

[54] METHOD FOR CUTTING A SHAPED MEMBER FROM A WOOD BLOCK

21,571 4/1930 Netherlands..... 144/86

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[21] Appl. No.: 124,779

[57] ABSTRACT

[52] U.S. Cl. 144/326 R, 144/86, 144/136 R, 144/312

[51] Int. Cl. B27c 9/00

[58] Field of Search..... 144/133, 136 R, 321, 144/323, 326, 218-219, 147, 136 H, 136 C, 144/86, 312

A method of cutting within the interior of a piece of wood or like material having any length and in the length-wise direction without any need to provide a space for the removal of shavings which may be produced, comprising the steps of forming in the piece by conventional means at least one longitudinal groove having a bottom portion which terminates at the level of the internal portion to be cut, inserting in said groove the body of a tool having a cutting portion which corresponds in shape to the portion to be cut and causing said body to follow said groove by subjecting said piece and said tool to a relative movement of unidirectional and longitudinal displacement.

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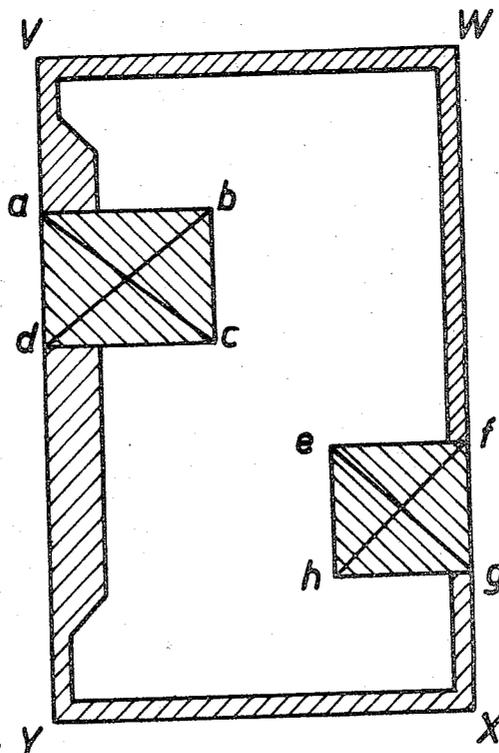
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3 Claims, 21 Drawing Figures



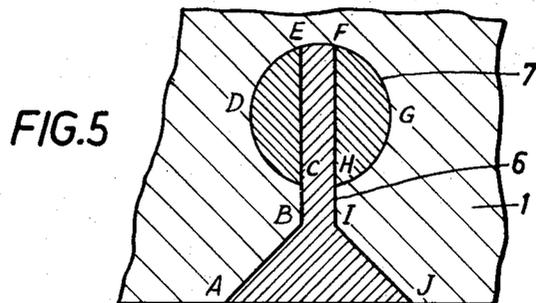
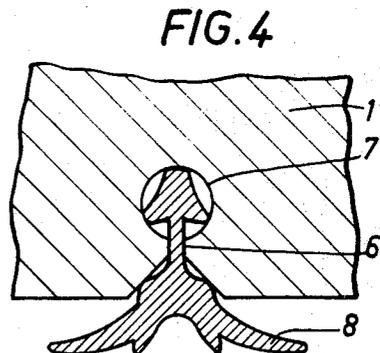
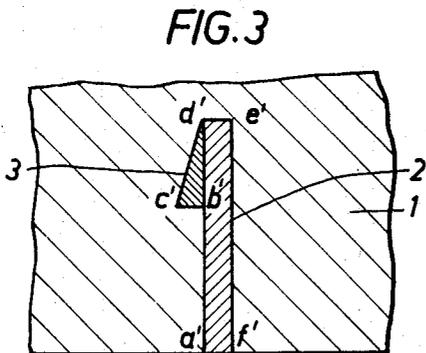
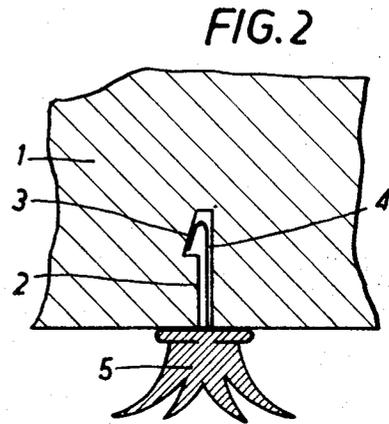
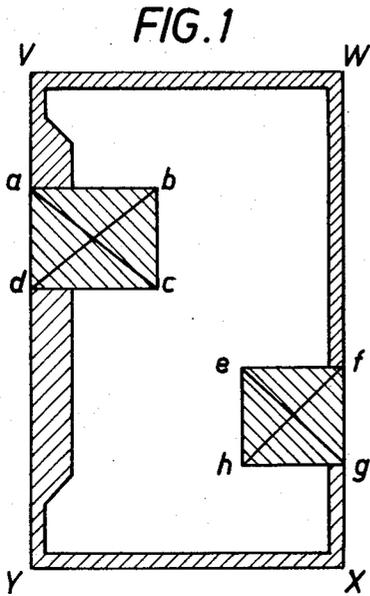


