(19) Europäisches Patentamt
European Patent Office
Office européen des brevets

(11) Publication number: **0 343 338 A1**

(12) EUROPEAN PATENT APPLICATION

(21) Application number: **89104967.8**

(51) Int. Cl.[4]: **B26D 7/18 , B26F 3/00**

(22) Date of filing: **20.03.89**

The title of the invention has been amended (Guidelines for Examination in the EPO, A-III, 7.3).

(30) Priority: **22.03.88 GB 8806780**

(43) Date of publication of application: **29.11.89 Bulletin 89/48**

(84) Designated Contracting States: **AT BE CH DE ES FR GB GR IT LI LU NL SE**

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(54) Blank separating device for die cutting machines.

(57) The invention provides that cut and creased sheets of cardboard are blanked into individual square or rectangular sheets (12) by a blanking apparatus which comprise parallel bars (34) for blanking the sheets into strips, and parallel wires (38) lying at right angles to the bars and under the upper blanking edges of the bars so as to blank the strips into individual sub-sheets (12), such action taking place by virtue of displacement of the cut and creased sheets (10) in a direction at right angles to both the bars and the wires. The spacing between the blanking edges of the bars (34) and the wires (38) in the direction of movement of the sheets is sufficient to enable the curving of the strips during the first blanking stage to recover before the blanking by the wires takes place.

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Improvements Relating to Blanking Apparatus

This invention relates to blanking apparatus, being apparatus for the separating into individual sub-sheets of a large sheet of cardboard or the like which has previously been cut to such an extent to define the individual sub-sheets, but leaving the individual sub-sheets connected together by catch-points which are in fact broken during the blanking process.

Such blanking apparatus typically comprises a station of a machine for processing large printed sheets for example sheets which are printed to define carton box blanks and wherein the large sheets are in a first station cut and creased to define the individual blanks, at a second station the cut and creased large sheet is subjected to a stripping process in which the waste material is displaced from the large sheet leaving only the cut and creased blanks connected by the catchpoints, and the stripping station is followed by the blanking station whereat the catchpoints are broken, in order to split the large sheet into the individual sub-sheets each forming a cut and creased blank.

Generally, the large sheet is fed through the machine whilst it lies in a horizontal plane, and the respective stations include reciprocating means to perform the operations on the sheet.

At the blanking station, a pattern of separating edges is created in a base support or panel, whilst an upper plate or panel has a series of punch members for punching the individual sub-sheets through apertures defined by said edges so that if for example each individual sheet defines forty sub-sheets there will be forty of said apertures defined by said edges, and as the machine works on a repeating basis, so at the blanking station forty piles of individual sub-sheets will gradually build up as subsequent sheets are cut and creased, stripped and blanked.

The machinery described above works satisfactory as long as the sub-sheets are of an irregular shape, and are provided with crease lines therein, but in fact difficulties are experienced where for example the large sheets are to be cut into individual sub-sheets which are of a plain four-sided profile e.g. are square or rectangular or perhaps diamond shaped because as each individual large sheet is blanked, the sub-sheets as they are forced into the said apertures, must be capable of curving in two directions simultaneously which of course cardboard and paper sheets cannot do satisfactorily and the result is that if an attempt is made simply to blank rectangular or square sub-sheets, at the corners of the sub-sheets the paper or board folds or creases resulting in an unsatisfactory product.

Suppliers of blanking machinery state in their literature that simple four-sided sub-sheets cannot be blanked completely on the machine, and the technique which is commonly used is to blank the large sheets into parallel rows of sub-sheets, and then to break the rows of sub-sheets into individual sub-sheets by hand, which latter process is time consuming and uneconomical.

The present invention is concerned with providing a blanking apparatus whereby the aforesaid disadvantage will be obviated or mitigated.

According to the present invention, a blanking apparatus comprises means defining blanking edges lying generally in a first direction, and means defining blanking edges lying generally in a second direction so as to define a plurality of apertures through which individual sub-sheets can be pushed by means of a punch plate or panel which cooperates with the blanking edges by reciprocating towards and away from the blanking edges, characterised in that the first blanking edges are arranged in a first plane lying transverse to the direction of reciprocation of the punch panel or plate, and the second blanking edges are arranged spaced from said first blanking edges in said direction of reciprocation by a sufficient extent to enable the sheets to be blanked into sub-sheets and then by the continued movement of the punch panel or plate to be blanked into the individual sub-sheets by means of said second blanking edges.

