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54 **Apparatus for making a contact lens.**

57 Apparatus for making a contact lens comprises a lens holder (3) mounted on a support (1), said support (1) being adjustable to position the lens in a desired orientation relative to a machining tool.

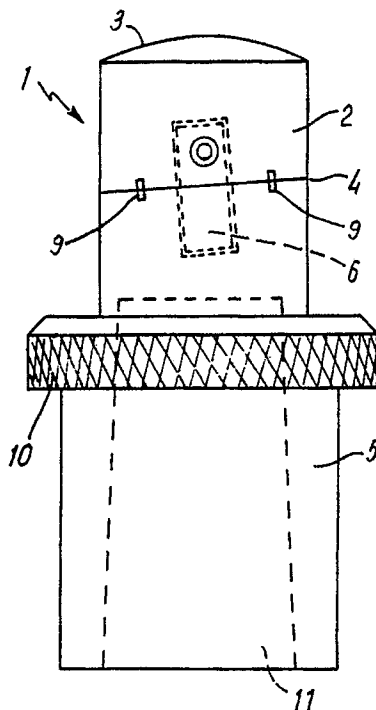


Fig. 1

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APPARATUS FOR MAKING A CONTACT LENS

This invention relates to apparatus for making a contact lens.

Contact lenses have an inner, polished, substantially concave surface for placement in contact with the eye and an outer, polished, substantially convex surface which is lathed differentially to the requirement of the wearer.

5 The outer surface of the lens is required to be lathed at different angles and in different positions for a number of reasons, including to correct the vision of the wearer to make torric or bifocal lenses, to thin down one area in order to keep the lens balanced in position on an eye, and/or to thin down the sides so that the lens is easier to locate.

10 Hitherto during preparation of the lens, the lens is mounted in a fixed position. The tools for shaping and polishing are respectively a movable lathe and a polishing head, both of which have to be adjustable to allow for alteration of the angle of lathing and polishing and to vary the part of the lens to be machined. By necessity, the lathing and polishing equipment for preparing the outer surface of the lens is expensive and the precision adjustment is time-consuming and delicate.

15 According to the present invention there is provided apparatus for making a contact lens, said apparatus comprising a lens holder mounted on a support, said support being adjustable to position the lens in a desired orientation relative to a machining tool.

Preferably, the lens holder is provided on a support which comprises a stem having an oblique sectional junction such that the stem is in two pieces each of asymmetrical height, one piece being rotatable on and in relation to the other.

20 The two pieces of the stem are interconnected and axially located to one another by a pin which is orthogonally arranged with respect to the oblique sectional junction; the pin defines the axis of rotation of one piece on the other.

Preferably, the stem pieces are a head and a base, the head bearing the lens holder and the base being fixed and provided with means for attachment to a lathe or a polishing tool.

25 Preferably, the pieces are rotationally located one to another by at least one and preferably two locating pins, allowing for selection of 90° or 180° rotation of the head on the base.

Preferably, the stem is selected from a number of alternative stems, each alternative stem having a differently angled oblique sectional junction, which as a consequence varies the asymmetry of the height of each piece of the stem.

30 Alternatively, the support on which the lens holder is mounted is in two complementary pieces, one upper piece, termed the "head", and one lower piece, termed the "base", the head being rotatable on the base about an axis transverse to the longitudinal axis of the base.

Preferably the upper surface of the head forms the lens holder and the lower portion of the head comprises a planar member extending away from said upper surface.

35 Preferably, the base has a complementary recess for receiving the planar member, said recess being a channel bounded by two walls. A pivoting pin is preferably provided to allow the planar member to rotate within the channel.

40 Preferably, the lower end of the planar member is arcuate to allow the member to pivot within the channel. A securing pin may be provided to bear upon and so fix the planar member in any required position.

Embodiments of the present invention will now be described, by way of example only, with reference to the following drawings, in which:

Fig. 1 is a first embodiment of a stem of apparatus for making a contact lens, said apparatus being in accordance with the present invention;

45 Fig. 2 is an exploded view of the stem of Fig. 1 without the dowel pin and locating pins;

Fig. 3 is a second embodiment of apparatus for making a contact lens;

Fig. 4 is a front sectional view of a third embodiment of apparatus for making a contact lens, with the head removed;

Fig. 5 is a side sectional view of the embodiment of Fig. 4;

50 Fig. 6 is a front view of the head of the apparatus of Fig. 4; and

Fig. 7a and 7b are side and underneath views respectively of the head of Fig. 6

Referring to the drawings, there is shown part of apparatus used for preparation of contact lenses, and in particular the preparation of the outer convex surface of such a lens (not shown).

