähnlich ist. 25
8. Geformtes Erzeugnis, in welchem ein nach dem Verfahren gemäß irgendeinem der Ansprüche 1 bis 7 hergestelltes Holzteil (1) verwendet wird. 30

Revendications

1. Procédé d'amélioration d'une pièce en bois, comportant la détection et l'élimination de matériau indésirable, le remplissage de l'ouverture pratiquée (5,6,7) avec une matière plastique susceptible de prendre, et la finition de la pièce en bois, **caractérisé en ce que** la pièce en bois comporte une portion en bois massif (1) qui est soumise à la détection à l'état non traité ou grossièrement prétraité, en ce que l'élimination de matériau indésirable comporte le percement d'une ouverture (5,6,7) d'au moins 1 cm de profondeur, en ce que la matière plastique comporte une matière plastique élastique de façon permanente, et en ce qu'après la prise de celle-ci la totalité de la pièce en bois est soumise à un premier traitement de finition. 35 40 45 50
2. Procédé selon la revendication 1, dans lequel le traitement d'usinage pour l'élimination de matériau indésirable comporte le fraisage. 55
3. Procédé selon l'une quelconque des revendications précédentes, dans lequel on utilise, pendant ou après l'insertion de la matière plastique, un procédé pour éliminer de celle-ci les 5

bulles de gaz.

4. Procédé selon la revendication 3, dans lequel les bulles de gaz sont éliminées par vibration.
5. Procédé selon l'une quelconque des revendications précédentes, dans lequel on utilise une matière plastique à base d'époxy.
6. Procédé selon l'une quelconque des revendications précédentes, dans lequel on utilise une matière plastique qui est, après la prise, d'une couleur correspondant à celle de la pièce en bois.
7. Procédé selon l'une quelconque des revendications précédentes, dans lequel la matière plastique utilisée est semblable à une pâte.
8. Produit en forme, dans lequel on utilise une pièce en bois (1) obtenue selon l'une quelconque des revendications 1 à 7.

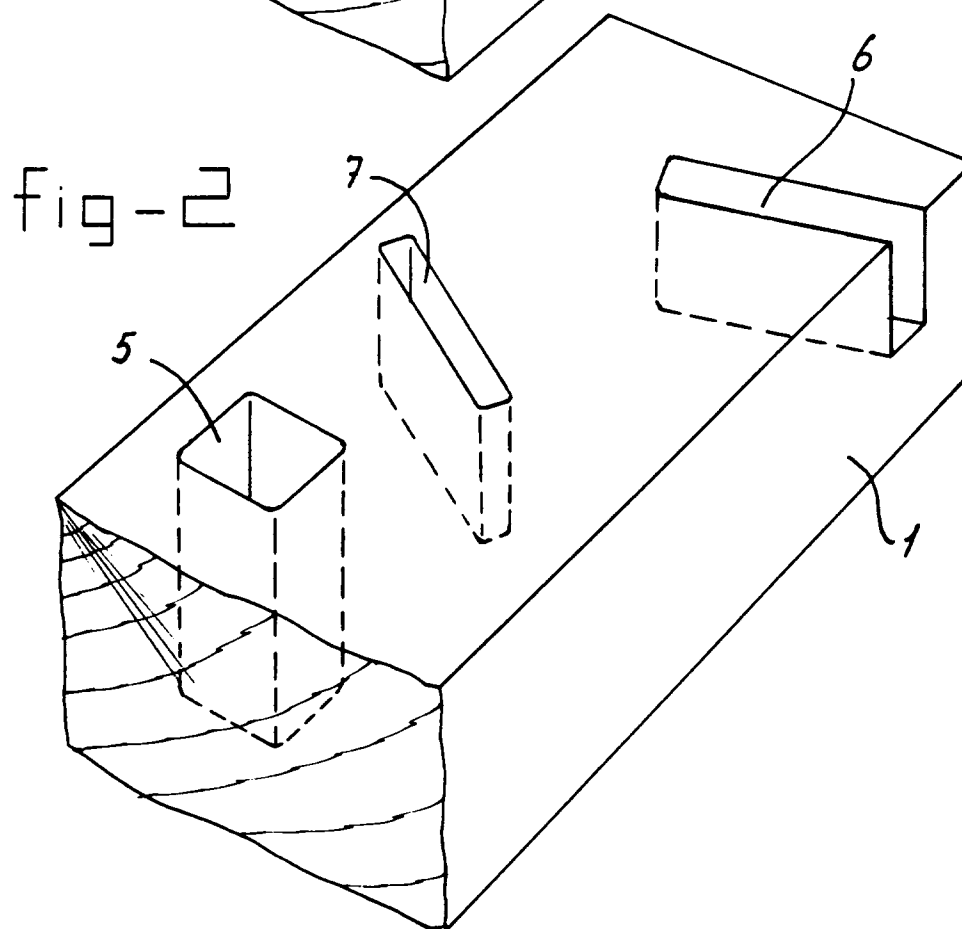
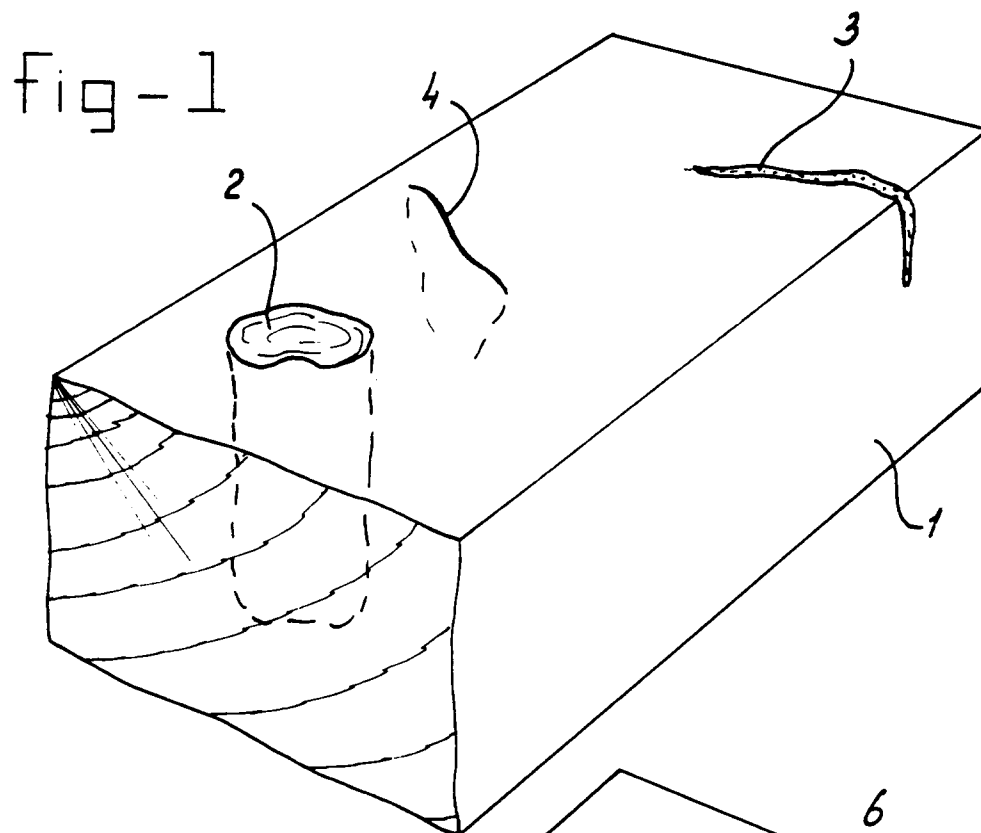


