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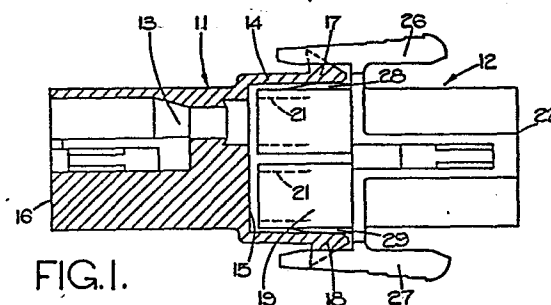
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**Electrical connectors.**

An electrical connector comprising a first moulded synthetic resin body part (11) for receiving first electrical terminals, said first body part including at one end thereof an integral thin-walled shroud (14), a second moulded synthetic resin body part (12) for receiving second electrical terminals interengageable in use with said first electrical terminals, said second body part (12) having an end region (19) which, when the first and second body parts are interengaged, is received within said shroud (14) of said first body part (11), first and second latch members on said second body part, said first and second latch members (26, 27) extending externally of said shroud (14) when said first and second body parts (11, 12) are interengaged, first and second external projections (17, 18) on said shroud (14), said first and second external projections (17, 18) being engageable in use with said first and second latch members (26, 27) respectively, and, localized ramp means (28, 29) on said end region (19) of said second body part (12), said ramp means (28, 29), when said first and second body parts are interengaged, coacting with the inner surface of said shroud (14), to ensure that at least those portions of the shroud (14) carrying said first and second projections (17, 18) are so positioned to the second body part (12) that said first and second projections (17, 18) can coact with said first and second latch members (26, 27) to afford a latching action.



"Electrical Connectors"

This invention relates to electrical connectors of the kind comprising first and second matable body parts, each carrying electrical terminals, the electrical  
5 terminals of the first body part engaging those of the second body part when the first and second body parts are in mating engagement.

In a known form of connector of the kind specified above the body parts are moulded in a synthetic resin  
10 material and the first body part has an integral, thin walled shroud at one axial end within which an appropriate axial end region of the second body part is received when the first and second body parts are interengaged in use. In order to avoid unintentional  
15 disengagement of the first and second body parts a latching arrangement is provided comprising a pair of latch members integral with opposite walls respectively of the second body part and which, when the body parts are interengaged, extend externally of the shroud and  
20 coact with respective projections extending integrally from the outer surface of opposite sides of the shroud. The projections are received within respective apertures in the latch members. The latch members are of strip-like form and lie generally parallel to and  
25 spaced from the opposite walls of the second body part, being joined thereto by flexible integral neck regions extending at right angles to the latch members. The projections of the first body part are of ramp-like  
30 form whereby during interengagement of the first and second body parts the latch members are deflected outwardly by the projections, and as permitted by flexing the respective neck regions. When the first and second body parts are fully interengaged the

projections align with the apertures in the latch members and the latch members restore to their original positions so that the projections are received within the apertures and disengagement of the first and second  
5 body parts is resisted. Intentional disengagement can be achieved by outward movement of the latch members to clear the projections thus permitting the body parts to be pulled apart. Such movement of the latch members can be achieved by applying pressure to the opposite ends  
10 of the latch members from the projections, the neck regions being disposed between the ends of the latch members so that the latch members perform a rocking action.

It will be recognised that in order for the latching  
15 arrangement to operate satisfactorily a certain degree of accuracy in the positioning of the projections in relation to the latch members is called for. Moreover, in order to ensure that mating terminals of the two body parts can interengage then there must be sufficient  
20 clearance between the interior of the shroud and the end region of the second body part to permit slight misalignment of the terminals to be accommodated. It has been found that owing to the thin walled nature of the shroud inward bowing of the walls can occur as the  
25 material of the shroud cools at the end of the moulding process. Such bowing can result in the projections not being sufficient accurately located in relation to the latch members to achieve a reliable latching action. In order to overcome this problem, that is to say in  
30 order to avoid the bowing, and thus the mis-positioning of the projections, it has previously been proposed to permit the first body part to cool, at the end of the moulding process, either in the mould itself, or on a former which supports the shroud during cooling. While  
35 this previous proposal overcomes the problem by

preventing the inward bowing of the shroud walls it greatly increases the production time of the first body part, and therefore greatly increases the cost of production of the first body part. It is an object of the present invention to provide an electrical connector wherein reliable latching can be achieved, and wherein the disadvantages of the previous proposal are minimised.

