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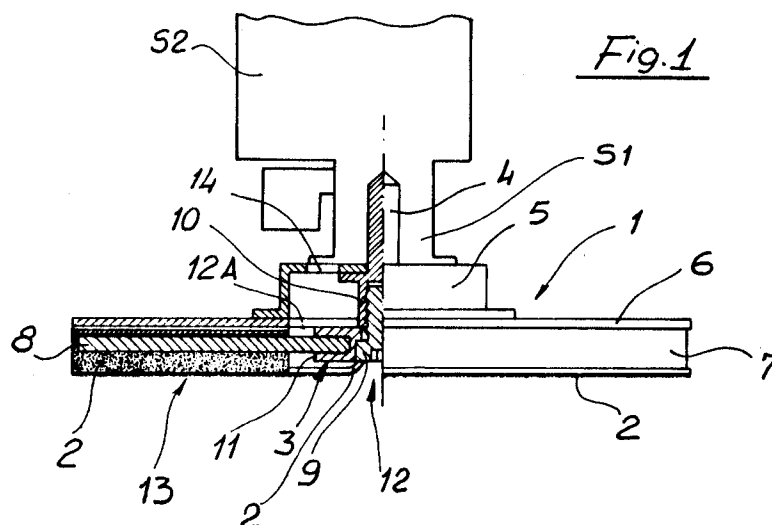
EUROPEAN PATENT APPLICATION(21) Application number: **91109241.9**(51) Int. Cl.⁵: **B24B 7/18, B24D 9/08**(22) Date of filing: **06.06.91**

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I-20124 Milano(IT)(54) **A set of a pad and an abrasive disk for a sander.**

(57) A set of a circular pad and an abrasive disk for a sander (S2) comprising: a) a pad (1) having means (4) for fixing to a sander spindle (S1) and a plurality of radial grooves (13) in the wall opposite the sander extending from the pad central recess (12) to the pad periphery; b) retaining means (3) for retaining an abrasive disk (2) on the pad (1) comprising a plural-

ity of retaining element (8) each corresponding to one said grooves (13) in the pad (1); c) an abrasive disk (2) presenting a central aperture (15) sized for passing the central core (11) of said retaining means (3) and adapted to warp and penetrating said grooves (13) under the pressure of said retaining means (3) fixed in its working position.



This present invention concerns a set of a pad and an abrasive disk fixable thereto for use with a sander. A sander as intended in this specification may be a roto- orbital sander, namely a machine which makes a disk bearing pad rotate by an electric or pneumatic motor means. As an example, such a sander associated with said set will be particularly adapted for sanding a car body.

Sanders as available on the market currently use pads provided with a layer of soft gummy material having a smooth surface whereon the adhesive surface of an abrasive disk is applied.

Another arrangement available on the market uses synthetic adhesive cloth to fix an abrasive disk to a pad.

According to a known improved arrangement, a dust from the operation area upto a container sander is associated with an exhaust fan to move incorporated in the sander body; consequently, a pad and an abrasive disk are used that present equally spaced apertures round the central hole; then an operator makes said apertures correspond when he applies an abrasive disk to the pad.

The main drawbacks in said arrangements for fixing an abrasive disk to a pad are the high cost of the pad and the lack of resistance due to even small tearing in the abrasive disk and pad.

Moreover, also those sanders which are provided with an exhaust fan are not able to remove completely the dust produced in the operation area; this causes gumming and overheating in the abrasive disk and releasing of very fine sand round the working area which is harmful for an operator.

The invention, as claimed, abviates the aforementioned drawbacks and solves the problem of supplying a set of a pad and an abrasive disk fixable thereto for use with a sander which makes the operation of the sander correct, rapid and cheap.

The invented set comprises:

- a) a pad provided with means for fixing to a spindle of an associated sander and with a plurality of angularly spaced grooves each extending from the pad periphery to a pad central recess, said grooves and recess being on the pad wall opposite the sander;
- b) retaining means for retaining an abrasive disk on the pad comprising a central core and a plurality of angularly spaced retaining elements each having an end fixed to said central core and extending from that central core to the periphery of said pad and corresponding to one of said groove in said pad, said central core corresponding too said central recess in the pad, the retaining means having a thickness lower than the depth of said grooves and recess in the pad;
- c) an abrasive disk made of material adapted for

having a conventional abrasive material applied to one side thereof, having no adhesive or fastening means applied to the other side for attaching to said pad wall and presenting a central aperture just sized for passing through said retaining means central core under the minimum backlash adapted for warping and penetrating said grooves deep without breaking under the pressure of said corresponding retaining elements as said retaining means is positioned into the bottom in said grooves and recess, fixed in its working position with a sander.

