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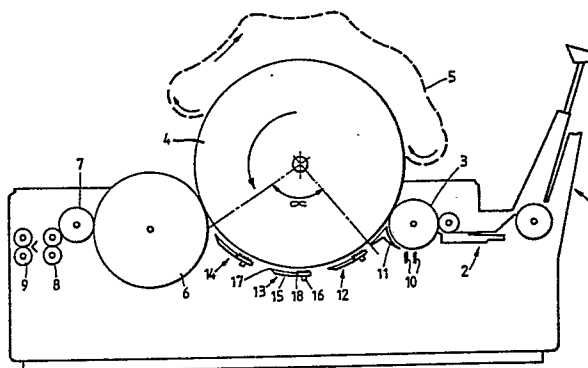
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(54) **Carding engines.**

(57) A carding engine comprises a takerin (3), a card-clothed main cylinder (4) for receiving fibres from the takerin, a doffer (6) for stripping a web of fibres from the main cylinder, carding means (5) in proximity to the main cylinder to co-operate with the card clothing thereon within a first arc of cylinder rotation from the takerin to the doffer, means (7) for stripping the carded web from the doffer, and cover means (12 to 14) provided over a substantial part of a second arc of cylinder rotation from the doffer to the takerin. The cover means comprises carding elements (e.g. 16) which co-operate in a carding action with the card clothing on the main cylinder over at least part of the second arc.



CARDING ENGINES

This invention relates to carding engines.

5 The basic configuration of a carding engine is well known, comprising a takerin, a card-clothed main cylinder for receiving fibres from the takerin, a doffer for stripping a web of fibres from the main cylinder, carding means in proximity to the main cylinder to co-operate with
10 the card clothing thereon within a first arc of cylinder rotation from the takerin to the doffer, and means for stripping the carded web from the doffer.

 Within this basic configuration, variation is found in the type of card clothing on the main cylinder, in the use
15 either of stationary or of movable flats having a variety of different carding surfaces co-operating with the card clothing on the main cylinder and in the particular configurations for the takerin and its associated feed system, and for the doffer and its associated stripping and
20 delivery system. In addition to the single card outlined above, so-called duo-cards are also known, wherein a breaker takerin, main cylinder and doffer are followed by a finisher takerin, main cylinder and doffer, material being transferred from the breaker doffer to the finisher takerin
25 by any suitable transfer arrangement in the centre of the card.

 In all carding engines there is a constant quest for improvement in the quality of the carded web and sliver formed therefrom. Apart from straightening the fibres, the
30 objective of the carding process is also to remove short fibres, dust and trash from the raw cotton or other feed stock, and both operations are performed with varying degrees of efficiency by the carding engines presently available. One problem that is experienced in the carding
35 process is the formation of neps, that is small balls or

bundles of fibre material which are taken from the main cylinder by the doffer and are thus present in the doffed web and sliver formed therefrom. Neps are undesirable in that they affect the uniformity of the sliver, and the invention seeks to provide a carding engine wherein nep formation is reduced.

The invention is directed to a carding engine having the basic configuration referred to above, in which cover means are provided over part of the second arc of cylinder rotation from the doffer to the takerin, and it is characterised in that the cover means comprises carding elements which co-operate in a carding action with the card clothing on the main cylinder over at least part of the second arc.

15 In carding engines that have hitherto been used, the second arc of cylinder rotation, from the doffer to the takerin, which is generally the lowermost arc of the cylinder, is usually covered by a coarse grid or screen through which short fibre, trash and dust thrown from the material carried on the cylinder surface can pass and be collected as waste. The grid or screen is usually substantially concentric with the cylinder surface and spaced from the envelope of the tips of the card clothing thereon by at least 0.76 mm and more usually by 1 mm and upwards. It is thought that it is in this region of the traditional card that some neps are formed, and that such formation may be due to fibres lifting from the card clothing into contact with the grid or screen and rolling between the carding cylinder and screen to be formed into a nep.

Use of carding elements co-operating with the cylinder card clothing introduces a completely different effect into this region of the main cylinder, significantly reducing or even eliminating the formation of neps and performing additional advantageous working of the material that is

carried by the main cylinder.

Preferably the carding elements on the cover means co-operate in a carding action with the card clothing on the main cylinder across the full width of the main cylinder.