By the arrangement described, large sheets can now be blanked effectively into individual sub-sheets of a plain four-sided configuration which typically will be of square or rectangular configuration but could if required be diamond shaped or even general quadrilateral shape by appropriate arrangement of the first and second blanking edges.

Normally, the first blanking edges will be parallel and in a machine as described above will extend in a direction of feed of the large sheets through the machine, whilst the second blanking edges also preferably will be parallel to each other but at right angles to the first blanking edges.

The first blanking edges may be constituted by flat bars arranged with edges thereof to form said blanking edges, whilst the second blanking edges may be defined by tensioned wires spaced from the edges of the bars which are remote from the first blanking edges.

The second blanking edges may be created by said wires by passing the wires through apertures formed in the bars forming the first blanking edges. By providing an appropriate pattern of said apertures, so the said wires can be threaded thereth-

rough in order to create the required pattern of first and second blanking edges to suit the pattern of sub-sheets which will be blanked from the large sheets. For example, whilst the large sheets will normally be blanked into individual sub-sheets of the same configuration and size, in some cases it may be required that the individual large sheets are to be blanked into sub-sheets which are of different sizes although perhaps of the same configuration.

It is desirable that the first blanking edges should be spaced from the second blanking edges to a sufficient extent so that when blanking along the first edges takes place, the rows of sub-sheets can bend between adjacent first blanking edges as the rows are pushed between said first blanking edges, and then recover, before the rows meet the individual second blanking edges, so that the individual sheets can bend in a direction at right angles to the first direction of bending as the individual sub-sheets are blanked between adjacent second blanking edges, individual sub-sheets eventually being discharged from the blanking panel onto a pallet or other support so that columns of individual sub-sheets can be built up on the pallet as the blanking process is repeated on a plurality of large sheets.

An embodiment of the present invention will now be described, by way of example, with reference to the accompanying diagrammatic drawings, wherein:-

Fig. 1 is a perspective view of a large sheet to be blanked into individual sub-sheets;

Fig. 2 shows the sheet of Fig. 1 when blanked into sub-sheets;

Fig. 3 is a diagram illustrating the difficulties which are experienced when individual sub-sheets are blanked using a lattice framework;

Fig. 4 shows a form of blanking apparatus according to the embodiment of the invention; and

Fig. 5 shows a modified form of the apparatus shown in Fig. 4.

Referring to Fig. 1, a sheet 10 is sub-divided into a plurality of individual rectangular sub-sheets 12 by means of longitudinal and transverse skip cut lines 14 and 16. By the use of such skip cut lines, the individual sheets 12 are defined, and remain attached by virtue of easily breakable catchpoints 18. To blank the sheet 10 means that the individual sheets 12 have to be separated as shown in Fig. 2, and to achieve such blanking it has been necessary with existing machinery to blank the sheet 10 along the longitudinal lines 14 to provide rows 20 of sheets, and such rows subsequently are broken by hand into the individual sheets 12. This breaking by hand is time consuming and expensive.

Fig. 3 illustrates why difficulty arises when an attempt is made to blank a sheet 10 into the individual sub-sheets in that if it is assumed as shown in Fig. 3 that the blanking framework or lattice comprises longitudinal bars 24 and transverse bars 26 having their blanking upper edges arranged in the same plane, then when a sub-sheet 12 as shown in Fig. 3 is forced through the aperture 28, because of dimensional tolerances, the sub-sheet 12 has to curve as shown at 30 and 32, simultaneously in two directions which means that the corners are turned up as the sheet passes through the frame and in fact the corners fold and crease which is undesirable and results in an unsatisfactory product.

With the embodiment of the instant invention as shown in Fig. 4, the blanking is effected by applying the sheet 10 of Fig. 1 to a first set of blanking edges 34 defined by the top edges of flat bars 36 which in this example are arranged in parallel as shown, and to the underside of the bars 36 there are transverse wires 38 which are tensioned and which define second blanking edges for separating the individual sheets 12 transversely along the lines 16.

