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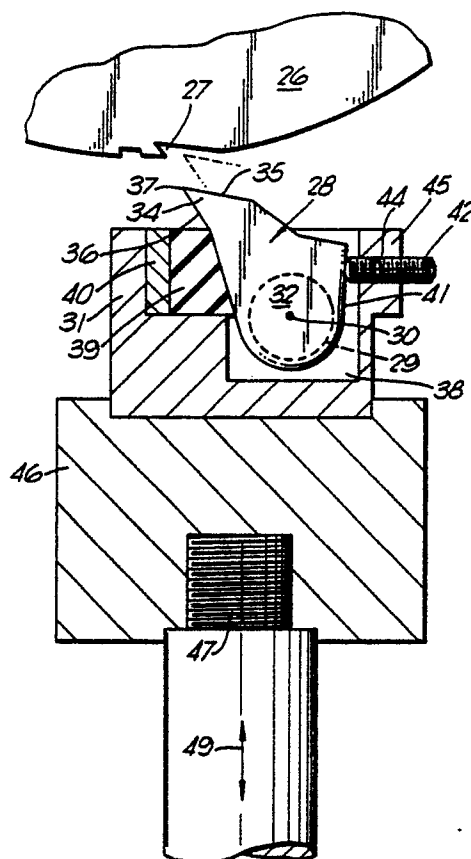
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POLLAK MERCER & TENCH High Holborn
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London WC1V 6RY(GB)(54) **Method and apparatus for forming indents in container bodies.**

(57) Apparatus for making one or more indents (16) in a container body (11) has an indenting tool having an indent forming head (28). The head (28) is arranged to move towards the container body to form an indent (16) in its surface and then move laterally of the body whilst it is maintained in contact with its surface to undercut the indent (16).

Fig. 3.



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Method and Apparatus for forming indents in container bodies.

This invention relates to the manufacture of containers, such as tinplate paint cans, having indexing means incorporated in their bodies to enable them to be oriented correctly, for example during manufacture, in readiness for operations such as riveting, printing or label applications.

It has been standard practice for a long time to use or provide containers with some form of indent, projection or other indexing means for this purpose. With cans having dry or cemented side seams, the seam itself can be used, but welded side seams are usually much smoother and do not provide a sufficiently wide shoulder for indexing purposes. Many attempts have been made to provide grooves, beads or other indents or projections.

Any form of locating means which projects can be disadvantageous, as such means can interfere with subsequent manufacturing steps, while many inwardly-directed grooves or other forms of indent are found to be insufficiently deep or sharp to operate reliably, especially at the high speeds of modern can-making plant.

The present invention provides a method and apparatus for making one or more indents in container bodies to serve as indexing means, in which the indent shoulder portion which serves as the actual locating surface used to index the container, in conjunction with a cooperating abutment, is undercut and preferably lies in a plane which, outside the container body, forms an acute angle with the plane tangential to the container body at the indent. The cooperating abutment thus reliably contacts this undercut portion of the indent, when indexing of the container relative to the abutment takes place.

According to one aspect, the invention provides apparatus for forming one or more indents in a container body; characterised by an indenting tool having an indent forming head arranged to move towards the container body to form an indent in its surface, and to move laterally of the container body surface whilst in contact therewith to undercut the indent.

Preferably the arrangement of the indent forming head is such that pressure of the head against the container body surface causes the lateral movement of the head. Thus, for example in the case of a cylindrical container, the or each undercut may be formed by a single stroke of the indent forming head effected in a radially inward direction relative to the longitudinal axis of the container body.

The indent forming head is preferably also biased against a stop to limit its lateral movement whereby pressure of the indent forming head against the container body surface moves the head against the biasing force. The biasing means may be a rubber block and the stop may be adjustable. A screw, for example, would form a suitable stop.

In the preferred embodiment of the invention, the forming head is mounted for pivotal movement about an axis which is perpendicular to the direction of movement of the head towards the container body.

Thus, the tool effects its lateral movement by rocking about that axis as it completes its movement towards the container body, due to the resistance provided by the container body. Preferably the container body is supported internally, e.g., by a mandrel.

