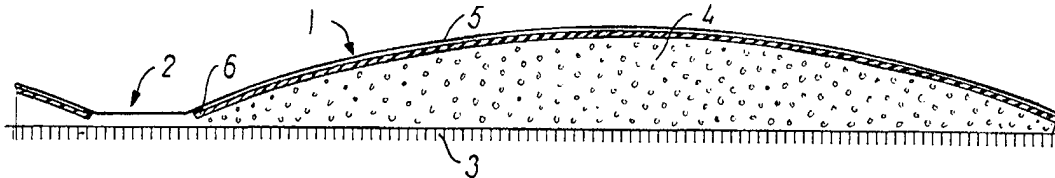




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<p>(21) International Application Number: PCT/DK97/00489 (22) International Filing Date: 30 October 1997 (30.10.97) (30) Priority Data: 1225/96 1 November 1996 (01.11.96) DK (71) Applicant (for all designated States except US): V. KANN RASMUSSEN INDUSTRI A/S [DK/DK]; Tobaksvejen 10, DK-2860 Søborg (DK). (72) Inventors; and (75) Inventors/Applicants (for US only): NIELSEN, Torben, Holst [DK/DK]; Vedersøvej 32, DK-2610 Rødovre (DK). HANSEN, Søren [DK/DK]; Hyldevangen 127, DK-7323 Give (DK). (74) Agents: RAFFNSØE, Knud, Rosenstand et al.; Internationalt Patent-Bureau, Høje Taastrup Boulevard 23, DK-2630 Taastrup (DK).</p>	<p>(81) Designated States: AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, CA, CH, CN, CU, CZ, DE, DK, EE, ES, FI, GB, GE, GH, HU, ID, IL, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MD, MG, MK, MN, MW, MX, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, SL, TJ, TM, TR, TT, UA, UG, US, UZ, VN, YU, ZW, ARIPO patent (GH, KE, LS, MW, SD, SZ, UG, ZW), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, CH, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, ML, MR, NE, SN, TD, TG).</p> <p>Published With international search report. In English translation (filed in Danish).</p>	

(54) Title: A ROLLER SHUTTER FOR WINDOWS, DOORS AND THE LIKE AND A METHOD OF MANUFACTURING



(57) Abstract

In a roller shutter for windows, doors and the like a number of slats (1) of a mainly curved cross-sectional profile are arranged in parallel and secured individually to a flexible web or cloth (3) which forms hinge connections in the interspaces (2) between the slats. The slats (1) are individually secured to said web or cloth (3) by means of an intermediate layer (4) of a thermoplastic material which is in full surface contact with the web or the cloth (3) and with the concave side of the slats (1). The roller shutter may be manufactured by applying to one side of the cloth (3) a coating of thermoplastic material to provide the intermediate layer (4), on top of which the slats (1) are placed in parallel transversely to a forwarding direction for the web or cloth (3) by means of a shaping device (12) which brings the concave side of the slats in surface contact with the thermoplastic intermediate layer (4), the intermediate layer (4) in the interspaces between the slats (1) being impacted with the cloth (3) to a thickness suited for providing said hinge connection.

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A ROLLER SHUTTER FOR WINDOWS, DOORS AND THE LIKE AND A
METHOD OF MANUFACTURING

The present invention relates to a roller shutter
5 for windows, doors and the like with a number of slats
of a mainly curved cross-sectional profile secured
individually to a flexible web or cloth which forms
hinge connections in the interspaces between the slats.

From EP-B1-0 410 364 a roller shutter is known, in
10 which the slats are connected in pairs around the
flexible web or cloth. For the manufacture of a roller
shutter with given dimensions a double set of slats is
therefore required, the manufacture being simultaneous-
ly made complicated by the prescribed pairwise inter-
15 locking of the slats. The fact that the flexible web or
cloth on account of the interlocking has to follow the
cross-sectional profile of the individual slats that
requirements are made as to good strength of the
flexible web or cloth.

20 EP-A-0 343 755 discloses a roller shutter of the
above type, in which the slats are secured individually
by being directly embedded on the flexible web or
cloth. It is a prerequisite for such an embedding to
use slats of plastic material which by use of a plastic
25 foil as carrier web also has to be mouldable at a lower
temperature than the plasticizing temperature.
Moreover, a comparatively heavy deformation of the
carrier web takes place at the embedment.

On this background it is the object of the inven-
30 tion to provide a roller shutter which, compared to the
first-mentioned E-B-0 410 364 is simpler and cheaper in
respect of material consumption and manufacturing
process, and, compared to the last-mentioned E-A-0 343
755 provides a wider freedom of choice in respect of
35 the slat material, just as deformation of the carrier

web is substantially avoided.