FIG. 6

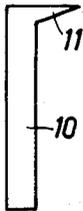


FIG. 7

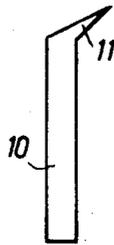


FIG. 8

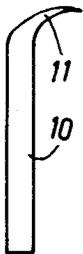


FIG. 9

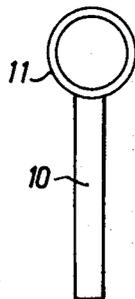


FIG. 11

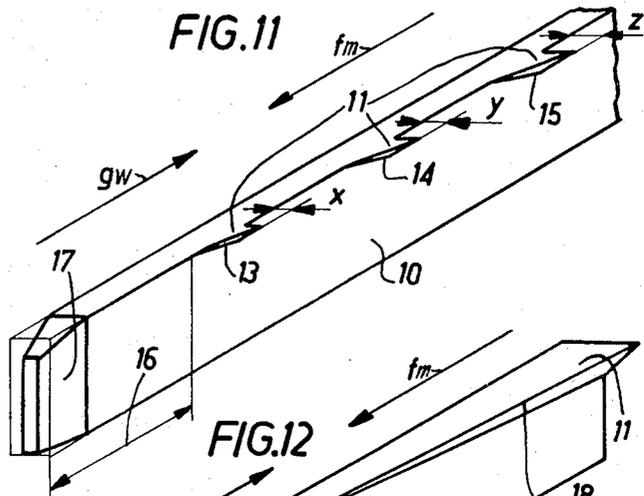


FIG. 12

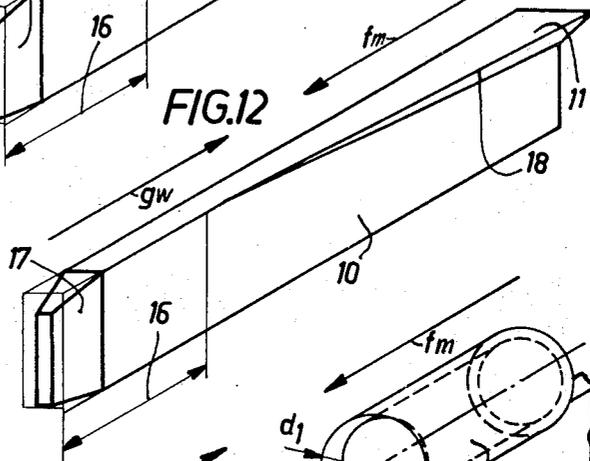


FIG. 13

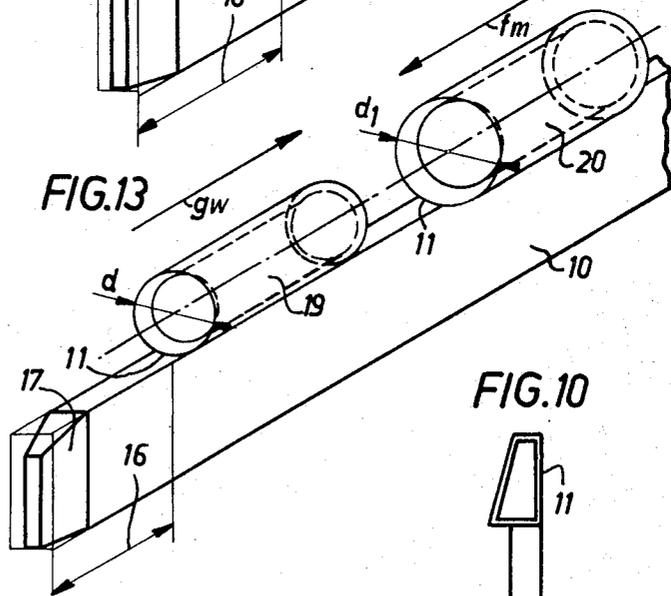
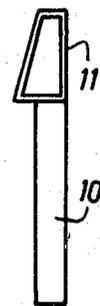


