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(54) Feed roller

(57) The present invention relates to a feed roller (1) for feeding logs (20). The feed roller comprises a body (2) and friction elements (3) provided on the outer circumference (6) of the body for enhancing the grip between the feed roller and the logs to be fed. The friction element comprises a feeding means (16),and a fixing means (7) mounted on the body and extending beyond the outer circumference of the body for fixing the feeding means to the body. The feed roller is controlled by a control shaft (4) connected thereto. The solution of the invention significantly improves the gripping properties of the feeding means (16) by mounting it pivotedly on shoulders (10) provided in the fixing means (7) and on a transfer means (17) such that the rotation axis of the feeding means is positioned as close to its upper surfacer (14) as possible. This makes it possible to prevent rotation of the feeding means (16) close to the surface of the log and penetration of the antiskid components (15) provided therein into the surface of the log (20).

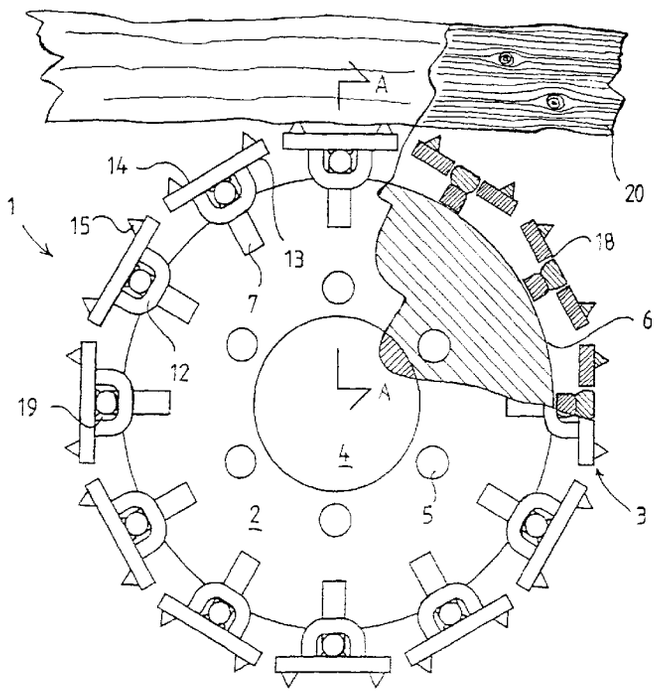

FIG. 1

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Description

The present invention relates to a feed roller for feeding logs, said feed roller comprising a body and friction elements provided on the outer circumference of the body for enhancing the grip between the feed roller and the logs to be fed, said friction element comprising a feeding means and a fixing means mounted on the body and extending beyond the outer circumference of the body for fixing the feeding means to the body, said feed roller being controlled by a control shaft connected thereto.

Such feed rollers are commonly used in logging machines. Generally known feed roller technology is represented by fixed rollers which are most often made of steel, and rollers containing various feeding means and rubber compositions.

Fixed rollers used as feed rollers usually consist of a cylinder provided with various stationary antiskid components. They are simple to manufacture, but since surface pressure is unevenly distributed, they easily damage the surface of the log. Since mechanical logging has become more common, surface defects have become a factor that is more and more significant in view of economical use of timber.

For the reasons mentioned above, feed rollers have been provided with different kinds of antiskid structures which level the surface pressure, damage the log to a smaller extent, and better adjust to the surface of the log. Such solutions are disclosed, for example, in patents FI 55103 and FI 84445, patent applications FI 931062, FI 944433 and FI 956262, and utility model application FI U930579. Separate antiskid components have generally been attached to a rubber-coated roller, which allows them to be flexible and level the pressure exerted on the log. In these solutions, the antiskid components have generally been various chains, meshes, and plates on which bevels have been welded.

There are also known solutions of the type disclosed in EP 0 478 522 (or the corresponding SE 500141) and FI 54244, wherein antiskid components are connected pivotedly to the feed roller. In connection with the antiskid components of EP 0 478 522, for example, there are provided absorbers made of a rubber-like material and positioned, for instance, between the antiskid components.

The prior-art solutions, however, have drawbacks which have not been obviated so far. When rubber-coated feed rollers or rubber absorbers, for example, are used with antiskid components, the rubber on the roller binds part of the feed energy exerted by the feed roller on the log, wherefore more power is needed. When the surface pressure grows, the roller and the rubber coating are heated disadvantageously. The heating of the roller causes changes in the dimensions of the roller, which increases the inaccuracy in the measurement of logs.