An electrical connector in accordance with the present invention comprises a first moulded synthetic resin body part for receiving first electrical terminals, said first body part including at one end thereof an integral thin-walled shroud, a second moulded synthetic resin body part for receiving second electrical terminals interengageable in use with said first electrical terminals, said second body part having an end region which, when the first and second body parts are interengaged, is received within said shroud of said first body part, first and second latch members on said second body part, said first and second latch members extending externally of said shroud when said first and second body parts are interengaged, first and second external projections on said shroud, said first and second external projections being engageable in use with said first and second latch members respectively, and, localized ramp means on said end region of said second body part, said ramp means, when said first and second body parts are interengaged, coacting with the inner surface of said shroud, to ensure that at least those portions of the shroud carrying said first and second projections are so positioned in relation to the second body part that said first and second projections can coact with said first and second latch members to afford a latching action.

Preferably said ramp means comprises a pair of  
upstanding ribs on opposite sides respectively of said  
end region of said second body part said ribs extending  
axially of the second body part and tapering in height  
5 from a minimum at their ends adjacent the front end of  
the second body part.

Desirably said ribs include a plateau region at their  
maximum height ends.

Preferably said ribs commence, at their minimum height  
10 end, at a point spaced rearwardly from the front end of  
the second body part.

Conveniently there is a pair of laterally spaced  
parallel ribs on one side of said end region of said  
second body part and a single centrally disposed rib on  
15 the opposite side of said end region.

One example of the present invention is illustrated in  
the accompanying drawings, wherein:

Figure 1 is a side elevational view partly in section  
of the first and second body parts of an electrical  
20 connector, showing the body parts interengaged;  
Figure 2 is a sectional view of the first body part  
shown in Figure 1;  
Figure 3 is a side elevational view of the second body  
part shown in Figure 1; and  
25 Figures 4 and 5 are views in the directions of arrows A  
and B in Figures 2 and 3 respectively.

Referring to the drawings, the electrical connector  
includes first and second moulded synthetic resin body  
parts 11, 12. The body part 11 is formed with a  
30 plurality of axially extending passages 13 and

extending from one end of the body 11 is an integral, thin-walled shroud 14. The body 11 includes an end face 15 at the base of the shroud, the passages 13 opening at one end at the face 15, and opening at their  
5 opposite ends at the opposite axial end 16 of the body 11. In use the passages 13 each receive a respective electrical terminal which is located and retained by engagement with its passage wall in known manner. Each of the terminals is a pin terminal, and is electrically  
10 connected to one or more respective electrical leads. The leads extend in use from the body 11 at the end face 16, and the pin portions of the pin terminals project from the face 15 parallel to one another within the shroud 14.

15 As is evident from Figure 4 the passages 13 are arranged in two parallel rows, and the passages in the two rows are staggered, one of the rows having one more passage than the other row. In cross-section therefore the body 11 and the shroud 14 are trapezoidal having a  
20 pair of parallel sides and a pair of sides inclined towards one another.

Adjacent the free edge of the shroud 14, and centrally disposed across the parallel sides thereof are first and second integral, outwardly extending projections  
25 17, 18. The projections 17, 18 are of barb-like form tapering from a minimum height at the free edge of the shroud 14 to a maximum height at their opposite axial end, where they terminate in a shoulder (indicated by the suffix a in Figure 2) which subtends, with the  
30 outer surface of the shroud 14, an acute angle approaching 90°.

The body part 12 is also moulded in synthetic resin material, and includes an end region 19 engageable

within the shroud 14 of the body part 11. As is clear from Figures 1 and 5 the body part 12 has a plurality of axially extending passages 21 which are disposed in the same arrangement as the passages 13 of the body part 11. The passages 21 extend through the body part 12 from the front end, that is to say the free end of the region 19, to the rear end 22 and in use receive respective socket terminals each of which is electrically connected to one or more respective electrical leads. The leads leave the passages 21 at the end 22 of the body and the socket regions of the terminals are received within the end region 19 of the body 12. When the body part 11, 12 are interengaged as shown in Figure 1, the pin regions of the terminals of the body 11 enter the end region 19 of the body 12 and engage within the socket regions of the terminals of the body part 12.