5 Preferably the cover means has an inner surface facing towards the main cylinder, and at least part of the inner surface is spaced from the envelope of the tips of the card clothing elements on the main cylinder by no more than a distance of from 0.075 mm to 0.75 mm, preferably 0.075 to
10 0.25 mm and more desirably from 0.1 to 0.2 mm. The part of the inner surface that is so spaced may be formed by the envelope of the tips of the carding elements on the cover.

The cover means may be continuous around a substantial part of the second arc, and may be formed either as a
15 single unit or of a number of sections that are mounted immediately adjacent one to another so as to form substantially continuous cover means.

In either case, part or all of the inner surface of the cover means, i.e. that surface which faces towards the
20 card clothing on the main cylinder, may be formed by carding elements of any suitable form. Such carding elements may, for example, be conventional card clothing, saw tooth wire or so-called granular card clothing which is a roughened surface wherein the individual peaks on the
25 surface act as carding elements in arresting fibres. The carding elements should preferably be selected so that they are substantially "non-loading", that is they will momentarily arrest a fibre as it passes the element, but will not permanently retain the fibre. Thus, if
30 conventional card clothing is used it should have very short wires with small metallic points, and if saw tooth wire is used the tooth should be short, have small points and be set at a suitable angle. By using non-loading carding elements accumulation of material between the
35 cylinder and the cover means is avoided.

In other embodiments, the cover means is discontinuous and comprises a plurality of sections each extending around part of the second arc and across the full width of the main cylinder, adjacent sections being spaced apart around the circumference of the main cylinder to leave a space extending the full width of the main cylinder and parallel to the axis of rotation of the main cylinder.

The provision of such spaces may be advantageous in that they will allow some short fibre, dust and waste to be released from the main cylinder, and they may also be advantageous in controlling air flow around the cylinder in an optimum manner. A screen may be mounted in any such space between adjacent cover sections, again in order to give required control.

The number of cover sections may vary from two upwardly and may to some extent be affected by the length of second arc that is available between the doffer and the takerin. The angular extent of each cover section may be the same, or the cover sections may have differing angular extents. Similarly, the angular extent of spaces between adjacent sections may be the same or different.

Where a number of cover sections are used, each cover section may have a plain inner surface or may have part or all of its inner surface formed by carding elements in any required configuration. The surfaces of the cover sections may be the same, or may be different. The carding elements may again be conventional card clothing, saw tooth wire, or granular card clothing, and may again be substantially "non-loading".

Each cover section may be a unitary structure or may be a composite structure made up of two or more elements. In one particular example each cover section may comprise a plate extending the full width of the cylinder and immediately followed in the direction of rotation of the cylinder by a segment having carding elements. The segment

may comprise one or more conventional flat bars provided either with conventional card clothing or with saw tooth wire card clothing. The segment may then be immediately followed by a space before the next combined cover section 5 of plate and segment. In this arrangement, the angular extent of the cover plate in each section may be greater than the angular extent of the segment. The spacing between the tips of the carding elements on the segment and the envelope of the tips of the carding elements on the 10 main cylinder will desirably be less than the spacing between the inner surface of the plate and the envelope of the tips of the card clothing on the main cylinder. For example, the spacing associated with the flat bar may be from 0.1 to 0.2 mm, while the spacing from the inner 15 surface of the plate may be from 0.3 to 0.75 mm.

The invention will be better understood from the following description of specific embodiments of carding engine in accordance therewith, given by way of example only, with reference to the accompanying drawings in 20 which:-

Fig. 1 is a schematic side elevation of a carding engine; and

Figs. 2 to 5 are each schematic side elevations of part of a carding engine extending from the takerin to the 25 doffer.

Fig. 1 shows in outline a single cylinder carding engine having a conventional feed arrangement 1, from which a lap of fibres is taken to a lap-feed 2 and then by a takerin 3 to the carding cylinder 4. The carding cylinder 30 is clothed with metallic saw tooth wire. A first arc of cylinder rotation from the takerin to the doffer (the upper arc shown in the drawing) is surrounded by a series of flat bars 5 secured to chains in any convenient manner and movable in a closed path adjacent to the cylinder surface 35 and along a return section as indicated by the arrows. On

the return section of the path there is provided an oscillating comb (not shown) for cleaning short fibres, neps and waste material in the form of flat strips from the flat bars. Below the flat bars 5 there is a doffer 6, also
5 clothed with metallic saw tooth wire, which takes the carded web from the cylinder, the web being removed from the doffer by a stripper roll 7 and thence being passed through a pair of crush rolls 8 to a condensor and calender rolls 9.