Furthermore, the heating of the roller and particularly of the rubber shortens the life of rubber rollers. Chains or meshes used as antiskid components wear hot rubber down quickly. This results in reduced gripping properties, wherefore the coating of the roller must be renewed frequently. Renewing the coating is not only expensive, but it also causes unnecessary idle periods in the use of a valuable machine.

In the known solutions, antiskid components follow the movements of the surface of the feed roller slavishly. This makes the antiskid components penetrate into the surface of the log to be conveyed, which damages the surface of the log.

An object of the invention is to obviate the drawbacks of the prior art and to provide a new type of solution for achieving better gripping properties than before. A further object of the invention is to provide a feed roller that does not have the disadvantageous wear properties of a rubber-coated roller and that can have longer maintenance intervals.

This is achieved with a feed roller of the invention, which has the characteristics disclosed in the claims. More specifically, the device of the invention is mainly characterized in that the end of the fixing means that is outside the outer circumference of the body is provided with at least one shoulder which is in immediate contact with the feeding means and arranged to receive the pressing force between the body and the log, and that the end of the fixing means that is outside the outer circumference of the body is further provided with a transfer element which extends further than the shoulder and which is provided in connection with the feeding means for guiding the feeding means in the direction of motion of the feed roller.

The invention is based on the discovery that it is not necessary to use rubber or flexible elements in order to level surface pressure; feeding means provided with antiskid components are attached to the surface of the body pivotedly in such a manner that as many antiskid components as possible are constantly in contact with the surface of the log. The pivotted joint between the body and the feeding means minimizes the turning of an antiskid component in the wood as the feed roller rotates.

When the pivot of the feeding means is positioned preferably close to the surface of the feeding means facing the log, the turning of the feeding means around the pivot by the action of the force feeding the log does not have to be limited or reduced for instance by rubber, but the feeding means is stationary in relation to the surface of the log during the feeding state.

The feed roller structure of the invention has significant advantages. When at least two lines of antiskid components are provided on the surface of the feeding means, a larger number of antiskid components, sometimes even four, are constantly in contact with the surface of the log. The antiskid components of the invention do not move in relation to the surface of the log while the feed roller rotates, but the entire friction element is

placed against the surface of the log at a time, and it is also detached substantially at a time. This is naturally a significant improvement as compared with fixed antiskid components: in the most disadvantageous case, only one line of such antiskid components engages the surface of the log to be conveyed. The conventional antiskid components of feed rollers penetrate the surface of the log; this is also avoided with the present invention. The surface of the log is thus prevented from being excessively damaged, whereby the sales value of timber is kept as high as possible.

As the turning radius of the friction element is significant, the invention provides a feed roller which exerts an even surface pressure even if the log surface has bumps or other uneven patches.

Since the friction element of the invention does not have to be mobile in the radial direction of the feed roller, the radius of the feed roller is always substantially constant. This allows various variables of logs, such as thickness, to be measured by the control mechanisms of the feed rollers.

Since the feed rollers of the invention have no rubber coatings or absorption structures, they have much longer maintenance intervals than the known solutions. This allows a working machine to be used more efficiently for productive work. The invention also provides a feed roller which can be measured without the measurement accuracy suffering from changes caused by temperature variation.

In addition, the friction elements of the feed roller of the invention are easier to repair, wherefore no expert is necessarily required, which results in considerable savings in the maintenance costs.

In the following, the invention will be described in greater detail with reference to the accompanying drawings, in which

Figure 1 is a side view of an embodiment of the feed roller of the invention,

Figure 2 is a detailed view of a friction element of the feed roller shown in Figure 1,

Figure 3 illustrates the operation of antiskid components when the surface of the log is straight,

Figure 4 illustrates the operation of antiskid components when the surface of the log contains a bump,

Figure 5 is a side view of another embodiment of the feed roller of the invention, and

Figure 6 is a detailed view of the friction element of the feed roller shown in Figure 5.

Figures 1 to 4 illustrate a preferred embodiment of the feed roller of the invention. The feed roller 1 comprises a body 2 and a friction element 3 connected to it.

