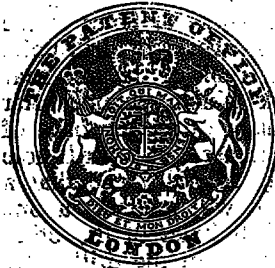


PATENT SPECIFICATION

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COMPLETE SPECIFICATION

DRAWINGS ATTACHED

Improvements in or relating to the Colouring of Wood

We, AARONSON BROS. LIMITED, a British Company of Town Wharf, Rickmansworth, Hertfordshire, England, do hereby declare the invention, for which we pray that a Patent may be granted to us, and the method by which it is to be performed, to be particularly described in and by the following statement:—

This invention relates to methods of colouring wood and to coloured wood so produced.

It has previously been proposed to obtain coloured wood by drilling intersecting holes in the trunk of a growing tree, and then introducing colouring material into the wood of the tree through the intersecting holes. These previous methods have only been partially successful in that the colour has spread through part of the tree, and, therefore, when the tree is felled and cut across its girth, some sections of the exposed tree retain the natural colour of the wood.

However, as a result of repeated experiments, the surprising discovery has now been made that colour may be introduced throughout substantially the whole of a considerable length of the trunk of a tree by providing in the trunk at least two networks of drill holes, each network comprising a first plurality of parallel drill holes through the trunk of a tree intersecting with a second plurality of drill holes in another direction through the trunk of a tree, and the drill holes in one network being offset with respect to the parallel drill holes in the other network. By the use of this method with two networks of drill holes, which may be only a foot or less apart, as much as a 20 foot length of the trunk of a tree may be coloured. Furthermore the networks of drill holes which are employed in order to give a colouring of such a length of the trunk of a tree are not such as to weaken

the trunk of the tree to the extent that it is in any danger of falling, unless subjected to very severe winds.

Accordingly the present invention provides a method of colouring wood comprising the steps of drilling a plurality of networks of intersecting drill holes in the trunk of a living tree, each network being formed by a first plurality of drill holes which intersect with a second plurality of drill holes, the drill holes comprising the respective networks being arranged out of vertical alignment with one another, feeding into the said networks of drill holes a liquid having the property of imparting colour to the wood of the tree, and sealing the said networks of drill holes so that the liquid may leave the said networks substantially only through the wood of the tree.

It will be understood that the step of sealing the networks may involve the positioning of plugs of wood or other suitable material in the mouths of a number of the drill holes comprising the network, so that exodus of the colouring liquid from these drill holes other than into the wood of the tree is substantially prevented, although some slight seeping of the colouring liquid round the edges of the plugs may take place.

Although the colouring material can be dispersed throughout the trunk of the tree, including the heart of the tree, it will naturally be understood that the intensity of the colour in different parts of the trunk of the tree will vary according to the nature of the wood in any part of the trunk.

Advantageously the drill holes comprising the networks of drill holes intersect at right angles, and each network of intersecting drill holes lies in a plane substantially at right angles to the trunk of the tree.

It will be understood that, when the

planes of the drill holes comprising each of the said networks are parallel to each other, the drill holes in one network are arranged such that a vertical line passing through a

5 drill hole in the said one network will intersect a horizontal line perpendicular to the corresponding drill holes in the adjacent network at a position between the drill holes forming the said adjacent network.

10 In a preferred arrangement according to the invention, there are two networks of intersecting drill holes, the holes in one network being arranged in such a way that a vertical line through any one hole in the said

15 one network bisects the distance between the adjacent parallel drill holes in the other network.

The present invention also comprehends a method of colouring wood, which method

20 comprises introducing a colouring liquid into the cellular tissues of a growing tree via a plurality of substantially horizontal networks each comprising a first plurality of drill holes intersecting at right angles

25 with a second plurality of drill holes, the drill holes comprising the respective networks being arranged out of vertical alignment with one another, whereby the colouring liquid is dispersed throughout the tree

30 by the natural movement of the sap in the tree, and cutting down the tree after a period of time sufficient to permit distribution of the colouring liquid throughout substantially the whole of the tree.