10 The feed roller 3 has associated therewith the usual mote knives 10 and screen 11. The invention is concerned with the arc of cylinder rotation from the doffer assembly to the takerin assembly, i.e. substantially that arc shown as α in the drawing. It is over a part of this region
15 that a cover means is provided, at least part of that cover means comprising carding elements.

In the particular example shown in Fig. 1, the cover means comprises three cover sections shown as 12 to 14, each adjacent pair of sections being separated by a space. Each
20 section, and only section 13 will be described in detail, comprises a curved plate 15 and a flat bar 16 mounted adjacent one to the other and each extending the full width of the main cylinder 4. The plate 15 has a tapered leading edge 17 and has a smooth surface facing towards the card
25 clothing on the main cylinder and spaced from the envelope of the tips of that card clothing by a distance of from 0.5 to 0.75 mm. Each flat bar has metallic saw tooth wire or conventional card clothing thereon, the carding elements being disposed in working relationship to the card clothing
30 on the main cylinder and being set at a distance of from 0.1 to 0.2 mm from the envelope of the main cylinder card clothing, so effecting a strong carding action on fibres carried by the main cylinder. A sealing strip 18 seals the space between the plate and its associated flat
35 bar. The free space between adjacent cover sections

communicates with the undercard cleaning system so that short fibres, dust and waste thrown therethrough will be collected and removed from the card. The sections are mounted in any suitable manner at opposite sides of the
5 carding engine, in order to allow setting and adjustment as required.

It is found that a card so constructed runs with a reduced instance of neps when compared with a conventional card.

10 It will be understood that any one or more of the cover sections may include two or more flat bars rather than the single one shown.

Further embodiments of the invention are shown in Figs. 2 to 5, each of which illustrate part of a takerin 3, a
15 main carding cylinder 4 and a doffer 6.

In the embodiment of Fig. 2 the arc from the doffer to the takerin is substantially completely covered by a continuous cover 20 fabricated as a plate curved to suit the curvature of the cylinder. The inner surface of the
20 plate 21 is furnished with granular card clothing having peaks facing towards the card clothing of the main carding cylinder. It will be understood that this construction can be modified by replacing the granular card clothing with very short wire or other non-loading card clothing, and
25 that whatever form of clothing is provided it need not be present over the whole of the inner surface of the plate. Thus, clothing may be present on any one or more bands of the plate extending across the carding engine from one side of the main cylinder to the other. The cover 20 is
30 suitably supported at opposite sides of the carding cylinder in order to allow adjustment and setting of the cover to the required position.

Fig. 3 shows an arrangement that effectively provides a continuous cover around substantially the whole of the
35 lower arc of the main cylinder, but the cover is formed of

three sections 22, 23 and 24, abutted closely together and having the spaces therebetween sealed by sealing strips 25, 26. Sections 22 and 24 are shown as smooth-surfaced plates; section 23 comprises a plurality of flat bars, with 5 sealing strips between adjacent bars. Each of the sections may be separately mounted on the carding engine for adjustment independent of the other two sections, and the sealing members may be sufficiently flexible to allow such adjustment. The flat bars may also be individually 10 adjustable. In the example shown only one of the sections 23 is provided with carding elements on its inner surface. However, it will be understood that carding elements may be provided on the inner surface of any selected one or more of the cover sections, either by using flat bars or in any 15 other manner.

Fig. 4 illustrates another embodiment wherein the cover is discontinuous. In this arrangement the cover comprises two sections 28 and 29 spaced apart circumferentially around the lower arc of the cylinder, and 20 suitably mounted for the required adjustment. Each of the sections has card clothing 30, 31 furnished on its inner surface, the clothing being of any desired form, for example wire or granular card clothing.