The main advantages of the invention reside in that: the dust removed from the operation area tends to transfer into said grooves, so in a sander not associated with an exhaust fan, such dust is easily ejected from said grooves by the centrifugal force, whilst in a sander associated with an exhaust fan such dust is sucked along the grooves, from the groove periphery towards the cores of the disk and pad ; as a result of the above, the problems of disk gumming and dust further atomization are obviated; the air passage from the periphery to the core or "vice versa" , along said grooves and, in part, within the disk surface and the work piece surface, causes cooling in the abrasive disk and this turns in a longer life for the abrasive disk.

Still a further advantage is the one that, as a disk is damaged due to gumming, tearing and wearing in an operation area, the disk may be released from the retaining means and rotated to be located with the damaged parts in said grooves so as to present fresh parts in the operation area.

Preferably, the central recess in said pad and the central core in said retaining means present passages for passing through the dust flow as sucked from the operation area by an exhaust fan associated with the sander.

According to another alternative, instead of providing said central core with through passages, said central core is so shaped, for instance square, as not to close the passage through a round open central recess in the pad and a round aperture in the abrasive disk; also this shaping causes the dust flow to move from the operation area to an exhaust fan through said apertures in the pad.

The parts described above may be assembled together in two ways: by means of a sole pin which passes through the three part (pad , abrasive disk and retaining means) for fixing to the sander spindle or by means of two screws, one fixing said pad to said spindle and another tightening said abrasive disk between said retaining means and said pad.

Said equally spaced elements may be preferably radial elements or take different paths and positions round the core of the retaining means, depending on the use or non use of an exhaust fan associated with the sander, to enhance, respec-

tively, the dust transfer towards the central area or the dust ejection by centrifugal force.

One way of carrying out the invention is described in detail herebelow with reference to the drawings which illustrate only one specific embodiment, in which:

FIG. 1 is a partly sectioned side view of a pad bearing an abrasive disk ;

FIG. 2 in a view of the retaining means and abrasive disk;

FIG. 3 is an exploded view showing an alternative embodiment for the pad and retaining means;

FIGG. 4a, 4b show alternative embodiments for fixing retaining elements;

FIG. 5 is an exploded view showing an alternative embodiment for the pad and retaining means, and

FIG. 6 is a perspective view of an alternative embodiment for the retaining means.

Figure 1 shows the pad 1, abrasive disk 2 and retaining means 3 assembled together and fixed to the spindle S1 of a sander S2. This sander incorporates an exhaust fan (not shown) and a metal cap 5, stiffening the rigid "nylon" disk 6 on the pad 1, is fixed to said spindle S1 by means of a pin 4. On the pad wall opposite the sander, the abrasive disk 2 is kept on the gummy part 7 of pad 1 by a pressure exerted by the radial elements 8 of the retaining means 3 which in turn is fixed to pad 1 by a socket head screw 9 engaged with the internal thread in the head of pin 4. In the abrasive disk 2, the surface which is in contact with the pad 1 has no adhesive means for attaching to the pad.

The retaining means 3, along with its central core 11 and radial retaining elements 8, is completely over the abrasive disk work surface as it is received deep in the central recess 12 and in the grooves 13 of gummy part 7 (better shown in Fig. 3).

The dust produced during sanding work moves into said grooves 13 wherein said radial elements 8 press sections of the abrasive disk 2. From said grooves, dust is sucked by the exhaust fan through apertures 12A in the gummy part 7 and rigid support 6 in the area of recess 12. In correspondence with said apertures 12A, the upper wall of cap 5 presents passages 14. It will be realized that in case a sander is not associated with an exhaust fan, the central recess 12 may be such as to receive said central core 11 and not present through passages 12A as shown in the figures.

Fig. 2 shows that the retaining means 3 comprises four straight equally spaced radial retaining elements 8 and the central core 11 is square shaped so as to let dust to flow through the open central recess 12 and apertures in the pad 1 (see 12A - FIG. 1), from the operation area to the

exhaust fan.