35 The dispersion of the colouring liquid through the wood and the cellular tissues of the tree, and so throughout substantially the whole of the tree is thought to be due to the osmotic pressure from the roots of the

40 tree combined with the transpiration associated with the sucking effect of the leaves of the tree. However, the colour will also disperse throughout the trunk of a tree which has been topped, so that the effect of

45 the leaves is not essential.

Preferably the colouring liquid is a dye, in which case, the same liquid may be applied to each of the networks. However, it is equally possible for the colouring liquid

50 to be formed from two chemicals introduced into adjacent networks so that the chemicals react to produce a colouring material within the tree. As a further alternative it is possible

55 for different colouring materials to be introduced into different networks, in which case two or more different dyes are preferably used.

Advantageously the dye is selected from the group known as acid dyestuffs. The

60 selected dyestuff should be soluble in water, have good penetration into wood, and have a good light fastness and certain azo dyes have these properties.

When the tree is topped by removal of

65 the upper growth of thin branches prior to

the drilling of the networks of holes in the trunk of the tree, the networks of drill holes may be drilled in the trunk of the tree near the top of the trunk which remains after

70 topping. Advantageously three networks of drill holes may then be used, each drill hole in each network being so positioned that a vertical line through it will intersect a line in the plane of the drill holes of the other

75 networks at a point between the drill holes in each of the other networks.

The present invention also comprehends coloured wood produced by the method of the invention.

In order that the invention may be more

80 clearly understood, reference will now be made to the accompanying drawings in which:—

Figures 1, 2 and 3 show respectively an elevation and two sectional views of a trunk

85 of a tree in which networks of drill holes have been formed according to the invention;

Figures 4, 5 and 6 show similar views of a trunk of a tree in which a preferred

90 arrangement of drill holes forming networks according to the invention are shown;

Figure 7 shows one method of applying a colouring liquid to the networks of drill

95 holes;

Figure 8 shows an alternative method of applying a colouring liquid to the networks of drill holes; and

Figure 9 shows a third method of applying colouring liquid to the networks of drill

100 holes.

In the drawings, like reference numerals designate the same or similar parts.

Referring first of all to Figures 1 to 3 of the accompanying drawings, there are indicated at 1 and 2 levels, in the trunk 3 of

105 a growing tree, at which two networks of drill holes may be formed.

The arrangement of Figures 1 to 3 is an arrangement of two substantially horizontal

110 networks drilled in the trunk 3 of the tree. One network is formed by the intersecting pairs of drill holes 8, 9 and 10, 11 and the other by the intersecting drill holes 12, 13, 14, 15 and 16 and 17, 18, 19, 20 and 21.

115 Each of the drill holes 8 to 21 is drilled by hand or by mechanical means and is approximately 1" in diameter. The vertical distance between the two networks comprised respectively by the drill holes 8 to 11 and the drill holes 12 to 21 is about 8-9".

120 The drill holes 12 to 16 and 17 to 21 are approximately 3" apart, while the drill holes 8, 9 and 10, 11 are about 6" apart.

It will be noted that a vertical line passing through the drill hole 8 will intersect a

125 horizontal line at right angles to the drill holes 12 to 16 at a point between the drill holes 12, 13. The drill holes 9, 10 and 11 are similarly positioned relative to the drill

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holes 15, 16 and 17, 18 and 20, 21.

A preferred embodiment of the invention is shown in Figures 4 to 6 where the two networks both consist of a considerable number of intersecting drill holes, one network comprising drill holes 22 to 26 and 27 to 31, and the other network comprising drill holes 32 to 37 and 38 to 43. In this case, a vertical line through each of the drill holes 22 to 26 and 27 to 31 will bisect a horizontal line joining respective pairs of the drill holes 32 to 37 and 38 to 43.

Each of the individual drill holes 22 to 26 and 27 to 31 in the upper network is separated from its neighbour by about 3" of tree. Similarly the individual drill holes 32 to 37 and 38 to 43 are separated from one another by about 3" of tree. All the drill holes are approximately 1 inch in diameter, and the two networks of drill holes are made near the base of the trunk 3 of the tree, and are spaced apart by a vertical distance of about 9 inches.