It can be seen that the region 19 of the body 12 is in fact defined by a plurality of parallel sleeves 23 extending axially of the remainder of the body 12 for receiving respective socket terminals. The sleeves 23 are of generally circular cross-section and are arranged in two rows with the sleeves being staggered and one row having one more sleeve than the other row. The two rows are separate, but within each row the sleeves merge into one another as is best seen in Figure 5.

In an end view it will be recognised that the body part 12 has a trapezoidal form similar to that of the body part 11, and projecting outwardly from the two parallel sides of the body part 12 are first and second flexible neck regions 24, 25. Integral with the end of each neck region 24, 25 remote from the body part 12 is a respective latch member 26, 27. The latch members 26,

27 extend parallel to the remainder of the body part 12 and are spaced therefrom by the neck regions 24, 25. The neck regions 24, 25 join with their respective latch members 26, 27 intermediate the ends of the latch member and thus by pressing one end of its latch member towards the body part 12, that latch member can be rocked relative to the body part 12 as permitted by flexure of its respective neck region. Upon release the neck region will restore the latch member to its position generally parallel to the body part 12.

At their forward ends, that is to say their ends adjacent the end region 19, the latch members 26, 27 are formed with apertures (indicated by the suffix a in Figure 3). As is clear from Figure 1, when the body parts 11, 12 are interengaged the projections 17, 18 of the body part 11 can be received within the apertures 26a, 27a so that the closed ends of the apertures 26a, 27a coact with the shoulders 17a, 18a, to resist disengagement of the body parts 11, 12. In order to permit disengagement the rearward ends of the latch members 26, 27 are pressed towards the body part 12 thus rocking the latch members to lift their forward ends out of engagement with the projections 17, 18 and permit movement of the body parts 11, 12 away from one another. The inclined surfaces of the projections 17, 18 facilitate interengagement of the body parts without the need manually to rock the latch members 26, 27 since the free forward ends of the latch members ride up the inclined surfaces of the projections 17, 18 as the body parts are pushed into engagement with one another. The latch members 26, 27 spring back to their parallel configurations to embrace the projections 17, 18 when the body parts are fully interengaged.

The opposite faces of the end region 19 of the body

part 12 are provided with localized ramp means 28, 29 which, when the body parts are interengaged, can, if necessary, engage the inner surface of the shroud 14 to push those regions of the shroud 14 carrying the  
5 projections 17, 18 outwardly. The ramp means 28 comprises a pair of parallel ribs integral with and projecting from the outer surface of the two centrally disposed sleeves of the upper row of sleeves 23. The ribs commence a short distance back from the front end  
10 of the portion 19 and taper in height from zero, in a rearward direction, to a maximum which is then maintained throughout a plateau region. The ramp means 29 is a similarly shaped rib on the central sleeve of the lower row of sleeves.

15 It will be recognised that the front end of the region 19 of the body part 12 is of smaller dimensions than the intended interior dimension of the shroud 14, thus permitting the front end of the region 19 readily to be inserted into the shroud. In other words there is an  
20 adequate clearance between the front end of the end region 19 of the body part 12 and the inner wall of the shroud to facilitate easy insertion even if the parallel walls of the shroud are in fact bowed inwardly as may well be the case as a result of unsupported  
25 cooling of the shroud at the end of the moulding process. However, in the event that the walls of the shroud do bow inwardly, co-operation of the projections 17, 18 with the latch members 26, 27 is assured by the provision of the ramp means 28, 29, since after the  
30 front end of the region 19 has been introduced into the shroud the inner wall of the shroud will be engaged by the inclined portions of the ribs constituting the ramp means 28, 29 and the walls of the shroud will thus be flexed outwardly by coaction with the inclined regions  
35 of the ribs. The walls of the shroud will be held in

their outwardly displaced positions by the plateau regions of the ribs and thus engagement of the projections 17, 18 with the latch members 26, 27 is ensured.

5 It will be recognised therefore that the body part 11 can be manufactured without the need for increased production time and therefore increased cost of allowing the body part 11 to cool in the mould, or with the shroud 14 engaged on a former.