The indenting tool may have two or more indent forming heads arranged in pivot about the same axis. This arrangement is particularly useful for forming indents in cylindrical cans having longitudinal side seams since if the axis is parallel to the longitudinal axis of the can body it can be used to form indents aligned with and adjacent the side seam.

According to another aspect, the invention provides a method of forming one or more indents in a container body, characterised by the steps of moving an indent forming head towards the container body to form an indent in its surface and, whilst the head is maintained in contact therewith, moving the head laterally of the container body surface, so as to undercut the indent.

In order that the invention can be readily understood, a method and details of apparatus for carrying out the invention are described below, by way of example only, in conjunction with the accompanying drawings, in which:

Fig. 1 shows an elevational view of a typical container, in the form of a cylindrical tinplate paint can;

Fig. 2 shows on an enlarged scale a fragmentary section taken on the line II-II of Fig. 1;

Fig. 3 shows a portion of a mandrel, by which a can is supported during manufacture, in conjunction with an indenting tool and a portion of the mechanism which causes the tool to undergo vertical reciprocal movement, in order to form one or more undercut indents in a can body disposed between the tool and the mandrel;

Fig. 4 shows the mandrel and tool of Fig. 3 after the tool has nearly completed the vertical upward component of its stroke;

Fig. 5 shows the mandrel and tool of Figs. 3 and 4 after the head of the tool has effected a lateral rocking movement, from the position shown in Fig. 4.

Referring to Fig. 1, a container 10, in the form of a conventional cylindrical tinplate paint can, has a cylindrical body part 11 incorporating a vertical welded side seam 12 and having a base 14 and a lever ring 15 at the upper end for receiving a lid (not shown). At two places close to the side stream 12 and adjacent its respective ends, two indexing means are formed in the can body 11, each having the form of an undercut indent 16. The shape of the wall 17 of the container body 11 at the side seam 12 adjacent each indent 16 is shown on a larger scale and in more detail in Fig. 2. The welded side seam 12 is formed by welding together the overlapping inclined edges of the wall 17, the side seam 12 having a width W as shown in Fig. 2. Each indent 16 consists of a locating surface 19 which lies in a plane, indicated by a double-dotted line 20, which lies at an acute angle, a, to the plane, indicated by a broken line 22, which is tangential to the exterior of the container body 11 at the indent 16. Reference 21 indicates a dash-dot line which represents the plane through the longitudinal axis of the container body 11 at the edge of the locating surface 19 of the indent. In the majority of known forms, the indent is not undercut and the angle is therefore obtuse. Also, known indents are made by indexing tool which effects a rotary or other form of complex movement. In the present case, the indenting tool, described below, makes a single inward movement parallel to the radial plane 21. As shown clearly Fig. 2, the indent 16 is formed inwardly of the wall 17 of the container 10 and consists of a V-shaped depression bounded by two generally flat surfaces 24 and 25, the latter comprising the locating surface 19; the edge 18 where the surface 19 meets the can wall 17 is desirably adjacent and parallel to the side seam 12, as shown in Figs. 1 and 2.

Referring to Figs. 3, 4 and 5, one or two indents 16, such as the two indents shown in Fig. 1, are made in each container body, as it travels through can-forming machinery (not shown) in the general direction of its longitudinal axis. For this purpose, the can bodies, before attachment of the bases 14 and the lever rings 15, are fed in sequence on to a horizontally-disposed generally cylindrical mandrel, part of which is shown at 26. Adjacent its lower side, the mandrel 26 includes two V-section recesses, one of which is shown at 27, against each of which one of the undercut indents 16 of the container body 11 is formed. The tool used for this purpose has an indent forming head or indenting finger 28, mounted in a support block 31 for rocking movement about a shaft 29

having a horizontal axis 30. The finger 28 consists of a body part 32 having an indent-forming nose portion 34 comprising upper 35 and lower inclined surfaces 36 meeting in a relatively sharp edge 37.

The surfaces 35 and 36 of the indenting finger 28 subtend approximately the same angle as the V of the recess 27 in the mandrel 26. The block 31 contains a recess 38 spanned by the shaft 29 and in which the finger 28 is located, a rubber block 39 or other resilient restoring means being mounted in the recess 38 between the lower surface 36 of the nose portion 34 and an abutment plate 40 mounted in the recess 38. At the opposite side of the recess 38, an abutment surface 41 provided on the finger 28 cooperates with an adjustable stop 42, for instance a threaded screw, mounted in a suitably tapped hole 44 in a strengthened part 45 of the block 31.