To meet this object the roller shutter according to the invention is characteristic in that the slats are prefabricated and secured to said web or cloth by means of an intermediate layer of a thermoplastic material which is in full surface contact with the web or cloth and with the concave side of the slats.

The slats may consist of curved, extruded profiles of metal foil, for instance aluminium foil, or thermoplastic material, whereas the flexible web or cloth may be a fine-meshed synthetic web and the intermediate layer may consist of a suitable thermoplastic material like for instance thermoplastic polyurethane.

Further advantages and details of the roller shutter according to the invention appear from the subclaims 1-10.

Furthermore, the invention relates to a method of manufacturing the roller shutter, which method according to the invention is characterized in that to one side of a flexible web or cloth a coating of thermoplastic material is applied to provide said intermediate layer, on top of which the prefabricated slats are placed in parallel transversely to an advancing direction for the web or cloth by means of a shaping device which brings the concave side of the slats in surface contact with the thermoplastic intermediate layer, the intermediate layer in the interspaces between the slats being impacted with the cloth to a thickness suited for providing said hinge connection.

In this way a manufacturing process is obtained which is well suited for industrial production.

Further advantages and details of this method appear from the subclaims 12-16.

The invention will now be explained in the following with reference to the schematic drawings, in which

Fig. 1 in perspective shows a sectional view of an embodiment of a roller shutter according to the invention,

Fig. 2 an enlarged sectional view of a part of the sectional view shown in Fig. 1, and

Fig. 3 the substantial parts of a plant for the manufacture of a roller shutter as shown in Figs 1 and 2 for illustrating the method according to the invention.

In the embodiment shown in Fig. 1 a roller shutter according to the invention comprises a number of slats 1 of a curved cross-sectional profile and secured parallel to each other with interspaces 2 to a flexible cloth 3 which forms hinge joints in the slat interspaces 2.

According to the invention the retainment of the slats 1 to the cloth 3 takes place by means of an intermediate layer of thermo-plastic material and is carried out such that the intermediate layer 4 is in full surface contact with both the cloth 3 and the concave side of the slats 1.

In the example shown the slats 1 are in the example shown made as curved extruded profiles of aluminium foil with a thickness 0.1 - 0.5 mm, for instance 0.2 mm. The slats may typically have a width of 25-40 mm, for instance 30 mm, and a radius of curvature of 35-60 mm, for instance 45 mm, whereas the slat interspaces 2 may have a width of 4-10 mm, for instance 5 mm.

In another embodiment the slats 1 may be made as curved profiles of a thermoplastic material, for instance thermoplastic polyurethane, with a thickness of 1.5 - 2.5 mm, for instance 2 mm.

The thermoplastic intermediate layer 4 may consist of any suitable thermoplastic material. A suitable material is thermoplastic polyurethane. As explained in detail in the following, the application of the intermediate layer 4 preferably takes place in such a way that the thickness of the intermediate layer 4 together with the cloth 3 in the slat interspaces 2 is in the range from 0.4 to 0.7 mm, for instance 0.5 mm, such that a good flexibility of the hinge connection formed in the interspaces 2 is obtained.

In order to further ensure the retainment of the slats 1 to the cloth 3 by the intermediate layer 4, a coating 5 of thermoplastic material has been applied to the convex side of the slats 1. Such a coating may form a comparatively thin film with a thickness of for instance 0.2 mm, and, like in case of the intermediate layer 3, a suitable material for this may be thermoplastic polyurethane. By use of slats made from aluminium foil or other metal foils such a coating will also function as a protective weather shield.

The coating 5 is, however, not absolutely necessary, as the slats 1 may for instance be provided on the concave side with a profiling which is anchored or interlocked in the thermoplastic intermediate layer 4. This may for instance be advantageous when using slats made from a thermoplastic material.

In order to provide a good retainment of the slats 1 to the intermediate layer 4, also at the transition to the hinge joints in the slat interspaces 2 and a good wearability of the hinge joints, it may be advantageous if the cross-sectional profile of the slats 1, as shown in Fig. 2, tapers towards the side edges 6 facing the interspace 2.

At the manufacture of the roller shutter on a production plant as shown schematically in Fig. 3, the

cloth 3 is advanced from a roll towards an application station 8, in which the thermoplastic material, for instance thermoplastic polyurethane, which is to form the intermediate layer 4, in the example shown is applied in powder form and brushed off to the desired thickness by means of a brushing off device 9, following which the cloth 3 with the applied thermoplastic material passes a heat-treatment station 10, in which the thermoplastic material is melted to a viscous consistence.