The body 2 is preferably made of a steel plate and shaped substantially as a disc, but is may also be shaped for example as a cylinder. In the middle of the body there are provided an opening for the control shaft 4 of the motor and mounting holes 5 for mounting the shaft to the body.

The friction elements 3 are mounted on the outer circumference 6 of the body 2. A friction element comprises a fixing means 7 for fixing it to the body. The inner end 8 of the fixing means is substantially rigidly connected to the body, and its outer end 9 extends beyond the outer circumference of the body. The outer end of the fixing means is provided with at least one shoulder 10, which is mounted on the bottom plate 11 of the friction element and on the holders 12 of the bottom plate. As can be seen from Figure 2, the holders are provided on the lower surface 13 of the bottom plate, whereas antiskid components 15 are preferably arranged in at least two lines on the upper surface 14 of the bottom plate. The antiskid components may be, for example, spikes or ridges. The bottom plate with the antiskid components and holders forms a feeding means 16.

A transfer element 17 is preferably provided in the middle of the outer end 9 of the fixing means 7. The centre axis of the transfer element is located further from the outer circumference of the body than the centre axis of the shoulder 10. These axes are substantially parallel to each other and preferably also parallel to the control shaft 4 of the motor to be connected to the feed roller 1. The bottom plate 11 is provided with a recess or opening 18 extending from the lower surface 13 of the bottom plate to its upper surface 14 for receiving the transfer element 17.

The feeding means 16 is mounted on the fixing means 7 by placing the transfer element 17 in the opening 18 on the bottom plate 11 along its entire length, and by mounting the ends of the shoulder 10 on the holders 12, whereby the entire shoulder is located between the lower surface of the bottom plate and the outer circumference 6 of the body. The lower surface of the shoulder is preferably in contact with the bottom plate. Thus the friction element comprises a pivot around which the feeding means is arranged to turn. This pivot is located on the centre axis of the transfer means in the opening 18 for receiving the transfer means, and it is substantially stationary in the radial direction of the feed roller.

The holders comprise a groove or opening 19 for receiving the end of the shoulder. In the direction perpendicular with respect to the lower surface of the bottom plate, the groove is preferably substantially as high as the diameter of the end of the shoulder. In the direction of the lower surface of the bottom plate, the groove is longer than the diameter of the shoulder, which allows the shoulder to move in the groove. The feeding means 16 can thus be turned substantially around the centre axis of the transfer element 17 as the shoulder slides in the groove 19. The feeding means is thus arranged to follow the surface of the log 20 conveyed in the machine, exerting an even pressure constantly on the surface of the log. The pressing force that the feed roller 1 exerts on the surface of the log 20 is transferred from the body to the shoulder 10. The function of the holder 12 is to

keep the friction element connected to the fixing means.

The holder 12 preferably comprises a U-shaped rod secured to the lower surface 13 of the bottom plate 11. The shoulder and the transfer element are preferably pieces of iron rod firmly mounted on the fixing means.

The smaller the moment that is caused by the feeding force and that turns the feeding means 16, the more evenly the surface pressure is distributed. The pivot of the feeding means must therefore be located as close to the surface of the log 20 as possible, optimally on the same level, and the distance between the centre axis of the transfer element 17 and the fixing point of an antiskid component 15 should be zero, i.e. H = 0. This allows the log pressing force to be further reduced, which also reduces damages to the log.

Figure 3 shows a situation where the feed roller 1 is in such a position with respect to the log that two feeding means 16 are fully in contact with the surface of the log 20.

Figure 4 shows a situation where the surface of the log 20 comprises a bump. It can be seen that the angle of motion of the feeding means 16 around the centre axis of the transfer element 17 is so great that they may be in an inclined position relative to each other, which also allows the surface pressure to be evenly distributed over an uneven surface. In this embodiment, the rotational movement of the feeding means is limited in the extreme positions by the body 2.

It can be seen from the figures that when the bottom plate is provided with two lines of antiskid components, at least these two lines of antiskid components are constantly in contact with the surface of the log. Part of the time, up to four lines of antiskid components are in contact with the log, and these antiskid components do not slip in relation to the surface of the log.

Figures 5 and 6 illustrate another preferred embodiment of the invention, in which the fixing means 7 consists of a planar object. The fixing means is mounted substantially transversely to the direction of rotation of the feed roller. The shoulders 10 comprise the edge of the planar object that is outside the outer circumference 6 of the body 2. Substantially in the middle of the shoulder is provided a transfer element 17 which projects therefrom and extends to the opening 18 of the feeding means 16, forming the pivot of the feeding means. The pivot is substantially stationary in the direction of the radius of the feed roller.