Figure 3 shows said pad 1, abrasive disk 2 and retaining means 3, the latter comprising three straight equally spaced radial retaining elements 8, the central core 11 bearing through passages 16 and a socket head screw 9. Just from this figure, it will be realized that one makes first a rapid and fine assembling of said central core 11 in the corresponding central aperture 15 in an abrasive disk 2 and then fix both said parts to a pad 1 by said socket head screw 9.

Also it will be realized that said retaining means, instead of being fixed in the central area, may be provided with means for fixing on the pad periphery:

Figure 4a shows one said radial element 8 provided with a hook 17 for engaging a retaining pin 18 fixed on the pad periphery.

Figure 4b shows a radial element 8 provided with a hinge 19 for articulating on the pad periphery.

Figure 5 shows that said retaining elements 8 in the retaining means 3 and said corresponding grooves 13 in the pad 1 are involute shaped according to the rotation direction R.

Figure 6 shows that said retaining means 3 comprises wings 20 extended within adjacent radial retaining elements 8 to work as an ejector or an aspirator, depending on the pad rotation direction. The radial extension of such wings is such that the wings are received within said central recess 12.

Claims

1. A set of a circular pad (1) and an abrasive disk (2) fixable thereto for use with a sander (S2) characterized in that it comprises:

a) a pad (1) provided with means (4) for fixing to a sander spindle (S1) and with a plurality of angularly spaced grooves (13) each extending from the pad periphery to a pad central recess (12), said grooves and recess being on the pad wall opposite the sander;

b) retaining means (3) for retaining an abrasive disk (2) on the pad (1) comprising a central core (11) and a plurality of angularly spaced retaining elements (8) each having an end fixed to said central core (11) and extending from said central core (11) to the periphery of said pad (1) and corresponding to one of said grooves (13) in said pad (1), said central core (11) corresponding to said central recess (12) in the pad (1), the retaining means (3) having a thickness lower than the depth of said grooves (13) and recess (12) in the pad (1);

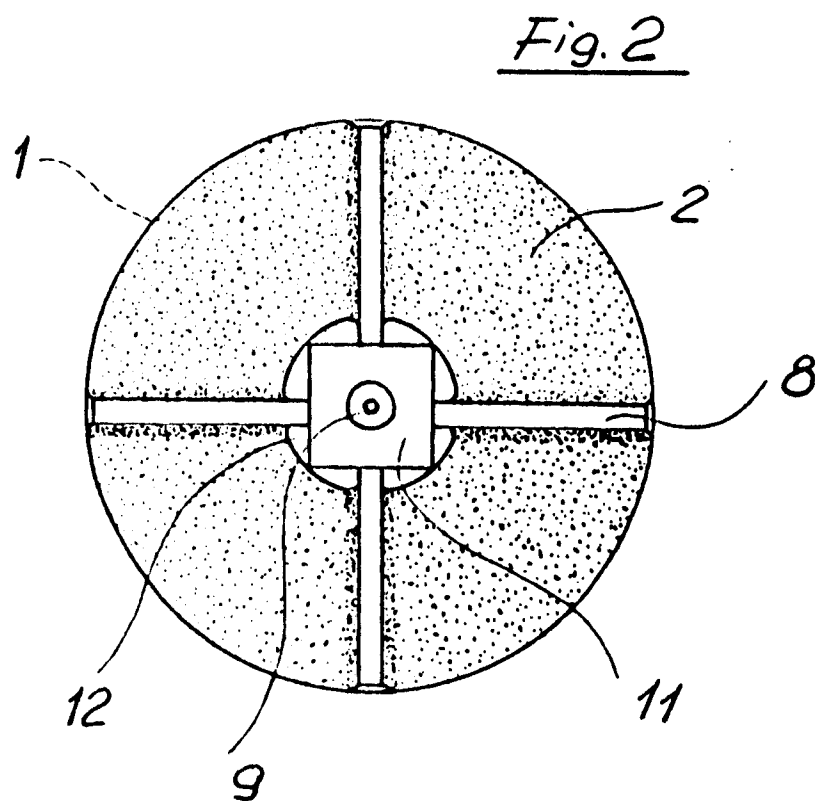
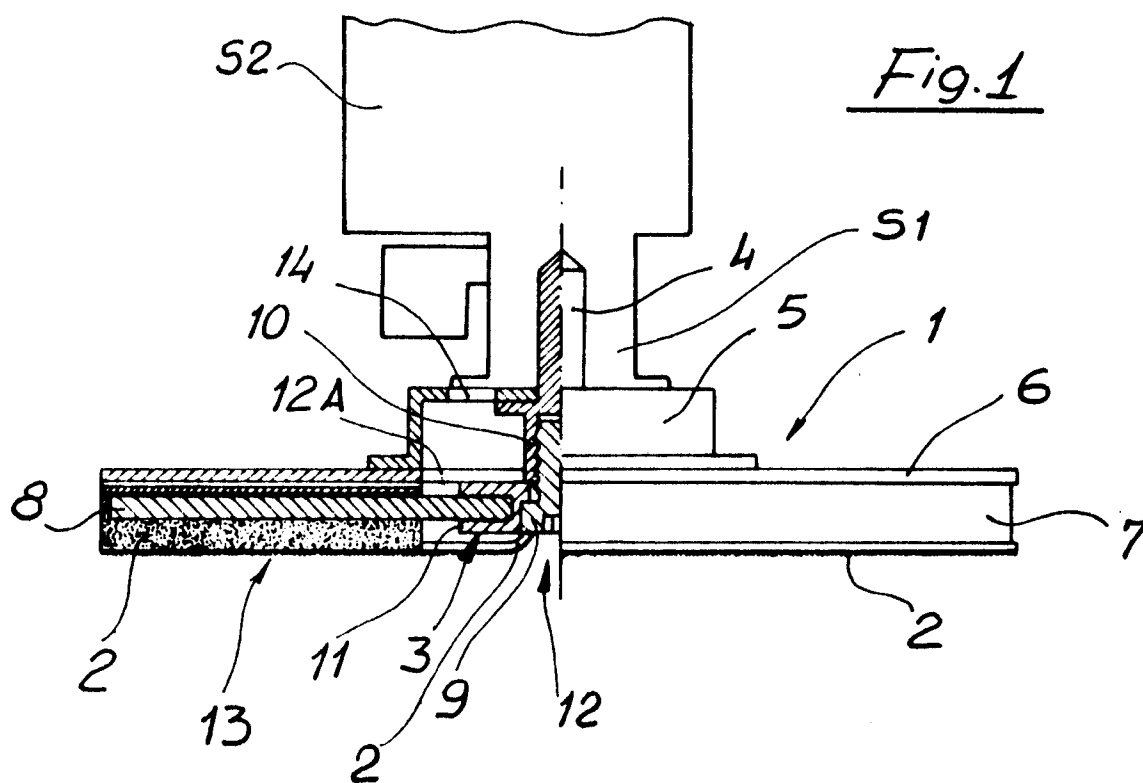
c) on abrasive disk (2) which is of material