The operation of the apparatus shown in Fig. 4 will be understood in that the sheet 10 is placed in registry over the apparatus of Fig. 4, and then is pushed by the punching panel or plate downwards initially over the edges 34 which are in register with the cut lines 14 so that the sheet is blanked into strips, and continued pushing of the sheet causes the line 16 in register with the wires 38 to be applied to the wires to cause separation of the sheets 12 into the individual sheets as shown in Fig. 2.

Fig. 4 also shows that the ends of the flat bars 36 are supported on brackets 40 carried by main frame rails 42. The brackets 40 are adjustable lengthwise of the rails 42 as shown by arrow 44 and also vertically relative to the rails 42 as shown by arrow 46. The adjustment means are conventional and are not shown.

In the arrangement in Fig. 4, the edges 34 and the wires 38 are arranged as two sets of edges so as to blank a sheet such as sheet 10 into individual and equally sized sub-sheets 12. The arrangement of Fig. 5 provides a means whereby a sheet 10 sub-divided in a different fashion by longitudinal and transverse lines so as to define sub-sheets of different sizes can be blanked by an apparatus embodying the structure of Fig. 5. In Fig. 5 a single rail 34 is shown, and the rail 34 receives guide tubes 48 in the positions shown, and the guide tubes receive a tensioned wire 50 so that different reaches 50A and 50B can be located to perform blanking of the edges of the sheets 12, but spaced longitudinally of the bar 34. It can be appreciated that by appropriately positioning guide tubes such as tubes 48 where required in the bar 34, so an

appropriate groove pattern can be built up dependent upon the individual sub-sheets which are defined in the large sheet 10.

In each case, the wires 38 and 50 as regards the blanking edges thereof, such edges must be located sufficiently under the edges 34 to ensure that blanking first takes place in one direction by the sheet being passed over the edges 34, and the sheet recovers from the bowing 32 which will take place so that when the sheet is blanked over the wires 38 and 50, it is free to bow as indicated by reference 30 in Fig. 3.

Many modifications of the invention may be made without departing from the scope thereof.

Claims

1. Blanking apparatus comprising means (36) defining blanking edges generally in a first direction, and means (38) defining blanking edges lying generally in a second direction so as to define a plurality of apertures through which individual sub-sheets (12) can be pushed by means of a punch plate panel or panel which co-operates with the blanking edges (36, 38) by reciprocating towards and away from the blanking edges, characterised in that the first blanking edges (36) are arranged in a first plane lying transverse to the direction of reciprocation of the punch panel or plate, and the second blanking edges (38) are arranged spaced from said first blanking edges (36) in said direction of reciprocation by a sufficient extent to enable the sheets to be blanked into sub-sheets and then by the continued movement of the punch panel or plate to be blanked into the individual sub-sheets (12) by means of said second blanking edges (38).

2. Blanking apparatus according to Claim 1, wherein said edges (36,38) are arranged so that the sheets are blanked effectively into individual sub-sheets of a square or rectangular configuration.

3. Blanking apparatus according to claim 1 or 2, the first blanking edges (36) are parallel and extend in a direction of feed of the large sheets from a cutting and creasing machine, whilst the second blanking edges (38) are also parallel to each other but are at right angles to the first blanking edges (36).

4. Blanking apparatus according to any of claims 1 to 3, wherein the first blanking edges (36) are constituted by flat bars (36) arranged with edges thereof to form said blanking edges (36) whilst the second blanking edges are defined by tensioned wires (38) spaced from the edges of the bars (36) which are remote from the first blanking edges.

5. Blanking apparatus according to claim 4, wherein the second blanking edges (38) are created by said wires by passing the wires through apertures formed in the bars forming the first blanking edges (36).

6. Blanking apparatus according to Claim 5, wherein the wires are threaded through the bars in order to create the required pattern of first and second blanking edges to suit the pattern of sub-sheets which will be blanked from the large sheets.

7. Blanking apparatus according to claim 6, wherein the wires are arranged so that the individual sub-sheets (12) will be of the same configuration but of different sizes.

8. Blanking apparatus according to any preceding claim, in combination with a cutting and creasing machine, the blanking apparatus being arranged to receive the cut and creased sheets from the machine sequentially for the blanking of such sheets.