The feeding means is secured to the fixing means and to the shoulders provided on it by means of walls 21 projecting from the lower surface of the bottom plate. As the walls are curved and surround the fixing means on two opposite sides, they form pivot grooves 19.

It will be understood that the above specification and the drawings relating thereto are intended merely to illustrate the present invention. The invention is thus not limited to the above or the embodiment disclosed in the claims, but it will be obvious to one skilled in the art that the invention can be varied and modified in many ways without departing from the inventive concept disclosed in the appended claims.

The fixing means 7 with the guide pins 10 and the fulcrum pin 17, for example, can be manufactured simply of a plate that is cut to shape and fitted loosely in the opening 18 of the bottom plate 11. Alternatively, generally known hinge structures and bushings can be used in a more expensive solution. Instead of a single plate, the body 2 of the feed roller may be a cylinder that is cast or cut by a lathe. The surface of the outer circumference of the body may also be conical or even concave, in which case there are, for instance, two parallel friction elements. The feeding means may also be made, for example, by casting, in which case the bottom plate, antiskid components and holders are of one integral piece.

Claims

1. A feed roller (1) for feeding logs (20), said feed roller comprising a body (2) and friction elements (3) provided on the outer circumference (6) of the body for enhancing the grip between the feed roller and the logs to be fed, said friction element (3) comprising a feeding means (16) and a fixing means (7) mounted on the body and extending beyond the outer circumference of the body for fixing the feeding means to the body, said feed roller being controlled by a control shaft (4) connected thereto, **characterized** in that the end (9) of the fixing means (7) that is outside the outer circumference of the body (2) is provided with at least one shoulder (10) which is in immediate contact with the feeding means (16) and arranged to receive the pressing force between the body and the log (20), and that the end of the fixing means (7) that is outside the outer circumference of the body (2) is further provided with a transfer element (17) which extends further than the shoulder and which is provided in connection with the feeding means (16) for guiding the feeding means in the direction of motion of the feed roller (1).

2. A device according to claim 1, **characterized** in that the feeding means (16) comprises a bottom plate (11) with a lower surface (13) and an upper surface (14), the upper surface comprising antiskid components (15), a recess or opening (18) extending from the lower surface of the bottom plate substantially to its upper surface for receiving the transfer element (17), whereby the recess or opening and the transfer element mounted therein form a pivot which is substantially stationary in the radial direction of the feed roller (1).

3. A device according to claim 2, **characterized** in that said at least one shoulder (10) of the fixing means (7) is arranged pivotedly in connection with the

feeding means (16), whereby the shoulder is substantially parallel to the control shaft of the feed roller (1).

4. A device according to claim 3, **characterized** in that the lower surface (13) of the feeding means (16) is provided with pivot grooves (19) for receiving the shoulder (10) to allow the feeding means to turn, said pivot groove being an elongated groove or opening which extends from the bottom plate (11) and is substantially parallel thereto to allow the shoulder (10) to move in the direction of the lower surface (13) of the bottom plate.

5. A device according to claim 4, **characterized** in that the feeding means (16) is arranged to turn around the centre axis of the transfer element (17) fitted in the opening (18) provided in the bottom plate (11), the shoulder (10) being simultaneously arranged to slide along the lower surface (13) of the bottom plate, guided by the pivot groove (19).