fig-3

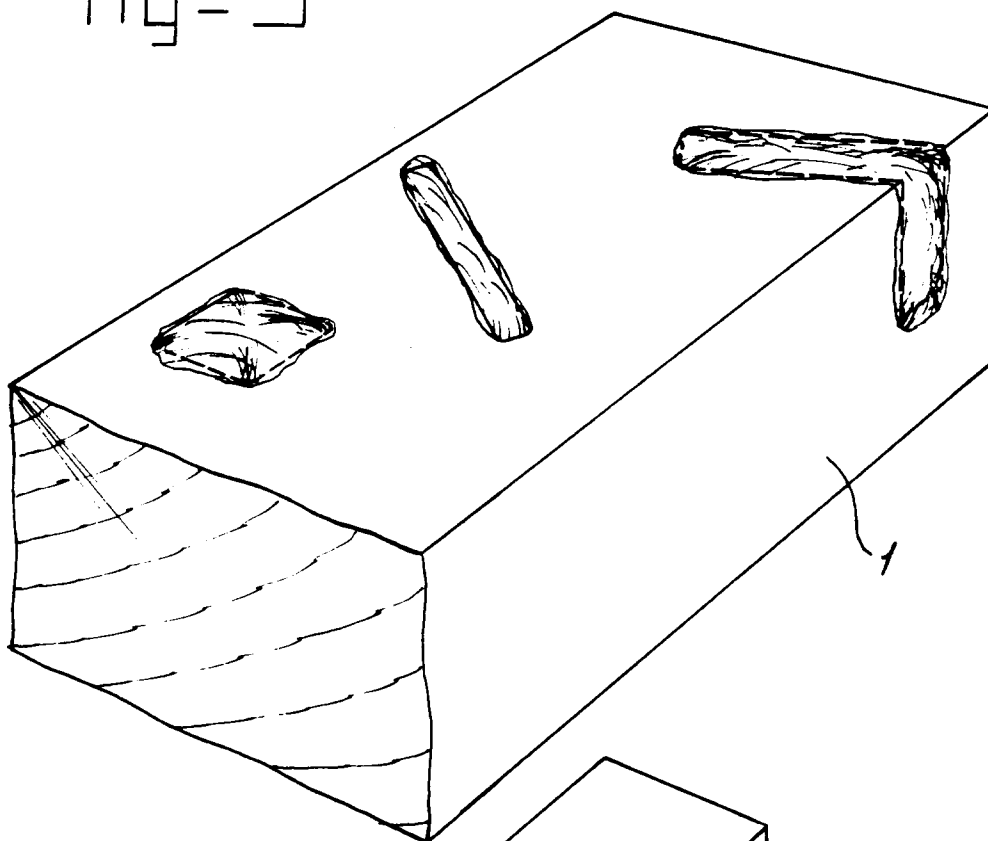


fig-4