In the arrangements of drill holes according to the invention which are shown in Figures 1 to 6 of the accompanying drawings, there are only two networks of intersecting drill holes, but the arrangements may be extended in accordance with the invention to include three, four or more networks of intersecting drill holes. Similarly, although all the networks shown comprise drill holes intersecting at right angles, it is equally possible for the drill holes to intersect at angles other than right angles, so that the figures formed by the intersecting drill holes are parallelograms instead of the rectangles shown in the sectional views of Figures 2, 3, 5 and 6.

Figures 7, 8 and 9 show diagrammatically three methods by which the colouring liquid may be fed into the networks of drill holes formed in the trunk 3 of a tree. In Figure 7, a tank 44 having an outlet pipe 45, conveniently a rubber tube, feeds a colouring liquid, for example an acid dyestuff such as the red dyestuff obtainable under the name Acilan Ponceau RR Extra 8066D, into the upper of the two networks of drill holes 46 and a connecting pipe 47 takes a portion of the applied dyestuff to the lower network 48.

Apart from the particular drill holes of the network 46 to which the pipes 45 and 47 are connected, all the other outlets from the drill holes are blocked up or sealed using plugs, preferably of wood but alternatively of cork or rubber, and similarly all the drill holes of the lower network 48, except that to which the pipe 47 is connected, are sealed or plugged.

Figure 8 shows an arrangement in which the tank 44 containing the acid dyestuff or other colouring liquid has a plurality of outlet pipes 49, 50 and 51 which feed the

colouring liquid to one of the drill holes in each of three networks 52, 53, 54. The other outlets for the drill holes forming the networks 50, 51 and 52 are sealed as described with reference to Figure 7.

Figure 9 shows an arrangement in which two tanks 44 of the colouring liquid are provided, one for each of the networks of drill holes 55, 56. In the arrangement of Figure 9, instead of the two tanks 44 containing the same colouring material, it is possible for the tanks to contain two different chemicals which are neither of them coloured but which will react within the tree to form a colouring material. An example of two liquids, neither of which themselves will impart a colour to a tree, but which will react within the wood of the tree to produce a colouring material for a tree are solutions of ferric chloride and potassium ferrocyanide. In practice there is required an excess of the theoretical quantity by weight of ferric chloride necessary to react with the potassium ferrocyanide, because the ferric chloride tends to react with tannic acid present in the tree. For example, a solution of 1 kg. of ferric chloride can be used with a solution of 600 grams of potassium ferrocyanide.

As a further alternative, the two tanks 44 may contain dyes of different colours, so that the coloured wood obtained has a multiplicity of colours derived from blending of the two dyes in the wood of the tree.

The amount of colouring liquid which is to be fed to a tree in order to colour it satisfactorily varies according to the size of the tree, but will be of the order of 150 to 300 gallons. The time for which the colouring liquid has to be fed to the tree will vary with the weather and in hot, sunny weather, with a suitable tree, may be only a week, but, on the other hand, under less favourable conditions, with a more difficult tree, the period may be extended to as much as three weeks.

Examples of acid dyestuffs which have been found to be satisfactory in the method of the present invention are the acid dyestuffs which are azo-dyes and which are obtainable under the trade names Acilan Ponceau RR Extra 8066D, Acilan Orange GX Type 8066D, Acilan Yellow Extra Type 8066D, Brilliant Black B Extra 8066D, Acilan Black 10 B 8066D, Cedar Brown 61250 8066D, and Turquoise Blue AE.

The method according to the invention has application to many types of tree, particularly alder, maple, sycamore, lime, birch, beech and poplar. Of these, sycamore is one of the easier trees to treat and the poplar one of the more difficult.

By the use of the present invention, it is found that penetration of the colouring liquid throughout a tree may be obtained.

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However, this does not mean that every part of the tree will be coloured, but that the colouring material will penetrate throughout most of the trunk of the tree. In order to obtain success in the colouring process, however, it is necessary for a very careful selection to be made of the trees. In selecting a tree, particular attention is paid to the regularity of its growth.

The dispersion of the colouring material throughout the trunk of the tree is not a uniform dispersal throughout the trunk as would be the case if the colouring material had been introduced solely by artificial methods rather than by methods in which the movement of sap in the tree is utilised. Consequently a method according to the invention provides a coloured trunk of a tree in which the colour has different shades or depths according to the grain in the wood of the tree.