10 It is to be understood that other body part shapes and terminal configurations, to those described above and shown in the drawings, can be used if desired.

CLAIMS

1. An electrical connector comprising a first moulded synthetic resin body part (11) for receiving first electrical terminals, said first body part including at one end thereof an integral thin-walled shroud (14), a second moulded synthetic resin body part (12) for receiving second electrical terminals interengageable in use with said first electrical terminal, said second body part having an end region (19) which, when the first and second body parts (11, 12) are interengaged, is received within said shroud (14) of said first body part (11), first and second latch members (26, 27) on said second body part (12), said first and second latch members (26, 27) extending externally of said shroud (14) when said first and second body parts (11, 12) are interengaged, and first and second external projections (17, 18) on said shroud (14), said first and second external projections (17, 18) being engageable in use with said first and second latch members (26, 27) respectively, characterized in that localized ramp means (28, 29) is provided on said end region (19) of said second body part (12), said ramp means (28, 29), when said first and second body parts (11, 12) are interengaged, coacting with the inner surface of said shroud (14), to ensure that at least those portions of the shroud (14) carrying said first and second projections (17, 18) are so positioned in relation to the second body part (12) that said first and second projections (17, 18) can coact with said first and second latch members (26, 27) to afford a latching action.

2. An electrical connection as claimed in Claim 1 characterized in that said ramp means (28, 29) comprises a pair of upstanding ribs on opposite sides

5 respectively of said end region (19) of said second body part (12), said ribs extending axially of the second body part (11) and tapering in height from a minimum at their ends adjacent the front end of the second body part (12).

3. An electrical connector as claimed in Claim 2 characterized in that said ribs include a plateau region at their maximum height ends.

10 4. An electrical connector as claimed in Claim 2 or Claim 2 characterized in that said ribs commence, at their minimum height end, at a point spaced rearwardly from the front end of the second body part (12).

15 5. An electrical connector as claimed in any one of Claims 2 to 4 characterized in that there is a pair of laterally spaced parallel ribs (28) on one side of said end region (19) and a centrally disposed rib (29) on the opposite side of said region (19).

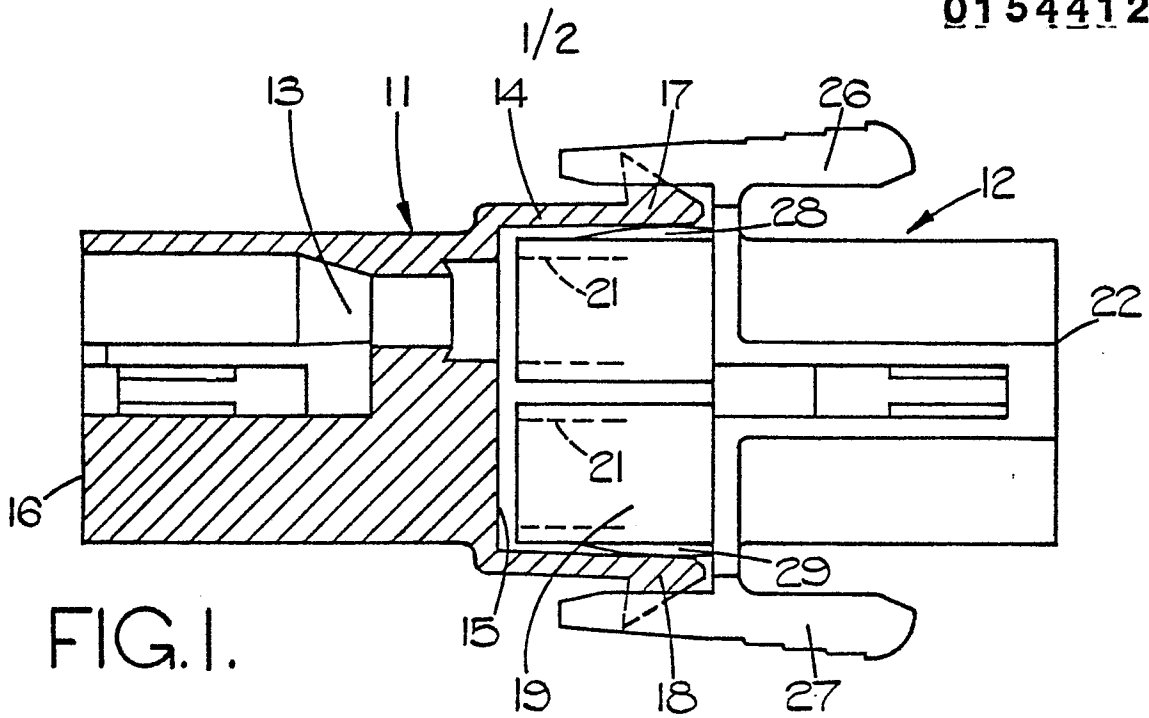


FIG. 1.