In order to impart the desired vertical reciprocating movement to the tool comprising the finger 28 and its supporting mechanism, in the direction of the double arrow 49 shown in Fig. 3, the block 31 is mounted in a suitable support, secured for instance by a threaded connection 47 to the upper end of a vertical shaft 48. This and the corresponding mechanism for making the second indent 16 in each container body 10 is mounted on a toggle mechanism (not shown), lateral movement of the driving member of which causes upward and then downward movement of the shaft 48 and the components supported upon it, including the rockable indenting finger 28.

Fig. 3 shows the position of the mandrel 26 and the finger 28 when a container body 11 has been brought into position about the mandrel and before operation of the toggle mechanism and therefore upward movement of the shaft 48 and the components mounted on it. While this movement occurs, in a radial direction relative to the longitudinal axis of the container 10, the rubber block 39 biases the finger 28 clockwise so that its surface 41 rests against the stop 42, as shown in Fig. 3. At the end of the upward stroke, the edge 37 forming the operative part of the indenting finger 28 is raised to the position shown in broken lines in Fig. 3. This is the position shown in full lines in Fig. 4, where chain-dotted lines 49 and 50 indicate the angle, b, between the underside of the recess 27 in the mandrel and the upper surface 35 of the finger 28. In this position, upward movement of the shaft 48 and the parts supported by it has almost but not quite ceased. The remainder of the upward movement caused the finger 28 to rock anti-clockwise, so that the edge 37 moves from the position shown in full lines in Fig. 4 and in broken lines in Figs. 3 and 5 to the position shown in full lines in Fig. 5. In this final position, the finger 28 compresses the rubber block 39 and its surface 41 moves away

from the end of the stop 42. This rocking movement completes the shaping of the indent 17 in the wall 17 of the container body 11. Thus, the tool 28 makes a single vertical stroke and thus first forms a depression and then shapes it into an undercut indent 16. On the return stroke of the tool, the rubber block 39 causes the rockable finger 28 again to contact the stop 42, so that it resumes the position shown in Figs. 3, ready for the next upward vertical stroke.

In use, for subsequent manufacturing operations, including for instance provision of studs, rivets or other means for attaching a handle to the container 10 or indexing it to locate it correctly for the application of printed matter or a label, the one or more indents 16, by virtue of their undercut shape and the sharp edges 18, provide an easily locatable and accurately formed indexing means, particularly suitable for use in the very short periods of time which occur in the operation of modern high-speed can manufacturing machinery. The invention thus provides a substantial advance in the manufacturing of containers.

Although described above in relation to a conventional paint can having a cylindrical body, it will be appreciated that the invention can apply to cans of other shapes, for instance rectangular in section, such as are commonly used for the packaging of motor oil and similar products, where the can body includes a welded or other side beam parallel to the longitudinal axis of the body and in respect of which the provision of one or more undercut indents according to the invention can be highly advantageous, in controlling the indexing and positioning of the can body after formation of the indents for the purpose of controlling subsequent manufacturing steps.

Claims

1. Apparatus for forming one or more indents (16) in a container body (11); characterised by an indenting tool having an indent forming head (28) arranged to move towards the container body to form an indent (16) in its surface and to move laterally of the container body surface whilst in contact therewith to undercut the indent (16).

2. Apparatus as claimed in Claim 1, in which the arrangement of the indent forming head (28) is such that pressure of the head (28) against the container body surface causes the lateral movement of the head (28).

3. Apparatus as claimed in Claim 2, in which the indent forming head (28) is biased against a stop (42) to limit its lateral movement, whereby

pressure of the indent forming head against the container body surface moves the head against the biasing force.

4. Apparatus as claimed in Claim 3, in which the indent forming head (28) is biased against the stop (42) by means of a rubber block (39).

5. Apparatus as claimed in Claim 3 or 4, in which the stop (42) is adjustable.

6. Apparatus as claimed in Claim 3, 4 or 5, in which the stop (42) comprises a threaded screw.

7. Apparatus as claimed in any preceding claim, in which the indent forming head (28) is mounted for pivotal movement about an axis (30) which is perpendicular to the direction of movement of the head (28) towards the container body (11).