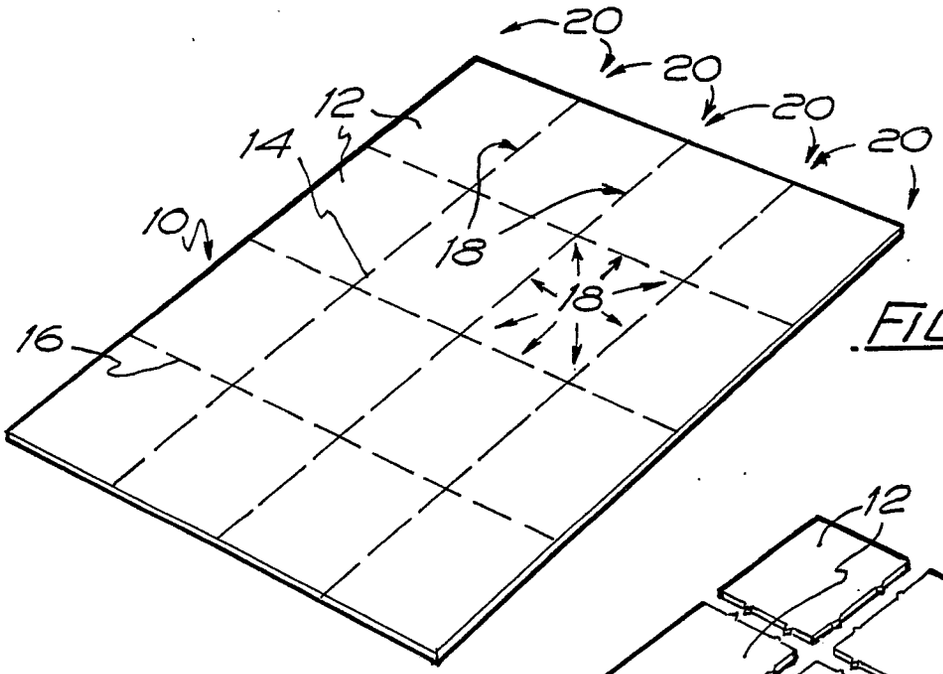


FIG. 1

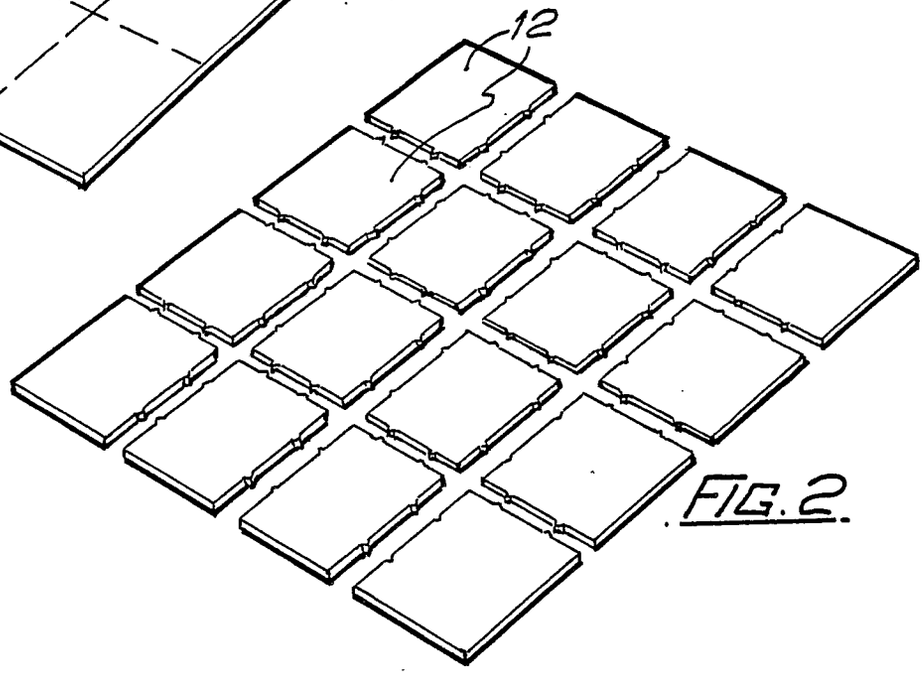


FIG. 2