The method according to the invention is also particularly adapted for introducing a plurality of colours throughout the wood in the trunk of a tree. By reason of the drill holes in one network being offset with respect to the parallel drill holes in another network, if one colour is introduced into one network and a different colour into another network, these colours are both dispersed throughout the wood of a tree but not directly into one another, so that the colours do not entirely merge, but both colours will appear when the trunk of the tree is cut across its girth. There will be naturally some blending of the two colours at positions in the trunk of the tree which fall on a vertical line between drill holes of the respective networks.

It is found that good results are obtained when the networks in the trunk of the tree are drilled at any distance from ground level up to a height of 10 feet from the ground in the trunk of a growing tree. The networks are most conveniently drilled at as low levels as possible in order to avoid waste of timber and also so that the tanks of colouring liquid are at a convenient height for inspection and refilling with the minimum expenditure of man-power. In general the trees which are treated have a trunk diameter of some 2 feet to 3 feet at the part of the trunk where the networks of holes are drilled.

When the method is employed on a tree which has been topped, however, the drill holes may be as much as 20 ft. from the ground. The position of the networks of drill holes in such a topped tree must be sufficiently below the topmost part of the trunk to allow of the tanks of colouring liquid being fastened to the trunk so that a gravity feed of the colouring liquid to the networks occurs. This method is preferably employed at the time of year when the sap

in the tree is tending to fall rather than to rise.

The coloured wood obtained according to the present invention provides a length of tree-trunk free from drill holes, so that the trunk may be sliced on a conventional veneer slicing machine in order to obtain substantial lengths of veneers of coloured wood which are free from blemishes and which may be used as coverings for walls or furniture. Also the coloured wood may be used as solid wood for general manufacture, for example of turned articles or furniture. In fact the coloured wood obtained according to the invention may be sold or used as logs, boards, or veneers, as bonded boards, bonded veneers, boards bonded with veneers, all in block form, or as veneers cut from such blocks.

WHAT WE CLAIM IS:—

1. A method of colouring wood comprising the steps of drilling a plurality of networks of intersecting drill holes in the trunk of a living tree, each network being formed by a first plurality of drill holes which intersect with a second plurality of drill holes, the drill holes comprising the respective networks being arranged out of vertical alignment with one another, feeding into the said networks of drill holes a liquid having the property of imparting colour to the wood of the tree, and sealing the said networks of drill holes so that the liquid may leave the said networks substantially only through the wood of the tree.
2. A method according to Claim 1, wherein the drill holes comprising the said networks intersect at right angles, and each network of intersecting drill holes lies in a plane substantially at right angles to the trunk of the tree.
3. A method according to Claim 2 in which there are two networks of intersecting drill holes, the holes in one network being arranged in such a way that a vertical line through any one hole in the said one network bisects the distance between the adjacent parallel drill holes in the other network.
4. A method of colouring wood, which method comprises introducing a colouring liquid into the cellular tissues of a growing tree via a plurality of substantially horizontal networks each comprising a first plurality of drill holes intersecting at right angles with a second plurality of drill holes, the drill holes comprising the respective networks being arranged out of vertical alignment with one another, whereby the colouring liquid is dispersed throughout the tree by the natural movement of the sap in the tree, and cutting down the tree after a period of time sufficient to permit distribution of the colouring liquid throughout substantially the whole of the tree.

However, this does not mean that every part of the tree will be coloured, but that the colouring material will penetrate throughout most of the trunk of the tree. In order to obtain success in the colouring process, however, it is necessary for a very careful selection to be made of the trees. In selecting a tree, particular attention is paid to the regularity of its growth.

- 10 The dispersion of the colouring material throughout the trunk of the tree is not a uniform dispersal throughout the trunk as would be the case if the colouring material had been introduced solely by artificial methods rather than by methods in which the movement of sap in the tree is utilised. Consequently a method according to the invention provides a coloured trunk of a tree in which the colour has different shades or depths according to the grain in the wood of the tree.