Fig. 5 again shows an arrangement wherein the cover is 25 discontinuous and comprises two sections 30 and 31 each comprising three flat bars having card clothing 32, 33 on their inner surfaces. Free space between the doffer 6 and the first section 30 is occupied by a first screen 34, free space between the sections 30 and 31 is occupied by a 30 second screen 35, and free space between the section 31 and the takerin 3 is occupied by a third screen 36. The flat bars and screens are again suitably mounted for the required adjustment.

In each of the foregoing embodiments the particular 35 settings of the cover or cover sections relative to the

tips of the teeth on the main cylinder will be chosen to give most effective control of the particular feed stock that is being processed, with a particular view to preventing the formation of neps and of promoting cleaning
5 of the web.

When conventional flat bars are used to form any part of the cover means then the carding elements may be ground so that their tips have an envelope that is either planar, or that is concave to match the curvature of the main
10 carding cylinder.

It will be understood that there are many more possible arrangements whereby carding elements may be incorporated onto a cover around part of the main cylinder arc extending from the doffer to the takerin.

CLAIMS:

1. A carding engine comprising a takerin, a card-clothed main cylinder for receiving fibres from the takerin, a doffer for stripping a web of fibres from the
5 main cylinder, carding means in proximity to the main cylinder to co-operate with the card clothing thereon within a first arc of cylinder rotation from the takerin to the doffer, means for stripping the carded web from the doffer, and cover means provided over a substantial part of
10 a second arc of cylinder rotation from the doffer to the takerin, the cover means comprising carding elements which co-operate in a carding action with the card clothing on the main cylinder over at least part of the second arc.

2. A carding engine according to claim 1 in which
15 the carding elements on the cover means co-operate in a carding action with the card clothing on the main cylinder across the full width of the main cylinder.

3. A carding engine according to claim 1 or claim 2 in which the cover means has an inner surface facing
20 towards the main cylinder, and at least part of the inner surface is spaced from the envelope of the tips of the card clothing elements on the main cylinder by no more than a distance selected of from 0.075 mm to 0.75 mm.

4. A carding engine according to claim 3 in which
25 said part of the inner surface of the cover means is formed by the tips of card elements forming an inner part of the cover means.

5. A carding engine according to any one of the preceding claims in which the cover means is continuous
30 around substantially the whole of the second arc.

6. A carding engine according to claim 5 in which carding elements are provided over the whole of the inner surface of the cover means.

7. A carding engine according to claim 5 in which
35 carding elements are provided over part only of the inner

surface of the cover means.

8. A carding engine according to any one of claims 1 to 4 in which the cover means is discontinuous and comprises a plurality of sections each extending around part of the second arc and across the full width of the main cylinder, adjacent sections being spaced apart around the circumference of the main cylinder to leave a space extending the full width of the main cylinder and parallel to the axis of rotation of the main cylinder.