8. Apparatus as claimed in any preceding claim, in which the head (28) of the indenting tool consists of a body part (32) having an indent forming nose portion (34) which ends in a sharp edge (37).

9. Apparatus as claimed in any preceding claim, comprising means for supporting the container body internally.

10. Apparatus as claimed in Claim 9, in which the means for supporting the container body (11) comprise a mandrel (26).

11. Apparatus as claimed in Claim 12, in which the surface of the mandrel (26) is provided with one or more recesses (27) against which the one or more indents (16) are formed.

12. Apparatus as claimed in any preceding claim, in which the indenting tool is provided with two indent forming heads (28).

13. Apparatus as claimed in Claim 12, in which the two indent forming heads are aligned and arranged to pivot about the same axis (30).

14. A method of forming one or more indents (16) in a container body (11), characterised by the steps of moving an indent forming head (28) towards the container body to form an indent (16) in its surface and, whilst the head (28) is maintained in contact therewith, moving the head laterally of the container body surface, so as to undercut the indent (16).

Fig. 1.

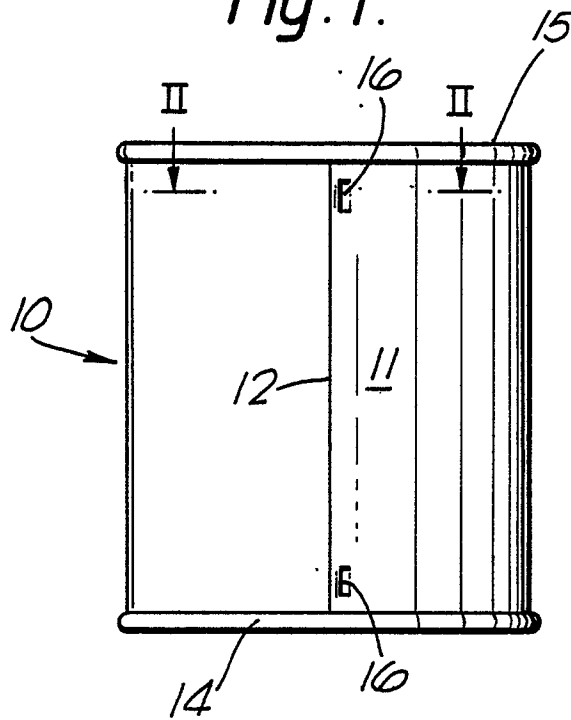


Fig. 2.

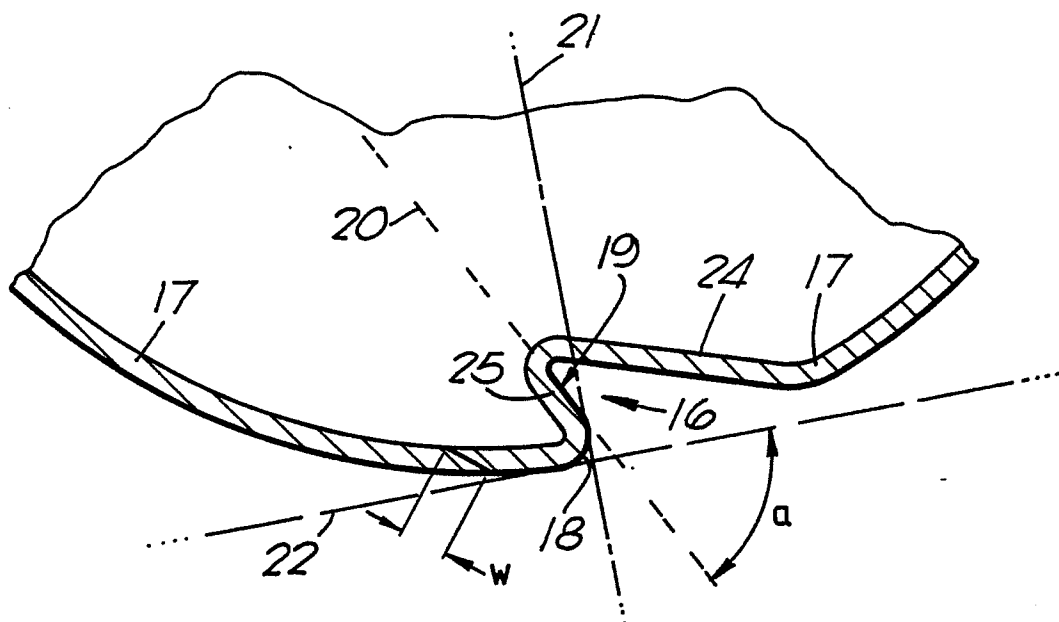


Fig. 3.