FIG. 10



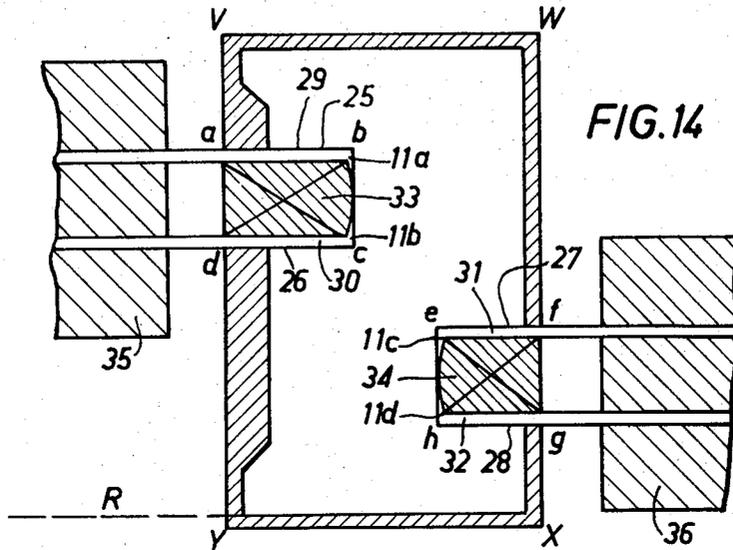


FIG. 15

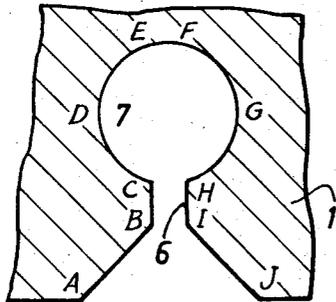


FIG. 16

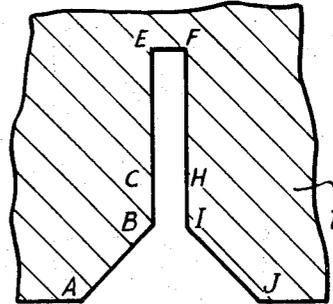


FIG. 17

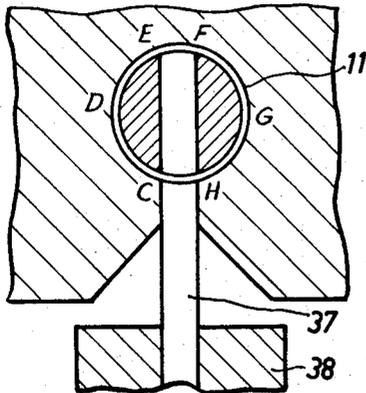
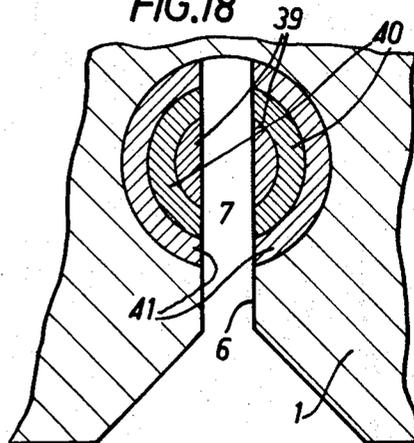
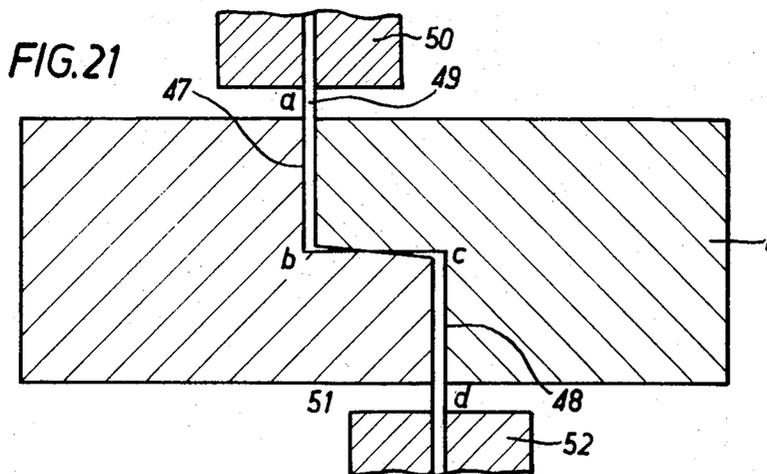
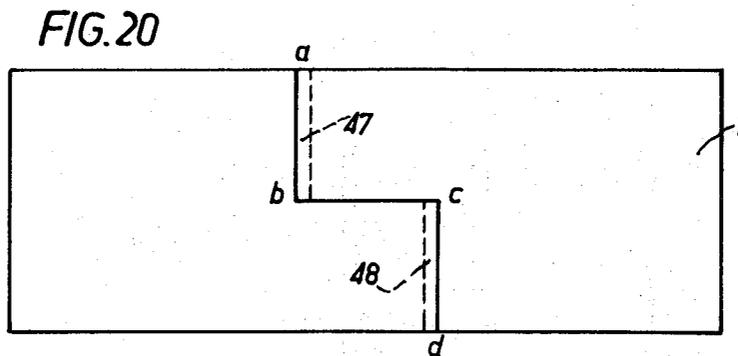
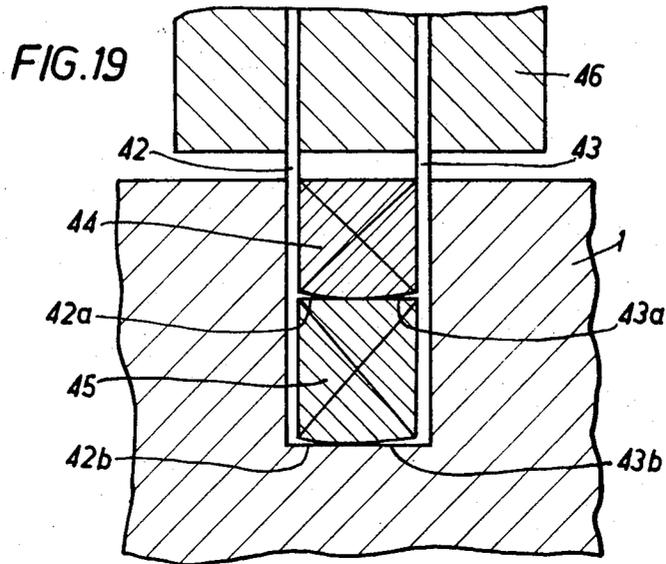


FIG. 18





METHOD FOR CUTTING A SHAPED MEMBER FROM A WOOD BLOCK

This invention relates to a method and a tool for working wood, plastics or like materials in places which are inaccessible to known tools or when working conditions are such that known tools could not be employed in a satisfactory manner.

In wood-working operations and in particular in order to obtain shaped members for building purposes, the usual procedure consists in removing shavings by means of rotary tools which correspond to the desired profile.

In many instances, the profiles of machined wood pieces are such that the transverse cross-section of the timber employed would make it possible not only to obtain the desired piece but also to obtain additional pieces from portions of the timber which are normally reduced to chips and shavings. In some instances, these wood pieces could be recovered by means of known tools whereas, in other instances, it would prove necessary to work in locations which could not be reached by any tools of known design.

Grooves of special shape are also frequently necessary for the attachment of accessories or for certain types of assemblies. These grooves sometimes have a profile such that they cannot be cut at a sufficiently high speed to permit completion during the same operation as the remainder of the profile. Alternatively, such grooves can be machined in a second operation but only under unsatisfactory conditions of economic performance.

The essential aim of this invention is to solve these problems or these difficulties and to permit the possibility of cutting within the interior of a piece of wood or like material having any length and in the lengthwise direction without any need to provide a space for the removal of shavings which may be produced.