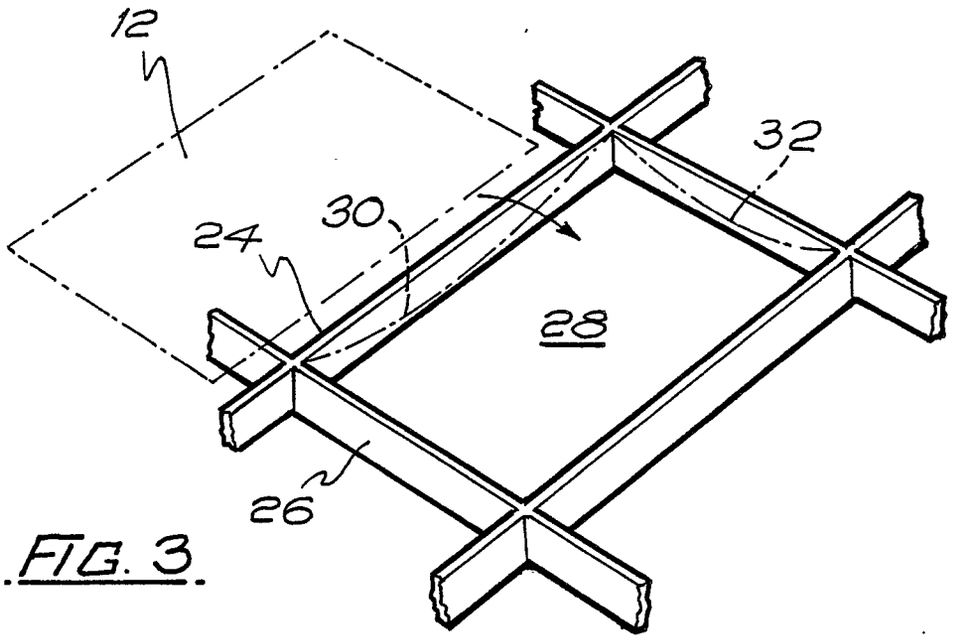


FIG. 3

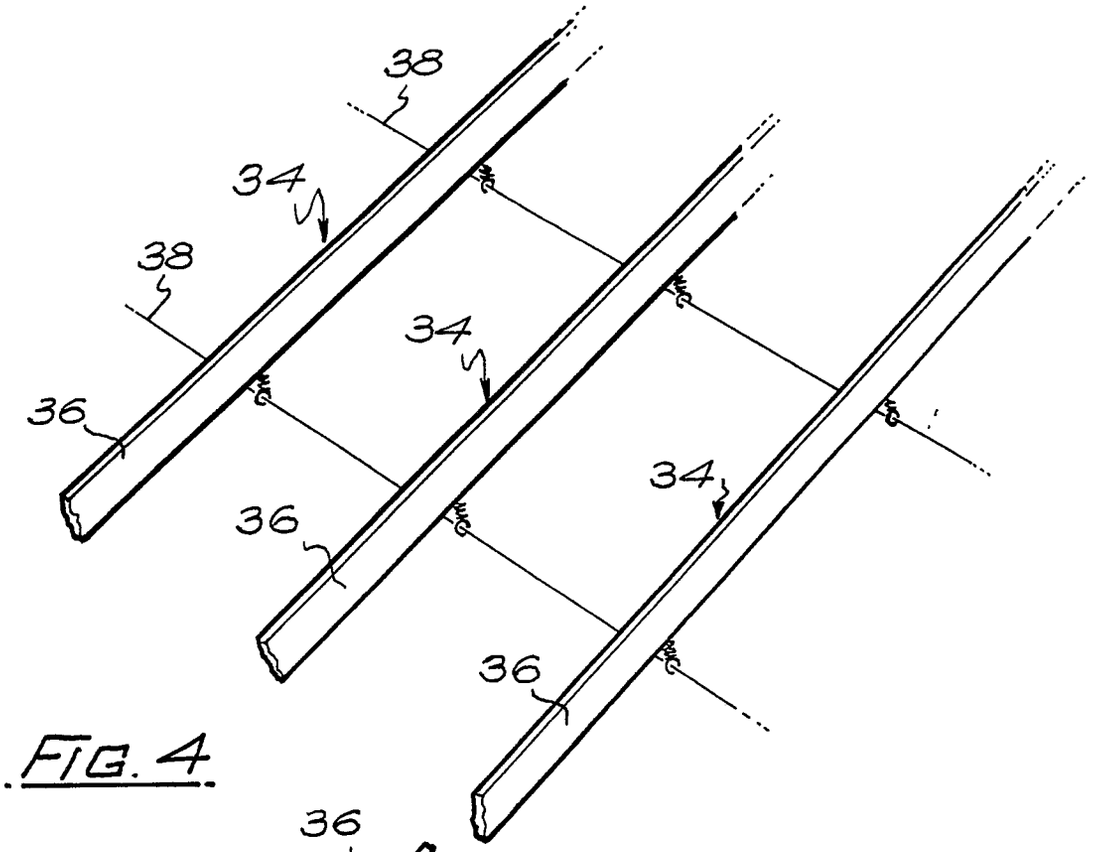
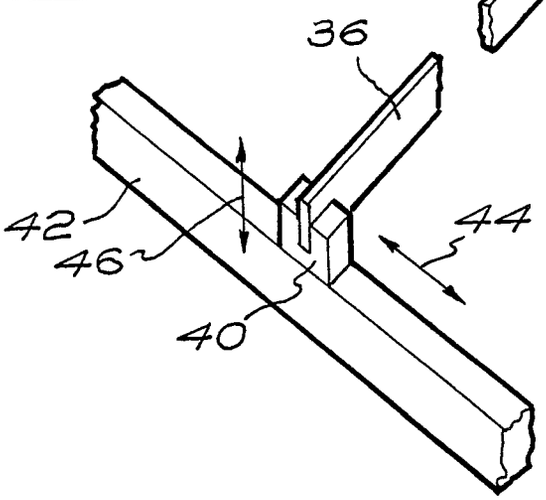