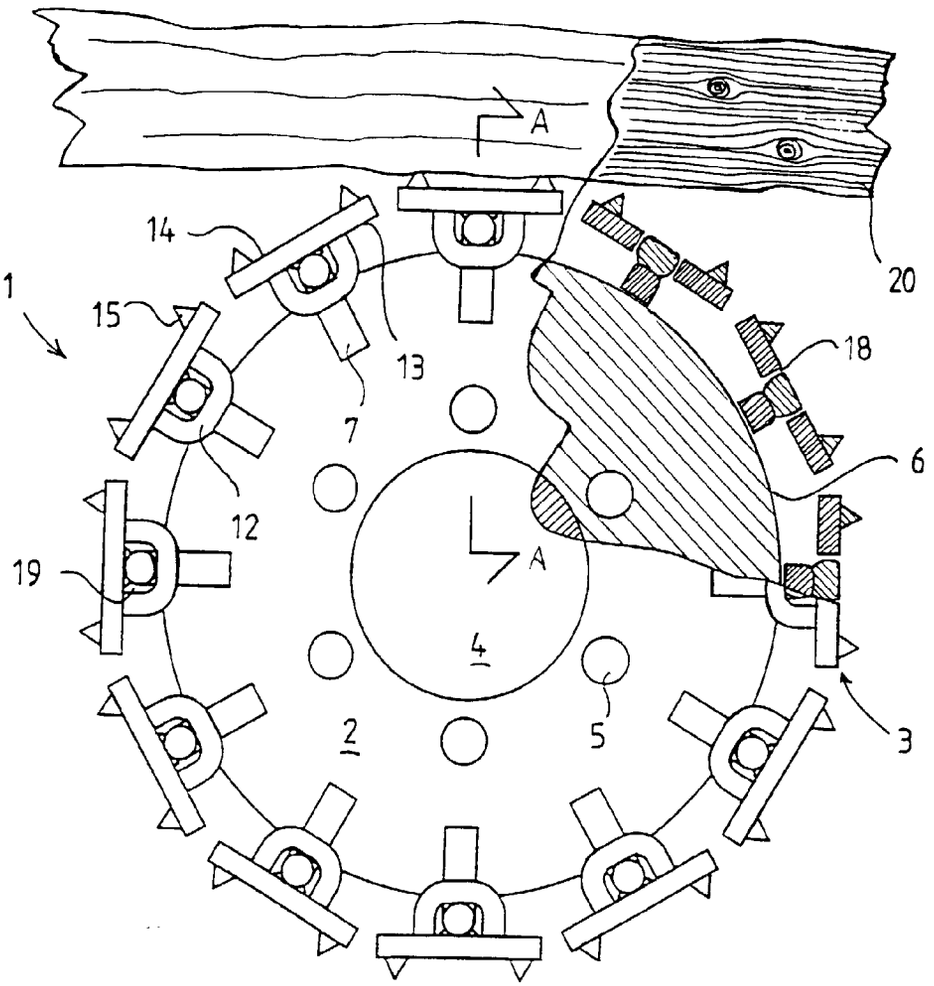
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FIG. 1

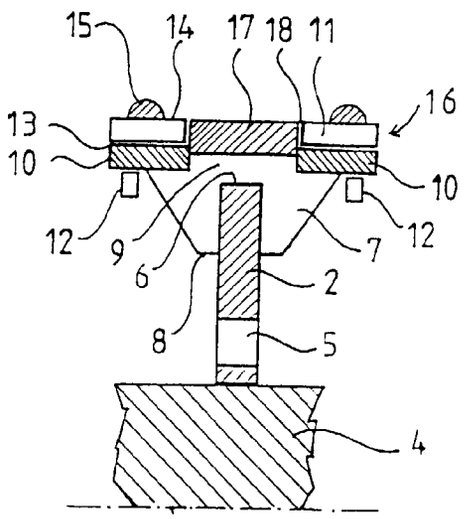
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FIG. 2