adapted for having a conventional abrasive material applied to its own working surface , presents a central aperture (15) just sized for passing through said central core (11) under a minimum backlash and is adapted for warping and penetrating deep said grooves (13) without breaking under the pressure of said corresponding retaining elements (8) as said retaining means (3) is positioned into the bottom in said grooves (13) and recess (12), fixed in its working position with a sander (S2).

2. A set according to claim 1 characterized in that said abrasive disk (2) has no adhesive or fastening means on the side adjacent to said pad (1). 15
3. A set according to claims 1 and 2 characterized in that said abrasive disk (2) has a central aperture (15) so sized and shaped as to substantially equal the perimeter of said pad central recess (12). 20
4. A set according to claims 1 to 3 characterized in that said pad (1) and said central core (11) in said retaining means (3) are provided with corresponding apertures (12A, 14; 16) for passing the dust flow sucked from the operation area by an exhaust fan associated with the sander. 25 30
5. A set according to claims 1 to 4 characterized in that said grooves (13) in said pad (1) and said retaining elements (8) in said retaining means (3) are straight shaped. 35
6. A set according to claims 1 to 4 characterized in that said grooves (13) in said pad (1) and said retaining elements (8) in said retaining means (3) are involute shaped according to the pad rotation direction (R). 40
7. A set according to claims 1 to 4 characterized in that said grooves (13) in said pad (1) and said retaining elements (8) in said retaining means (3) are involute shaped contrary to the pad rotation direction (R). 45
8. A set according to claims 1 to 7 characterized in that said retaining elements (8) have their central ends joined in a central crossing region (11) and have their peripheral ends provided with means (17, 18) for fixing on the periphery of said pad (1). 50 55
9. A set according to claims 1 to 7 characterized in that said retaining elements (8) have their

peripheral ends provided with means (17, 18) for fixing on the periphery of said pad (1) and have their central ends free.