Subsequently, the slats 1 are positioned on in a feeding station 11 by means of a shaping device in form of a profiled roller 12 with longitudinal grooves or tracks 13 adapted to the cross-sectional profile of the slats 1, the slats 1 being supplied to the roller 12 from a feeding stack 14. The special design of the shaping roller 12 with a star-like cross-section also has the effect that the intermediate layer 4 and the cloth 3 in the slat interspaces 2 are compressed to the desired thickness as described above.

In the coating station 15, a thin foil coating is applied as described above, for instance by spraying, before the cloth 3 with the slats 1 positioned thereon and retained by means of the intermediate layer 4 is taken to a cooling station 16 and further on to a rewinding drum 17 for the finished roller shutter.

Instead of application of the thermoplastic material for the intermediate layer 4 in powder form as described above, the intermediate layer 4 may be applied by coextrusion with lamination of the intermediate layer 4 to the cloth 3.

P A T E N T C L A I M S

1. A roller shutter for windows, doors and the like with a number of slats (1) of a mainly curved cross-sectional profile arranged in parallel and
5 secured individually to a flexible web or cloth (3) which forms hinge connections in the interspaces (2) between the slats, c h a r a c t e r i z e d in that the slats (1) are prefabricated and secured to said web or cloth (3) by means of an intermediate layer (4) of
10 a thermoplastic material which is in full surface contact with the web or cloth (3) and with the concave side of the slats (1).

2. A roller shutter according to claim 1, c h a r a c t e r i z e d in that a coating (5) of a thermo-
15 plastic material is applied to the convex side of the slats (1) facing away from the cloth (3).

3. A roller shutter according to claim 1 or 2, c h a r a c t e r i z e d in that the slats (1) are made as curved extruded profiles with a width in the
20 range from 25 to 40 mm, a radius of curvature of 35-60 mm and a mutual spacing in the area of 4-10 mm.

4. A roller shutter according to claim 2, c h a r a c t e r i z e d in that the slats (1) are profiles made from metallic foil with a thickness of 0.1 - 0.5
25 mm.

5. A roller shutter according to claim 2, c h a r a c t e r i z e d in that the slats are profiles of thermoplastic material with a thickness of 1.5 - 2.5
mm.

30 6. A roller shutter according to any of the preceding claims, c h a r a c t e r i z e d in that said web or cloth (3) consists of a fine-meshed synthetic web with a thickness of 0.1 - 0.4 mm.

7. A roller shutter according to one of the
35 preceding claims, c h a r a c t e r i z e d in that

the thermoplastic intermediate layer (4) together with said web or cloth (3) and possibly said coating (5) in the interspaces (2) between the slats (1) has a thickness of 0.3 - 0.7 mm.

5 8. A roller shutter according to one of the preceding claims, characterized in that the intermediate layer (4) consists of thermoplastic polyurethane.

10 9. A roller shutter according to claim 2, characterized in that said coating (5) consists of thermoplastic polyurethane.

15 10. A roller shutter according to one of the preceding claims, characterized in that the slats (1) are made with a cross-sectional profile which tapers with the side edges (6) facing the interspaces (2).

20 11. A method for the manufacture of a roller shutter according to one of the preceding claims, characterized in that to one side of a flexible web or cloth (3) a coating of thermoplastic material is applied to provide said intermediate layer (4), on top of which the prefabricated slats (1) are placed in parallel transversely to an advancing direction for the web or cloth (3) by means of a shaping device (12) which brings the concave side of the slats in surface contact with the thermoplastic intermediate layer (4), the intermediate layer (4) in the interspaces between the slats (1) being impacted with the cloth (3) to a thickness suited for providing said hinge connection.

25 12. A method according to claim 11, characterized in that the application of said coating is made by applying a powder with subsequent heat-treatment.

35 13. A method according to claim 11, characterized

t e r i z e d in that the application of said coating is made by co-extrusion of said web or cloth (3) by lamination of the thermoplastic material.

14. A method according to claim 11, 12 or 13,
5 c h a r a c t e r i z e d in that said shaping device (12) comprises a profiled roller with longitudinal grooves or tracks (13) adapted to the cross-sectional profile of the slats.

15. A method according to one of the claims 11-14,
10 c h a r a c t e r i z e d in that a coating (5) of a thermoplastic material is applied to the convex side of the slats (1).

16. A method according to claim 15, c h a r a c -
t e r i z e d in that said coating (5) is applied in
15 the form of a dispersion of a thermoplastic material.