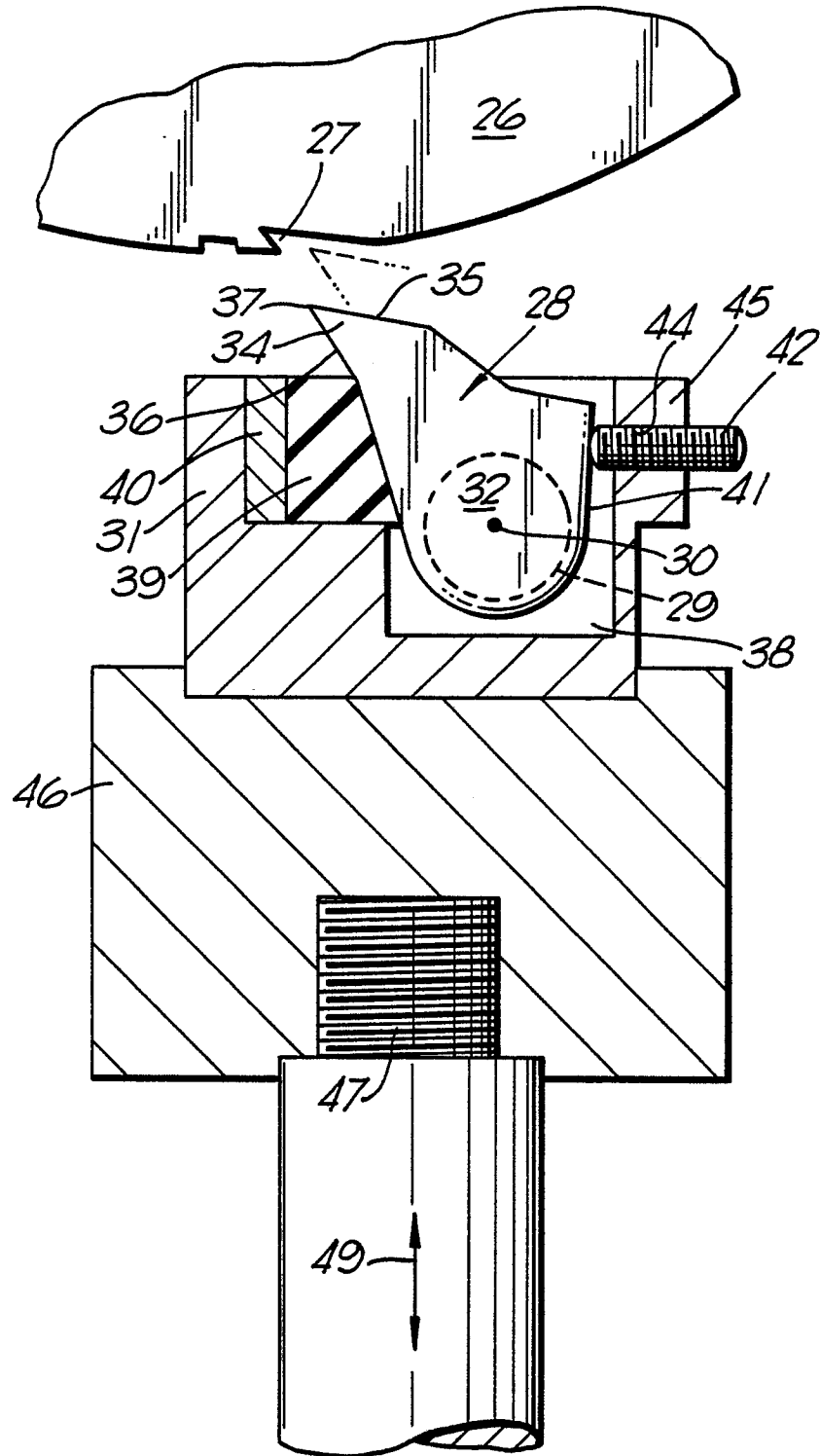


Fig. 4.