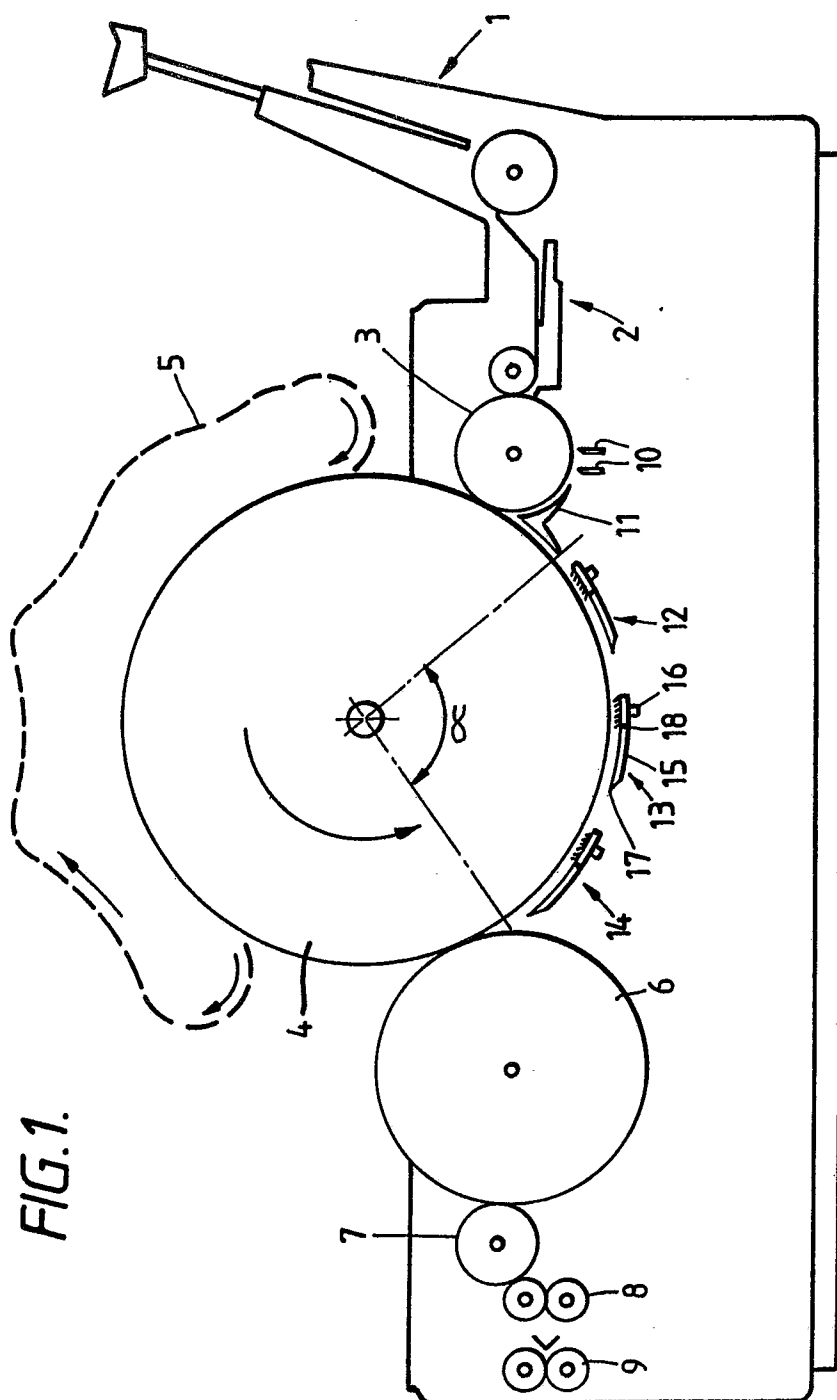
9. A carding engine according to claim 8 in which a screen is mounted in a space between adjacent cover sections.