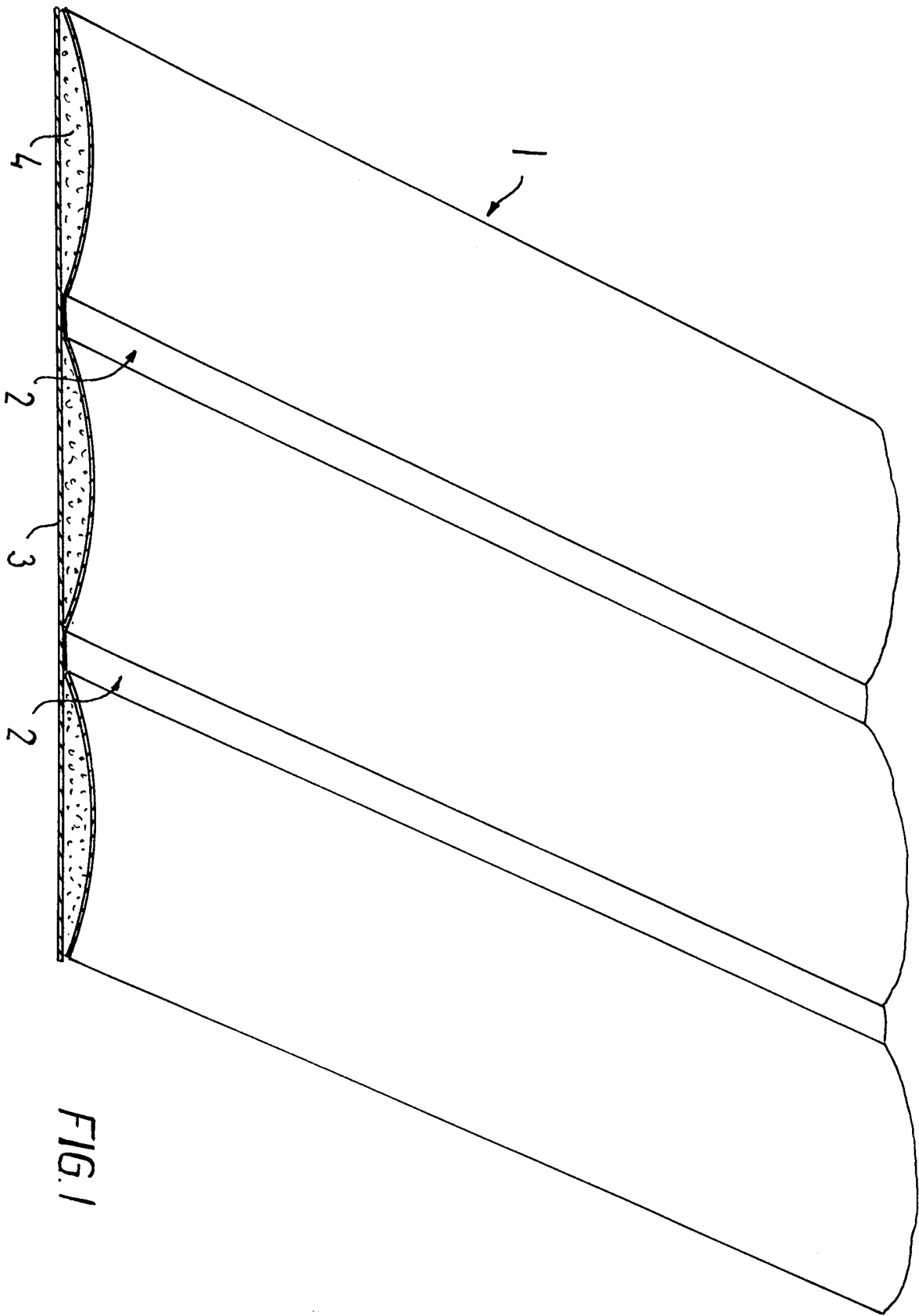


FIG. 1

1/2

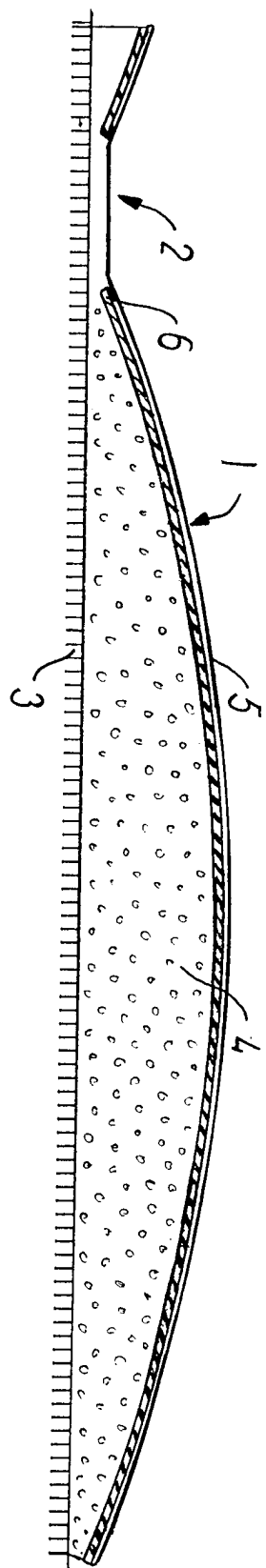


FIG. 2

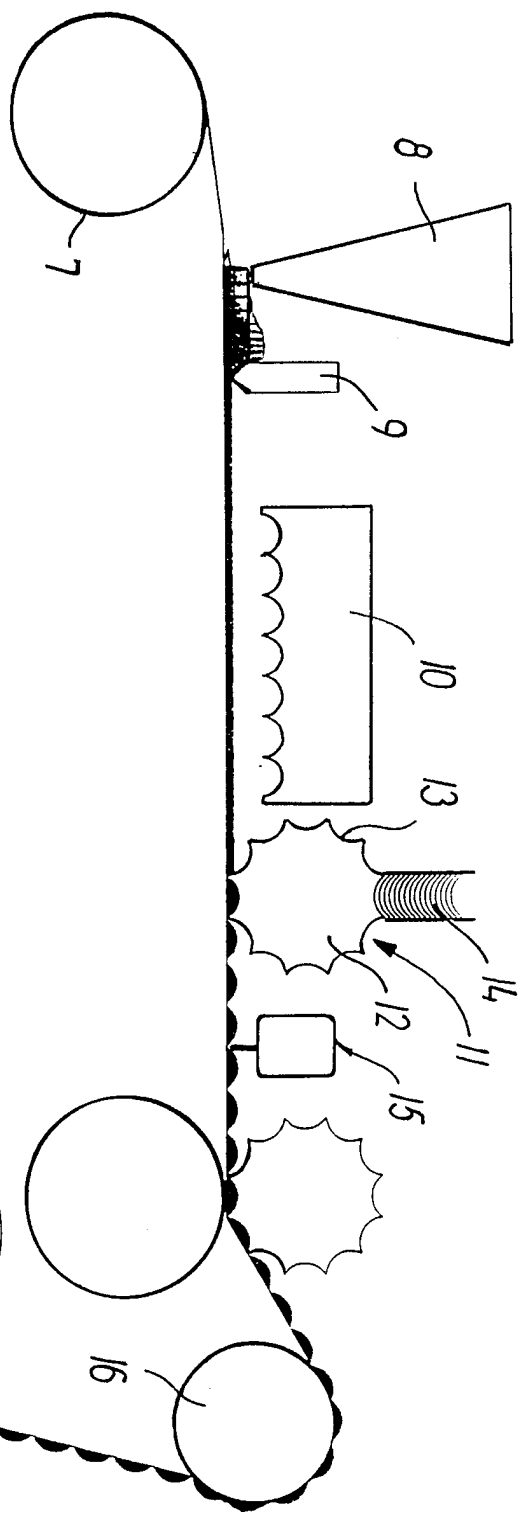


FIG. 3

INTERNATIONAL SEARCH REPORT

International application No.

PCT/DK 97/00489

A. CLASSIFICATION OF SUBJECT MATTER

IPC6: E06B 9/13

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC6: E06B, A47H

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

SE,DK,FI,NO classes as above

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

EPODOC, WPI

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	WO 9221516 A1 (KLEIN, A.), 10 December 1992 (10.12.92)	1,3-8,10-11, 14
A	---	2,9,12-13, 15-16
Y	DE 3912528 A1 (BRAAS & CO GMBH), 18 October 1990 (18.10.90)	1,3-8,10-11, 14
A	---	2,9,12-13, 15-16
A	EP 0343755 A2 (INDUSTRIAL MOULDINGS B.V.), 29 November 1989 (29.11.89)	1-16

 Further documents are listed in the continuation of Box C. See patent family annex.

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Date of the actual completion of the international search

30 January 1998

Date of mailing of the international search report

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C (Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT		
Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	EP 0410364 A2 (HENKENJOHANN, J.), 30 January 1991 (30.01.91) --	1-16
A	DE 1275267 B (GRÜNZWEIG & HARTMANN AKTIENGESELLSCHAFT), 14 August 1968 (14.08.68) -- -----	1-16

INTERNATIONAL SEARCH REPORT
Information on patent family members

07/01/98

International application No.

PCT/DK 97/00489

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