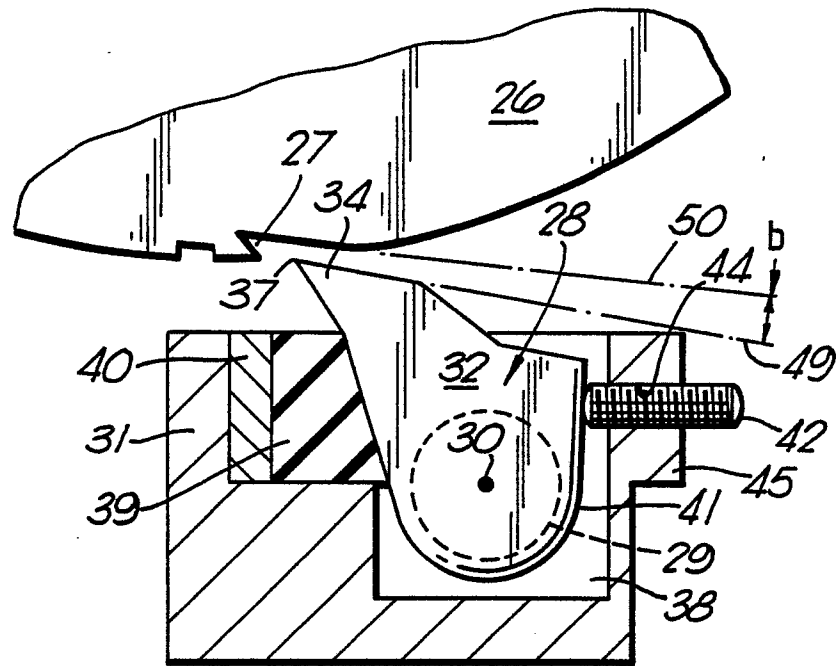
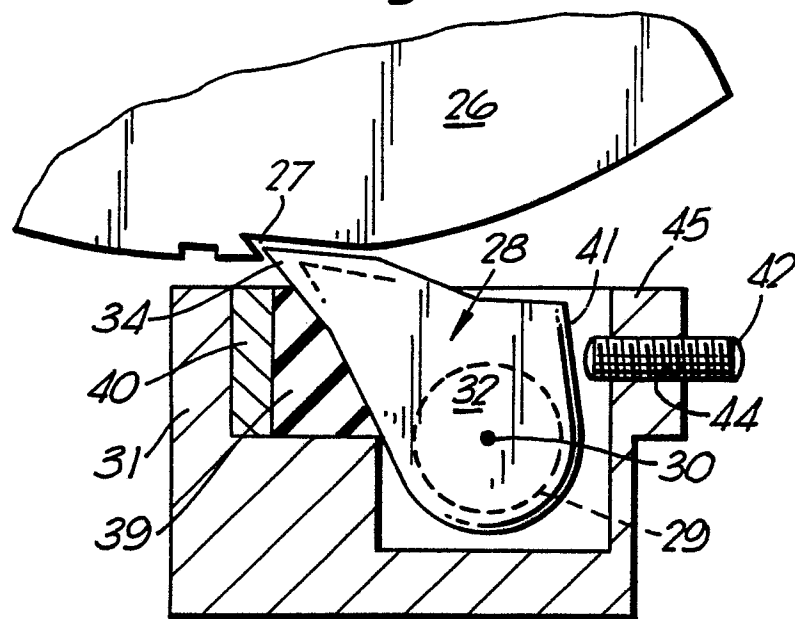


Fig. 5.





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.4)
A	DE-B-2 239 011 (DYNAMIT NOBEL) * claim 1, figure 3 * -----	1	B 21 D 51/26
			TECHNICAL FIELDS SEARCHED (Int. Cl.4)
			B 21 D 17/00 B 21 D 51/00 B 21 C 51/00
The present search report has been drawn up for all claims			
Place of search BERLIN		Date of completion of the search 20-10-1987	Examiner SCHLAITZ J
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	