It has already been proposed to form grooves within the interior of a wood piece but in the direction of the thickness by means of a saw which extends over part of the length of the tool and a blade which projects with respect to the saw. However, when making use of a tool of this type, the saw and the wood piece are driven in reciprocating motion and the sawdust formed by the saw cannot be removed since the groove is formed in the direction of the width of the piece, that is to say over a small length.

By contrast and in accordance with the invention, at least one longitudinal groove having a bottom portion which terminates at the level of the internal portion to be cut is formed in the piece by conventional means, the body of a tool having a cutting portion which corresponds in shape to the portion to be cut is inserted in said groove and said body is caused to follow said groove by subjecting said piece and said tool to a continuous movement of relative longitudinal displacement.

The method according to the invention can be carried out by means of a tool which also constitutes an object of the invention and has a prism-shaped body as well as at least one cutting portion which projects from said body and is adapted to divide the fibers of the wood in the longitudinal direction which is parallel to the terminal edges of said prism.

The method according to the invention makes it possible to work the material in places which cannot be

reached by means of conventional tools, to recover any pieces which may be required and which would otherwise be lost and to form profiles of special shape such as grooves at the same speed as in conventional machines.

The method of the invention also makes it possible to divide a block of wood in the longitudinal direction into two parts which are limited by a stepped line without thereby entailing any loss of material.

In accordance with the invention, two non-traversing longitudinal grooves which have parallel outlines on the faces of the piece and are not located in the geometrical line of extension of each other are accordingly formed in said piece and have bottom portions which terminate respectively at the level of the two inner extremities of the internal portion to be cut and the tool body whose cutting portions correspond in shape to two complementary sections of said internal portion to be cut is inserted in said grooves.

A certain number of examples of operations which are performed by the method according to the invention and the tools which are employed for carrying out said operations are shown by way of a non-limiting example in the accompanying drawings, wherein :

FIG. 1 is a diagrammatic end view of a piece of lumber which is intended to be machined by removal of the shaded portions ;

FIG. 2 illustrates, partly in section, one example of a groove which may be required to fit a seal;

FIG. 3 is a view which is similar to the preceding and shows the cross-section of the groove on a larger scale ;

FIGS. 4 and 5 are views which are similar respectively to FIGS. 2 and 3 but relate to another shape of groove ;

FIGS. 6 to 10 are diagrammatic end views of different types of tools according to the invention ;

FIG. 11 is a perspective view of a tool having a number of cutting edges ;

FIG. 12 is a view which is similar to FIG. 11 but shows a tool having a single cutting edge ;

FIG. 13 is another view which is similar to FIG. 11 but shows a tool which is provided with cylindrical cutting portions ;

FIG. 14 is a diagram which is similar to FIG. 1 and shows the manner in which the piece of wood can be machined in accordance with the invention ;

FIGS. 15 to 18 are diagrammatic sectional views showing the manner in which a groove of the type shown in FIGS. 4 and 5 can be machined in accordance with the invention ;

FIG. 19 is a diagrammatic sectional view showing the manner in which a number of strips can be recovered while machining a groove ;

FIGS. 20 and 21 show the manner in which a stepped cut can be made in a wood piece.

The cross-section of a piece of prepared timber or lumber is shown in FIG. 1 at *v, w, x* and *y*. The profile of the machined piece which is desired is shown by a thick line. The portion to be removed is shaded in diagonal lines. In this portion, the sections *a, b, c, d* and *e, f, g, h* can be recovered by virtue of the invention, thereby permitting a substantial economy of material.

In order to detach the sections *a, b, c, d* and *e, f, g, h*, cuts can be formed in the wood along *a, b, c, d, e, f* and *g, h* by means of a circular saw, for example. On the other hand, the faces *b, c* and *e, h* cannot be formed by

means of conventional tools. However, the invention makes it possible to form said faces as will be explained below.

In FIG. 2, a wood piece 1 has a groove 2 in which an internal recess 3 is formed at the bottom of said groove and serves to attach the supporting armature 4 of a lipped seal 5. As shown in FIG. 3, the cross-section of the groove 2 can be divided into a rectangle $a' d' e' f'$ which can readily be machined by means of a saw, for example, and into a triangle $b' c' d'$ which cannot be formed by means of conventional tools. This operation can also be carried out in accordance with the invention as will also become apparent hereinafter.