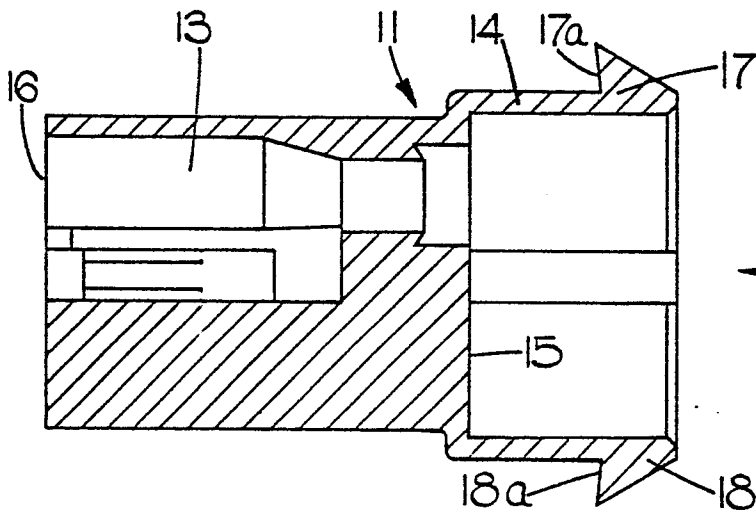


FIG. 2.

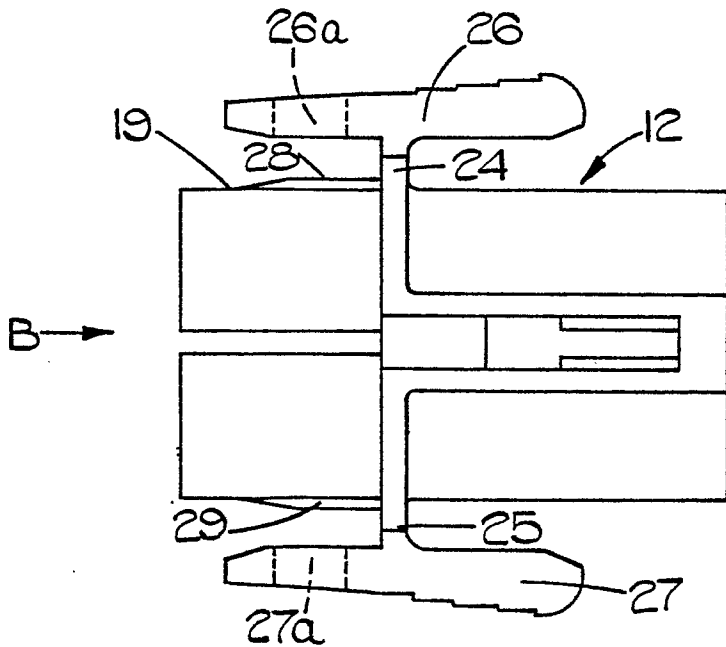


FIG. 3.