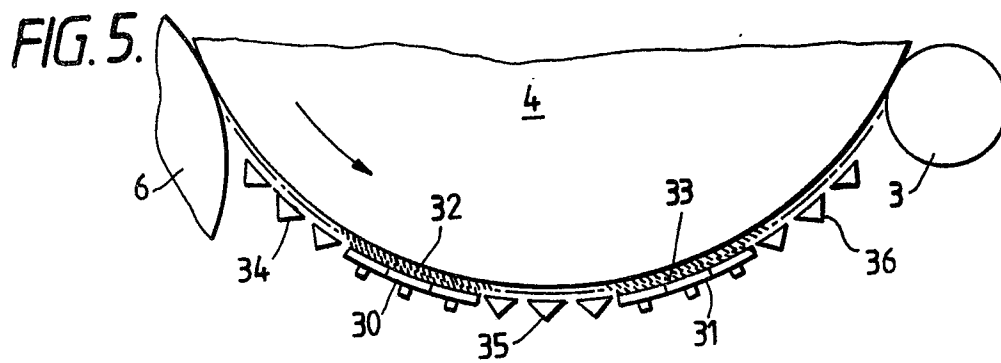
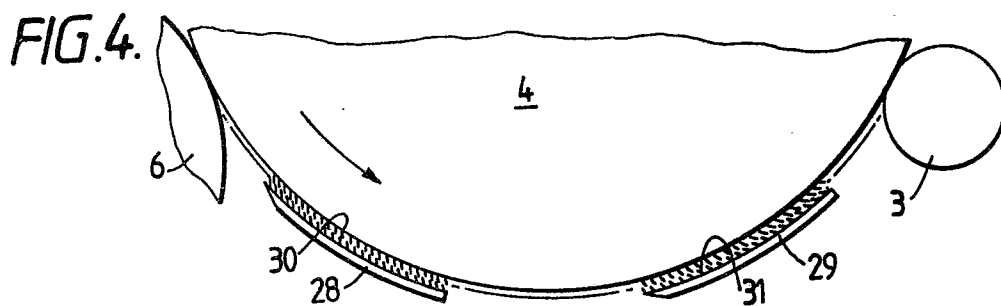
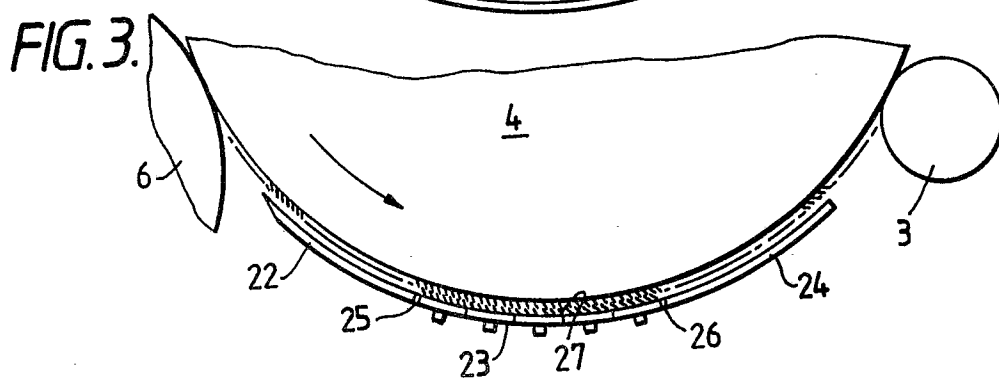
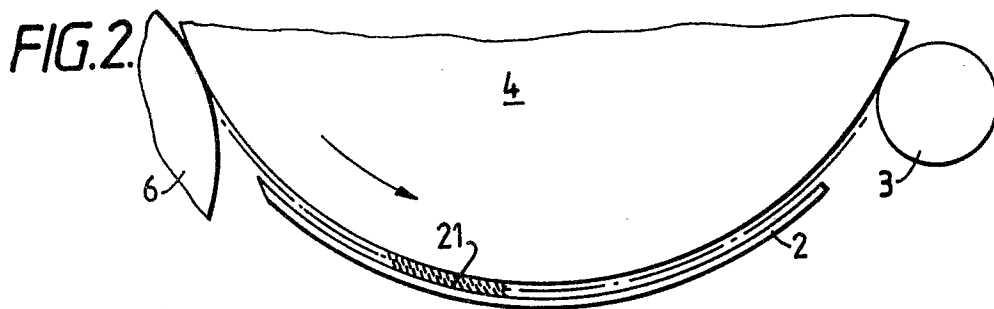
10. A carding engine according to claim 8 or claim 9 in which at least one of the cover sections has carding elements provided over the whole of its inner surface.

11. A carding engine according to claim 8 or claim 9 in which at least one of the cover sections has carding elements provided over part only of its inner surface.

12. A carding engine according to any one of claims 8 to 11 in which each cover section is a composite structure comprising a plate having a substantially smooth inner surface, and a segment having carding elements, the segment lying immediately downstream of the plate in the direction of rotation of the main cylinder.

13. A carding engine according to claim 12 in which the segment comprises at least one flat bar.







European Patent
Office

EUROPEAN SEARCH REPORT

0250126

Application number

EP 87 30 4905

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)
P	EP-A-0 195 756 (G. MARCELLO) * Column 3, lines 8-59; figure 1 *	1,2	D 01 G 15/24
A		4,5,8, 12,13	
X	FR-A-1 057 159 (E. BETTONI) * Page 2, left-hand column; figures 1,2 *	1,2	
A		4,5,13	
X	DE-C- 34 008 (J.R. LOEFFEL) * Front page; figure 1 *	1,2	
A		4,5,13	TECHNICAL FIELDS SEARCHED (Int. Cl. 4)
A	DE-A-2 033 036 (J.D. HOLLINGWORTH) * Pages 6,8; figure 1 *	1-5,13	D 01 G
A	GB-A-1 582 405 (DIXIE YARN INC.)		
The present search report has been drawn up for all claims			
Place of search THE HAGUE		Date of completion of the search 07-10-1987	Examiner MUNZER E.
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	