In the example of FIG. 4, a groove 6 terminating in a cylindrical cavity 7 is intended to be formed in the wood piece 1 for the purpose of anchoring a lipped seal 8. As is shown in FIG. 5, the portion A B C E F H I J of the groove can be formed by means of a tool of conventional type. However, the cross-section portions C D E and F G H are necessarily machined by means of a tool of very small size which is therefore fragile and which rotates at high speed but cannot perform the operation in a sufficiently short time.

The invention makes it possible to carry out said operation at normal speed as will also be seen from the following description.

The tool in accordance with the invention essentially comprises an elongated body 10 in the form of a relatively thin blade having the shape of a parallelepiped, for example, and having a thickness of a few millimeters, the width and length of the tool being dependent on the application for which the tool is intended.

The body 10 is rigidly fixed to or integral with at least one cutting portion 11 which projects from said body. As shown in the few examples given in FIGS. 6 to 10, the arrangement and shape of said cutting portion can vary according to the operations to be performed. The cutting direction of the portion 11 is parallel to the length of the body 10.

It is clear from FIG. 6 that the cutting portion 11 is perpendicular to the width of the body 10; in FIG. 7, said portion is inclined with respect to said width; in FIG. 8, the cutting portion is curved and in FIG. 9 has the shape of a hollow cylinder, the axis of which is parallel to the length of the body 10; in FIG. 10, the cutting portion is constituted by a hollow prism, the axis of which is also parallel to the length of the body 10.

Any other form of cutting portion, whether open or closed, may be contemplated without thereby departing from the scope of the invention. The tool can also have a number of parallel lines of cutting portions.

FIG. 11 shows a tool of the type which is illustrated diagrammatically in FIG. 6 and in which the cutting portion 11 is formed of a number of teeth having an oblique cutting edge 13, 14, 15 forming prominent surfaces X, Y, Z on the adjacent face of the body 10 and projecting to an extent which increases progressively in a direction opposite to the direction of forward motion of the tool as designated by the arrow fm , X being smaller than Y which is in turn smaller than Z. The direction of feed of the wood is indicated by the arrow gw . These directions are relative in the sense that either or both of the wood pieces can be endowed with motion. The first tooth begins only at a predetermined distance 16 from the front extremity of the tool in order to ensure a guiding action. This extremity is chamfered at 17 in order to facilitate the engagement of the tool

in the material to be machined. The length of the tool and the number of teeth can vary according to requirements in particular operations of different types for which the tool is used.

In FIG. 12, the tool which is again of the type shown in FIG. 6 has a cutting portion 11 which is made in one piece and the cutting edge 18 of which is inclined at an oblique angle to the length of the body 10. Said edge extends from the body at the predetermined distance 16 and is located at a progressively greater distance from said body in the direction opposite to the direction of feed of the tool.

The tool of FIG. 13 is of the general type illustrated in FIG. 9.

The cutting portion 11 of said tool is formed of two tubular cylinders 19 and 20 having axes which are parallel to the length of the body 10. The diameter d of the cylinder 19 which is located nearest the forward end of the tool is smaller than the diameter d_1 of the cylinder 20.

In order to machine complex shapes, provision can be made on one body for cutting portions having different shapes. For example, said shapes can consist both of cylindrical portions such as those of the tool of FIG. 9 and of prismatic portions such as those of the tool of FIG. 10 or of any combination of suitable shapes.

FIG. 14 shows the manner in which it is possible in accordance with the invention to detach strips in those portions which correspond to the recoverable sections $a b c d$ and $e f g h$ of the wood piece V W X Y of FIG. 1.

The piece of wood in the form of rough timber or of lumber which has already been cut to size is first placed in a multiface planer which is designed to smooth one face having a reference R and to form longitudinal saw-cuts 25, 26, 27 and 28 respectively along the sides $a b$, $c d$, $e f$ and $g h$.

There are engaged respectively in said saw-cuts the tools 29, 30, 31 and 32 having bodies which are substantially equal in thickness to the width of the saw-cut and having cutting portions 11a, 11b, 11c and 11d of the type described with reference to FIG. 6, said cutting portions being directed towards each other in pairs and having a sufficient width to detach a strip 33 or 34 along the sides $b c$ or $e h$ respectively in the piece of wood.

The tools 29, 30, 31 and 32 are mounted either respectively in separate tool-holders 35 or 36 or in a single tool-holder which has a suitable configuration.