FIG. 4



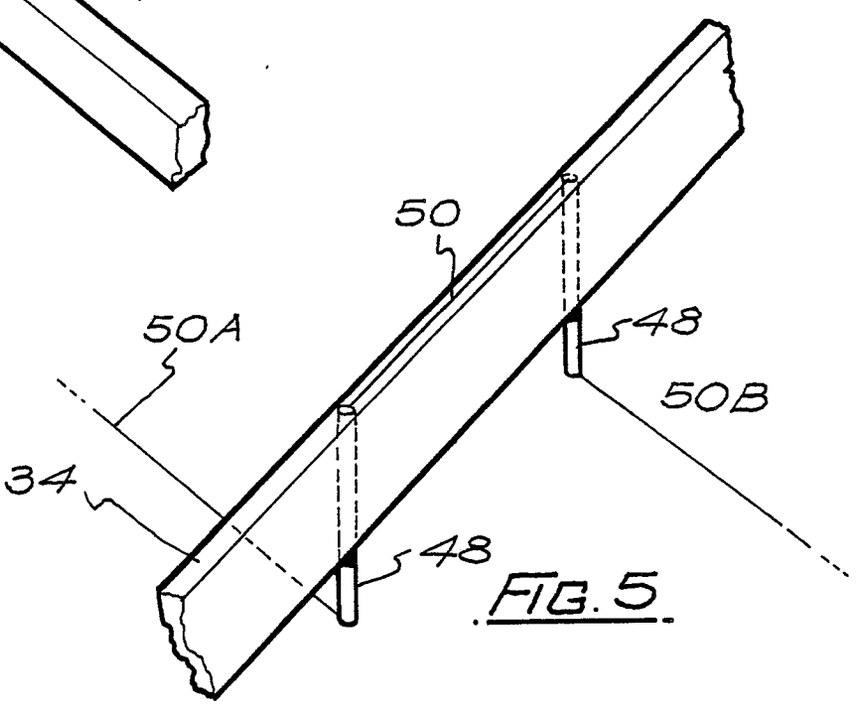


FIG. 5

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EUROPEAN SEARCH REPORT

Application Number

EP 89 10 4967

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-0 152 214 (THE MEAD CORP.) * Whole document *	1-4,8	B 26 D 7/18 B 26 F 3/00
A	US-A-4 573 384 (JONES) * Column 1, lines 27-48; figures 1-4 *	1-3	
A	DE-A-2 031 185 (SIMAUTICS)		
A	US-A-2 413 999 (SHANER)		
A	US-A-4 653 680 (REGAN)		

TECHNICAL FIELDS SEARCHED (Int. Cl.4)

B 26 D
B 65 H
B 31 B
B 26 F

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
THE HAGUE	31-05-1989	HUGGINS J.D.

CATEGORY OF CITED DOCUMENTS

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