10. A set according to claims 1 to 7 characterized in that said retaining elements (8) have their peripheral ends articulated (19) on the pad periphery to swing between an open position where they are disengaged from said grooves (13) and a closed position where they are engaged into said grooves(13).
11. A set according to claims 1 to 10 characterized in that said retaining means (3) bears wings (20) received in said central recess (12) provided with passages (12A) to work as an aspirator for the dust removed in the operation area.
12. A set according to claims 1 to 10 characterized in that said retaining means (3) have wings (20) received in said central recess (12) to work as an ejector for the dust removed in the operation area.



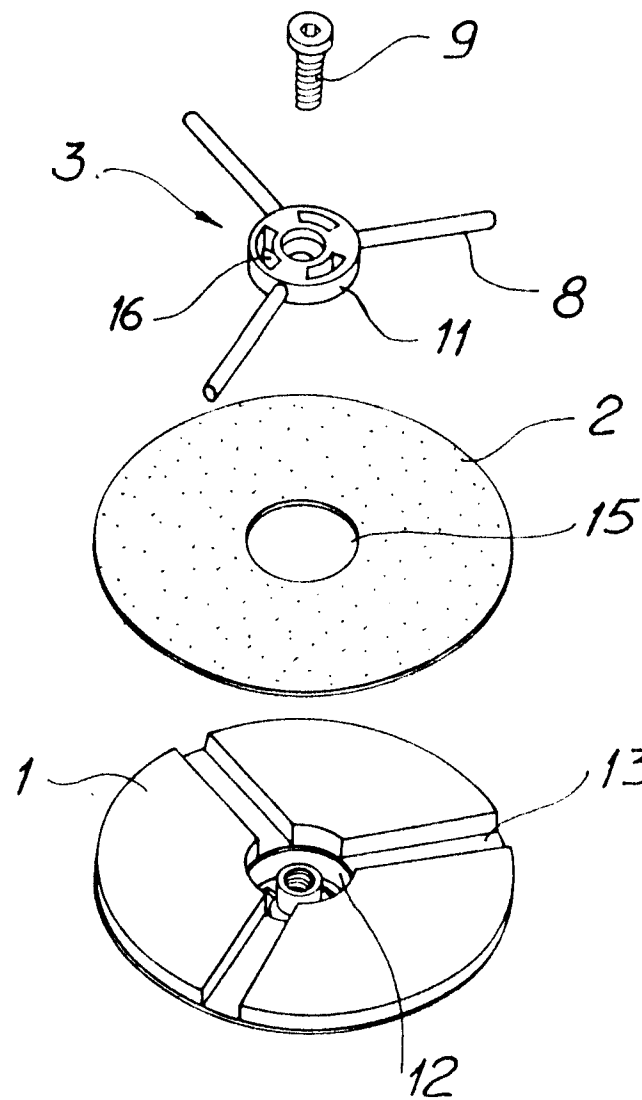


Fig. 3

Fig. 4b

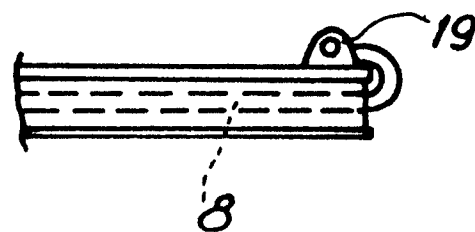
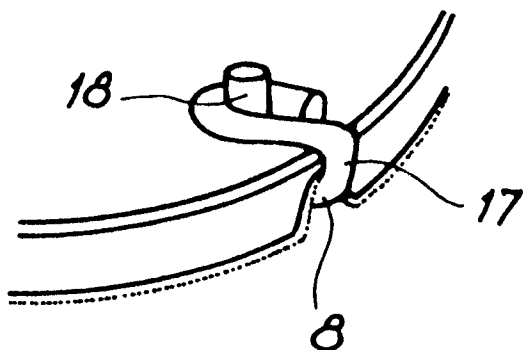
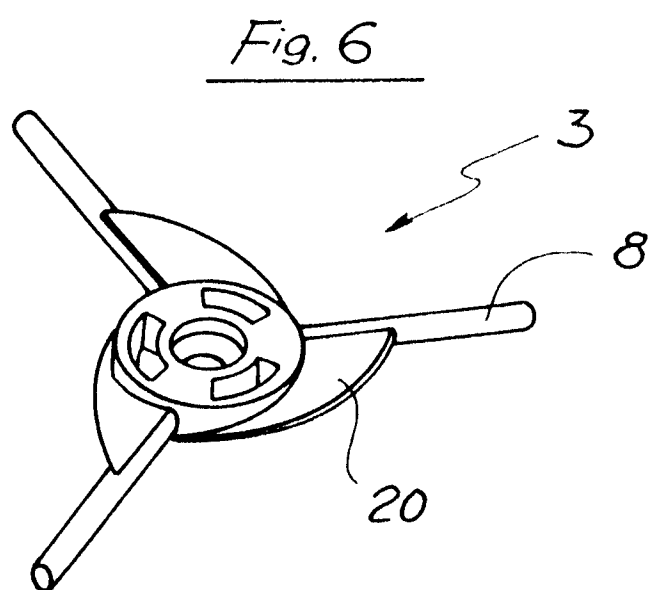
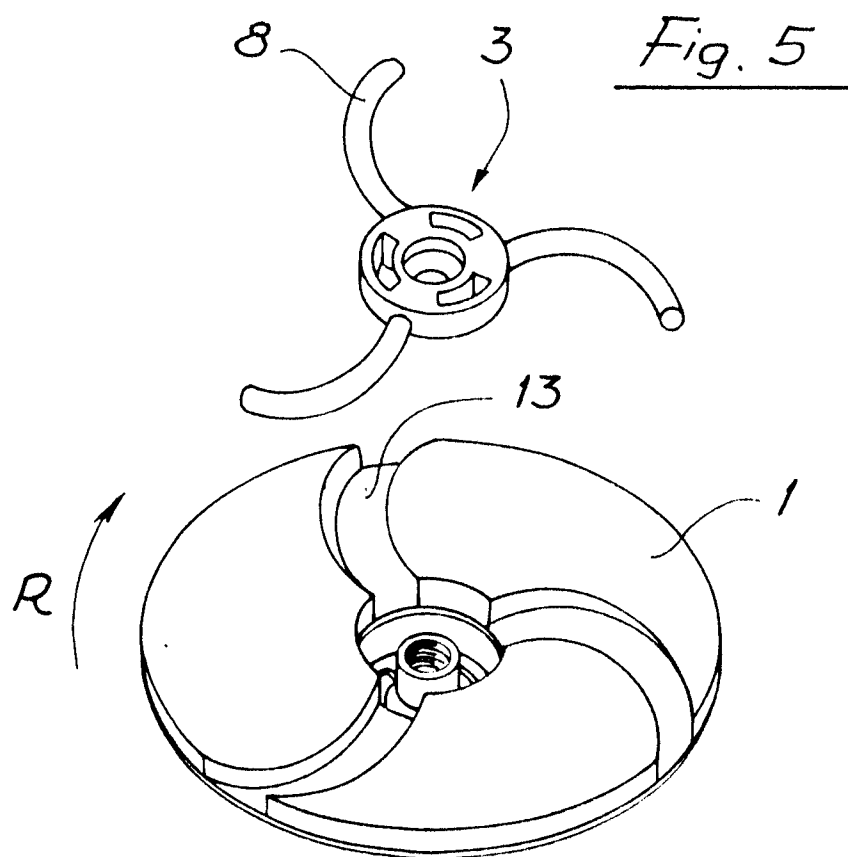


Fig. 4a







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EUROPEAN SEARCH REPORT

Application number

EP 91109241.9

DOCUMENTS CONSIDERED TO BE RELEVANT			EP 91109241.9
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int. Cl. 4)
A	US - A - 2 842 904 (RALYS) * Fig. 1-9 *	1, 2, 5	B 24 B 7/18 B 24 D 9/08
A	GB - A - 2 003 770 (MARTON) * Fig. 1-6; abstract *	1, 3, 8	
A	GB - A - 1 582 366 (LA FRANCAISE METALLURGIE) * Fig. 1,2; page 2, lines 97-105 *	1, 6	
A	US - A - 1 100 612 (POINTON) * Fig. 1, 2 *	1, 5	
A	US - A - 2 143 970 (BLOOD) * Fig. 1-7 *	1	
			TECHNICAL FIELDS SEARCHED (Int. Cl. 4)
			B 24 B 7/00 B 24 B 55/00 B 24 B 23/00 B 24 D 9/00
The present search report has been drawn up for all claims			
Place of search VIENNA		Date of completion of the search 13-08-1991	Examiner BRÄUER
CATEGORY OF CITED DOCUMENTS			
X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document		T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document	