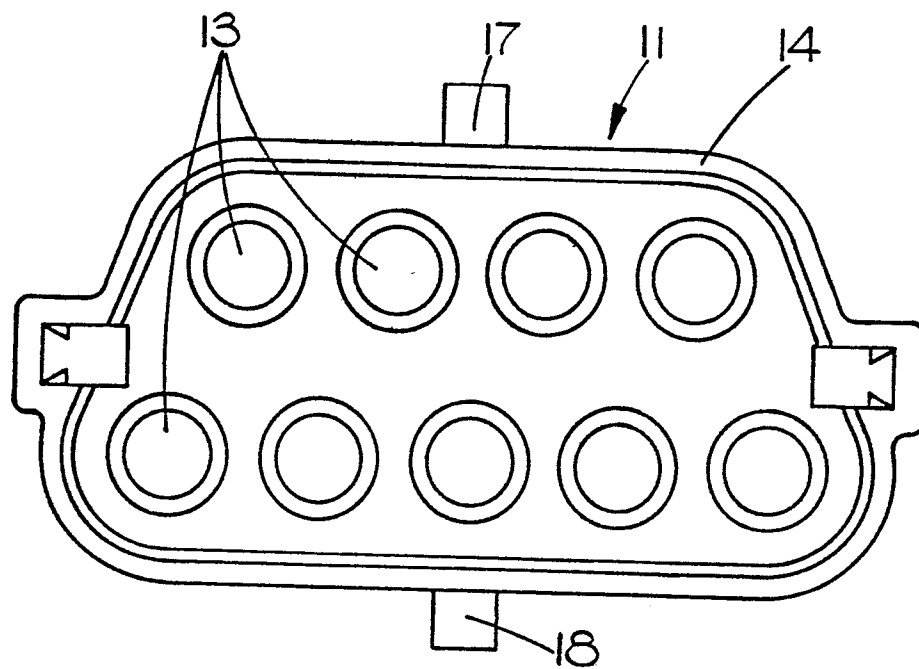


FIG. 4.

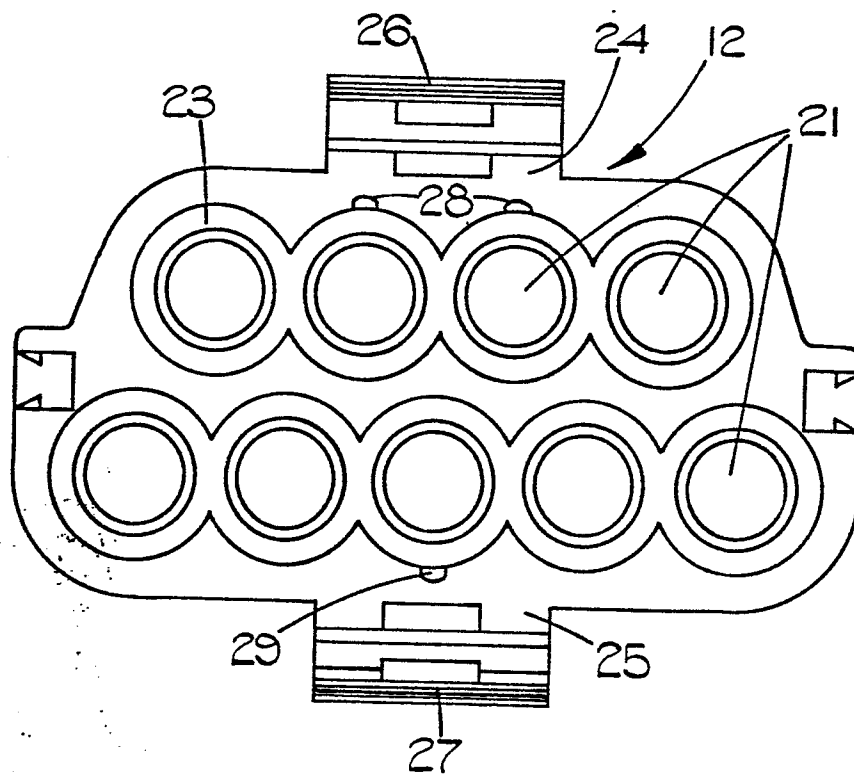


FIG. 5.



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	EP-A-0 060 655 (AMP) * Figures 4-7; page 5, line 10 - page 6, line 3 *	1,2	H 01 R 13/627
A	--- GB-A-2 061 633 (NISSAN) * Figures 1-5; page 1, lines 9-101 *	1	
A	--- US-A-3 933 406 (CAMERON et al.)  * Figures 2-5; column 5, line 27 - column 8, line 19 *  -----		
The present search report has been drawn up for all claims			TECHNICAL FIELDS SEARCHED (Int. Cl. 4)
			H 01 R 13/627 H 01 R 13/639 H 01 R 23/70
Place of search	Date of completion of the search	Examiner	
BERLIN	30-04-1985	HAHN G	
CATEGORY OF CITED DOCUMENTS		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	
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			