- The method according to the invention is also particularly adapted for introducing a plurality of colours throughout the wood in the trunk of a tree. By reason of the drill holes in one network being offset with respect to the parallel drill holes in another network, if one colour is introduced into one network and a different colour into another network, these colours are both dispersed throughout the wood of a tree but not directly into one another, so that the colours do not entirely merge, but both colours will appear when the trunk of the tree is cut across its girth. There will be naturally some blending of the two colours at positions in the trunk of the tree which fall on a vertical line between drill holes of the respective networks.

- 40 It is found that good results are obtained when the networks in the trunk of the tree are drilled at any distance from ground level up to a height of 10 feet from the ground in the trunk of a growing tree. The networks are most conveniently drilled at as low levels as possible in order to avoid waste of timber and also so that the tanks of colouring liquid are at a convenient height for inspection and refilling with the minimum expenditure of man-power. In general the trees which are treated have a trunk diameter of some 2 feet to 3 feet at the part of the trunk where the networks of holes are drilled.

- 55 When the method is employed on a tree which has been topped, however, the drill holes may be as much as 20 ft. from the ground. The position of the networks of drill holes in such a topped tree must be sufficiently below the topmost part of the trunk to allow of the tanks of colouring liquid being fastened to the trunk so that a gravity feed of the colouring liquid to the networks occurs. This method is preferably employed at the time of year when the sap

in the tree is tending to fall rather than to rise.

The coloured wood obtained according to the present invention provides a length of tree-trunk free from drill holes, so that the trunk may be sliced on a conventional veneer slicing machine in order to obtain substantial lengths of veneers of coloured wood which are free from blemishes and which may be used as coverings for walls or furniture. Also the coloured wood may be used as solid wood for general manufacture, for example of turned articles or furniture. In fact the coloured wood obtained according to the invention may be sold or used as logs, boards, or veneers, as bonded boards, bonded veneers, boards bonded with veneers, all in block form, or as veneers cut from such blocks.

WHAT WE CLAIM IS:—

1. A method of colouring wood comprising the steps of drilling a plurality of networks of intersecting drill holes in the trunk of a living tree, each network being formed by a first plurality of drill holes which intersect with a second plurality of drill holes, the drill holes comprising the respective networks being arranged out of vertical alignment with one another, feeding into the said networks of drill holes a liquid having the property of imparting colour to the wood of the tree, and sealing the said networks of drill holes so that the liquid may leave the said networks substantially only through the wood of the tree.
2. A method according to Claim 1, wherein the drill holes comprising the said networks intersect at right angles, and each network of intersecting drill holes lies in a plane substantially at right angles to the trunk of the tree.
3. A method according to Claim 2 in which there are two networks of intersecting drill holes, the holes in one network being arranged in such a way that a vertical line through any one hole in the said one network bisects the distance between the adjacent parallel drill holes in the other network.
4. A method of colouring wood, which method comprises introducing a colouring liquid into the cellular tissues of a growing tree via a plurality of substantially horizontal networks each comprising a first plurality of drill holes intersecting at right angles with a second plurality of drill holes, the drill holes comprising the respective networks being arranged out of vertical alignment with one another, whereby the colouring liquid is dispersed throughout the tree by the natural movement of the sap in the tree, and cutting down the tree after a period of time sufficient to permit distribution of the colouring liquid throughout substantially the whole of the tree.



5. A method according to any of the preceding claims in which the colouring liquid is an aqueous solution of an acid dyestuff.
- 5 6. A method according to any of claims 1 to 4 in which the colouring liquid is formed from two chemicals, introduced into adjacent networks, which chemicals will react to produce a colouring material
- 10 within the tree.
7. A method according to any of Claims 1 to 4 wherein different colouring materials are introduced into different networks.
8. A method according to Claim 1 or
- 15 Claim 2 wherein the tree is first topped and then three or more networks of drill holes are formed in the trunk of the tree near the end of the trunk at which the tree has been topped.
9. A method of colouring wood substantially as hereinbefore described and with reference to the accompanying drawings.
10. Coloured wood obtained by the method of any of the preceding claims.
- 25 11. Veneers sliced from coloured wood according to Claim 10.

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* C L H S *