The machine which is provided with said tool-holders can also be fitted with conventional tools placed in succession to the tools 29 to 32 in order that the wood piece may be given the desired profile in a single pass.

FIGS. 15 to 18 show the manner in which it is possible in accordance with the invention to machine a groove 6, 7 of the type shown in FIGS. 4 and 5.

A groove having a transverse cross-section A B C E F H I J (as shown in FIG. 16) can readily be machined in the wood piece 1 by means of conventional tools.

A tool 37 of the type described with reference to FIG. 9 is engaged in the groove which has thus been formed, as shown in FIG. 17. Said tool is mounted in a tool-holder 38.

The cutting portion 11 of said tool removes the portions of wood which correspond to the sections C D E and F G H which pass into the interior of the tube and are compressed within this latter.

As illustrated in FIG. 18 and assuming that the tool employed is of the multiple-cylinder type described with reference to FIG. 13 and consists, for example, of three cylinders of increasing diameter, said cylinders will remove successively the shavings 39, 40 and 41 in order to give a final profile to the cylindrical portion 7 of the groove 6.

FIG. 19 shows the method adopted for using tools 42 and 43 having two parallel rows 42a, 42b and 43a, 43b of cutting portions in order to recover two wood strips 44 and 45 in a single operation from a piece 1. Both tools are mounted in a tool-holder 46.

As shown in FIG. 20, a block 1 can be converted into two pieces by forming a cut along the stepped line *l m n o*.

To this end, grooves 47 and 48 are cut in the block along the lines *l m* and *n o* respectively, for example with a saw ; a tool 49 which is mounted in a tool-holder 50 and a tool 51 mounted in a tool-holder 52 are then engaged respectively in said grooves. In this example, the tools are provided with cutting portions of the type shown in FIG. 6 for the purpose of separating the two pieces along the line *m n* (as shown in FIG. 21).

The invention can be carried into effect whenever it proves necessary to machine materials which permit the operation of the tools described in the foregoing. One use for which the invention is particularly advantageous is the cutting of sectional members of wood or of synthetic or plastic materials for such purposes as building construction.

It is readily understood that modifications can be made in the embodiments which have just been described, especially by substituting equivalent technical means, without thereby departing either from the scope or the spirit of the present invention.

What I claim is :

1. A method for separating a shaped member from a piece of wood or similar fibrous material in its length-

wise direction without the production of shavings which comprises the steps of forming in the said piece at least one longitudinal groove having a bottom portion which terminates in the vicinity of the internal portion to be cut, inserting in said groove the body of a tool having a cutting portion which corresponds in shape to the portion to be separated and separates the fibers of said piece without producing shavings and moving said body along said groove by subjecting said piece and said tool to a relative movement of unidirectional and longitudinal displacement.

2. A method according to claim 1, wherein are formed in said piece two non-traversing longitudinal grooves which have parallel outlines on the faces of the piece and are not located in the line of extension of each other and have bottom portions which terminate respectively in the vicinity of the two inner extremities of the internal portion to be separated and inserting in said grooves the tool body whose cutting portions correspond in shape to two complementary sections of said internal portion to be cut.

3. A method for cutting a shaped member from a block of wood or the like which comprises cutting a groove which is substantially rectangular in cross-section across the grain in said block to a depth substantially equal to one dimension of the said shaped member, providing a tool having a body and a cutting portion with a cutting edge which corresponds in configuration to the shape of said member, inserting the tool body in the groove with the cutting edge disposed adjacent to the groove in a position whereby upon relative movement between the block and tool the body moves in the groove and the cutting edge slits the block along the grain without forming any shavings or other waste and thereby cuts the shaped member from the block, and moving said tool body along the groove by causing relative movement between the block and tool.

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UNITED STATES PATENT OFFICE
CERTIFICATE OF CORRECTION

Patent No. 3,774,661 Dated November 27, 1973

Inventor(s) Louis-Andre Duong Vinh

It is certified that error appears in the above-identified patent and that said Letters Patent are hereby corrected as shown below:

On the title page at Item 30, it should read:

Claims priority, application France, March 19, 1970, 70 09878.

Signed and sealed this 24th day of September 1974.

(SEAL)
Attest:

McCOY M. GIBSON JR.
Attesting Officer

C. MARSHALL DANN
Commissioner of Patents