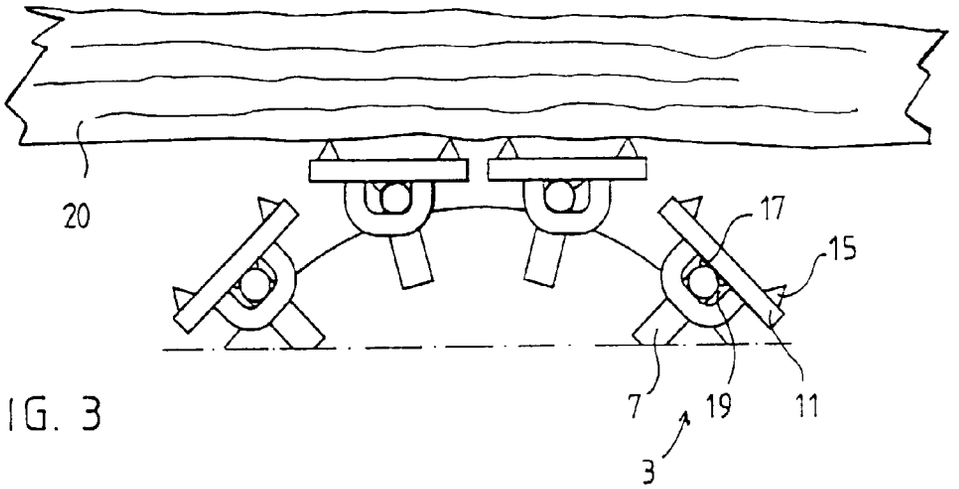

FIG. 3

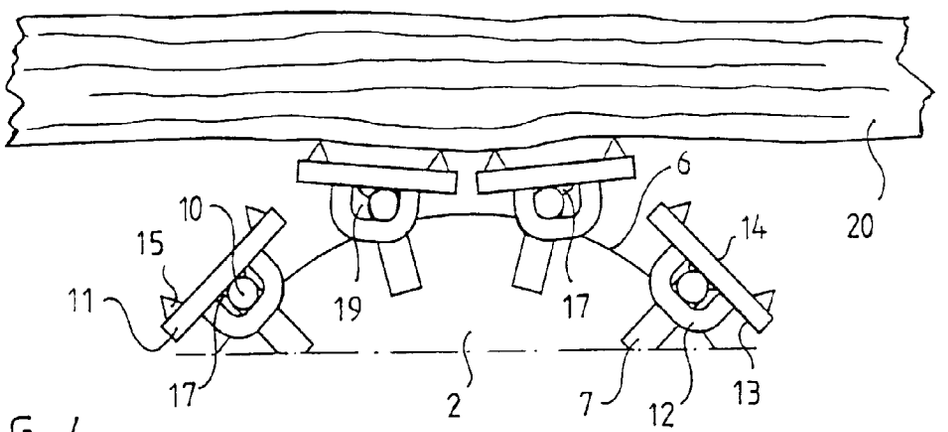

FIG. 4

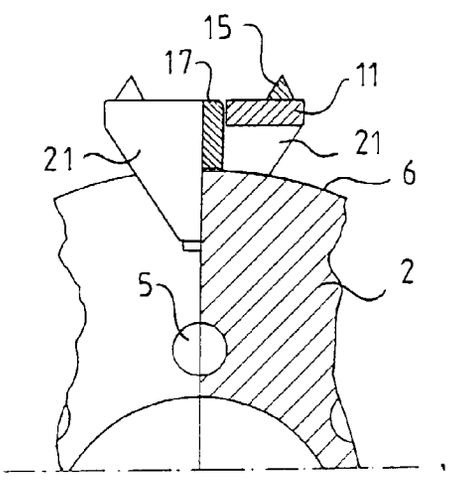

FIG. 5

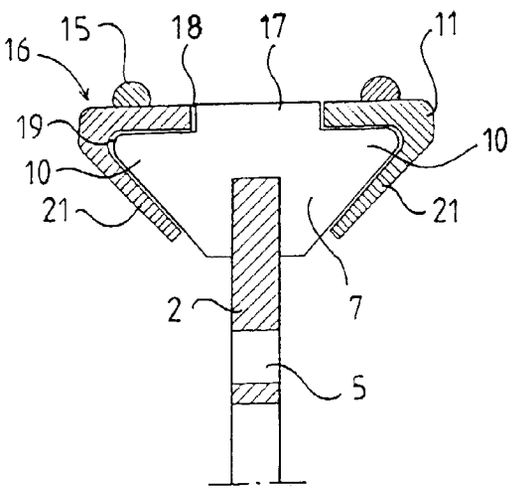

FIG. 6

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EUROPEAN SEARCH REPORT

Application Number
EP 97 66 0086

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int.Cl.6)
D,A	EP 0 478 522 A (GRANGAERDE MASKIN AB) 1 April 1992 * claim 1 *	1	B27B25/02
D,A	WO 95 01856 A (MOISIO JUHA) 19 January 1995 * claim 1 *	1	
A	WO 89 01855 A (WADELL PATENT AB) 9 March 1989 * claim 1 *	1	
D,A	DE 21 09 069 A (OESTBERGS FABRIKS AB) 16 September 1971 * claim 1 *	1	
A	US 2 867 253 A (COALWELL) 6 January 1959 * column 06; claim 1 *	1	
			TECHNICAL FIELDS SEARCHED (Int.Cl.6) B27B

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
THE HAGUE	18 November 1997	De Gussem, J

CATEGORY OF CITED DOCUMENTS

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