The illustrated first embodiment (Fig. 1) comprises a stem 1 which is movable for attachment to lathe and polishing equipment, the head 2 of the stem 1 having a domed lens mount 3.

An oblique sectional junction 4 separates the head 2 from a base 5, the two pieces 2, 5 of the stem 1 being interconnected by a removable dowel pin 6, which interfits complementary cavities 7, 8 in the underside of the head 2 and in the uppermost surface of the base 5 and axially locates the two pieces 2, 5 in close apposition. The head 2 is rotatable in relation to the base 5 and user-located at selected 90° and 180° turns by means of locating pins 9. Alternatively, the locating pins 9 may be absent and the head 2 rotated to any position required.

The base 5 has a rough diamond knurl 10 for attachment to a lathe support (not shown) and a tapered inferior cavity 11 for alternative attachment to a polishing tool support (not shown).

In use, the curved back of a lens, which has already been polished, is placed onto the domed lens mount 3, the curvature of the domed lens mount 3 complementing that of the concave surface of the lens. The outer convex surface of the lens is then exposed to be worked upon by the lathe and, if differential thinning is required, or other fine adjustment, the head 2 of the stem 1 is rotated on the base 5, the rotation being either 90° or 180° if the pins 9 are used, depending on the requirement, the rotation resulting in an offsetting of the long axis of the head 2 from the long axis of the base 5 and the consequent offsetting of the lens at an oblique angle to the axis of the base 5.

The stem 1 is selected from a number of alternative stems, each alternative stem being dimensionally different having a differently angled oblique sectional junction, which in turn varies the asymmetry of the heights of each piece 2, 5 of the stem. This consequently provides a range of offset positions for the lens. There are preferably three stems provided, these varying in three particular dimensions A, B and C, shown in Fig. 2.

STEM SIZE	DIMENSIONS (millimetres)		
	"A"	"B"	"C"
1(2.0D)	0.279	23.121	7.77
2(4.0D)	0.482	22.918	7.98
3(6.0D)	0.685	22.715	8.18

To vary the angle of the lathing or polishing, the head 2 or the stem 1 is adjusted or the stem 1 replaced, rather- than the lathe being moved. Thus, stem adjustment and replacement is more readily undertaken and very precise, additional stems being more cost effective than the variable lathe.

A second embodiment of the present invention is shown in Fig. 3, in which similar parts are labelled as in Fig. 1 plus 200 i.e. 1 becomes 201.

In this second embodiment, the base 205 is wider than the head 202 and the locating pins 9 are absent. The base 208 thus gives a solid support. The other features are similar to that of the first embodiment, except that the dowel pin 206 is held in position using a screw in the base 205 rather than in the head 202.

A third embodiment of the present invention is shown in Figs. 4 to 7b, in which similar parts are labelled as in Fig. 1 plus 300 i.e. 1 becomes 301.

In this third embodiment, a base 305 with a longitudinal axis, comprises three parts: a cylindrical lower part with a tapered interior cavity 311, a frusto-conical middle part 12 and an upper cylinder 13, placed about the longitudinal axis, which is shaped to define a top surface 14. The surface 14 is part cylindrical about an axis transverse to the longitudinal axis of the base 305. The cylinder 13 and frusto-conical part 12 are recessed along their longitudinal axis to form a channel 15 bounded by two walls 16.

The upper surface of the head 302 forms the lens mount 303 and the lower portion of the head 302 comprises a planar member 17 extending away from said upper surface. The planar member 17 fits within the channel 15. The underside 18 of the upper surface of the head 302 is curved to match the curve of the top surface 14, and so to allow movement against the curved top surface 14, and the underside 18b of the planar member is arcuate to allow pivotal movement within the channel 15. Such movement thus presents the lens mount 303 to the instruments at a variety of angles.

A recess 19 for a screw-threaded bolt (not shown) is provided in the frusto-conical part 12, the bolt being used to bear against the planar member 17 within the channel 15. The head 302 also has a recess for a pivot pin. Thus, this embodiment of the present invention is used by placing the planar member 17 within the channel 15, running the pivot pin through the recess 20 of the head 302 and angling the head 302 upon the base 305 as desired, using the bolt to secure it in position.

Suitable dimensions for the third embodiment are as follows;

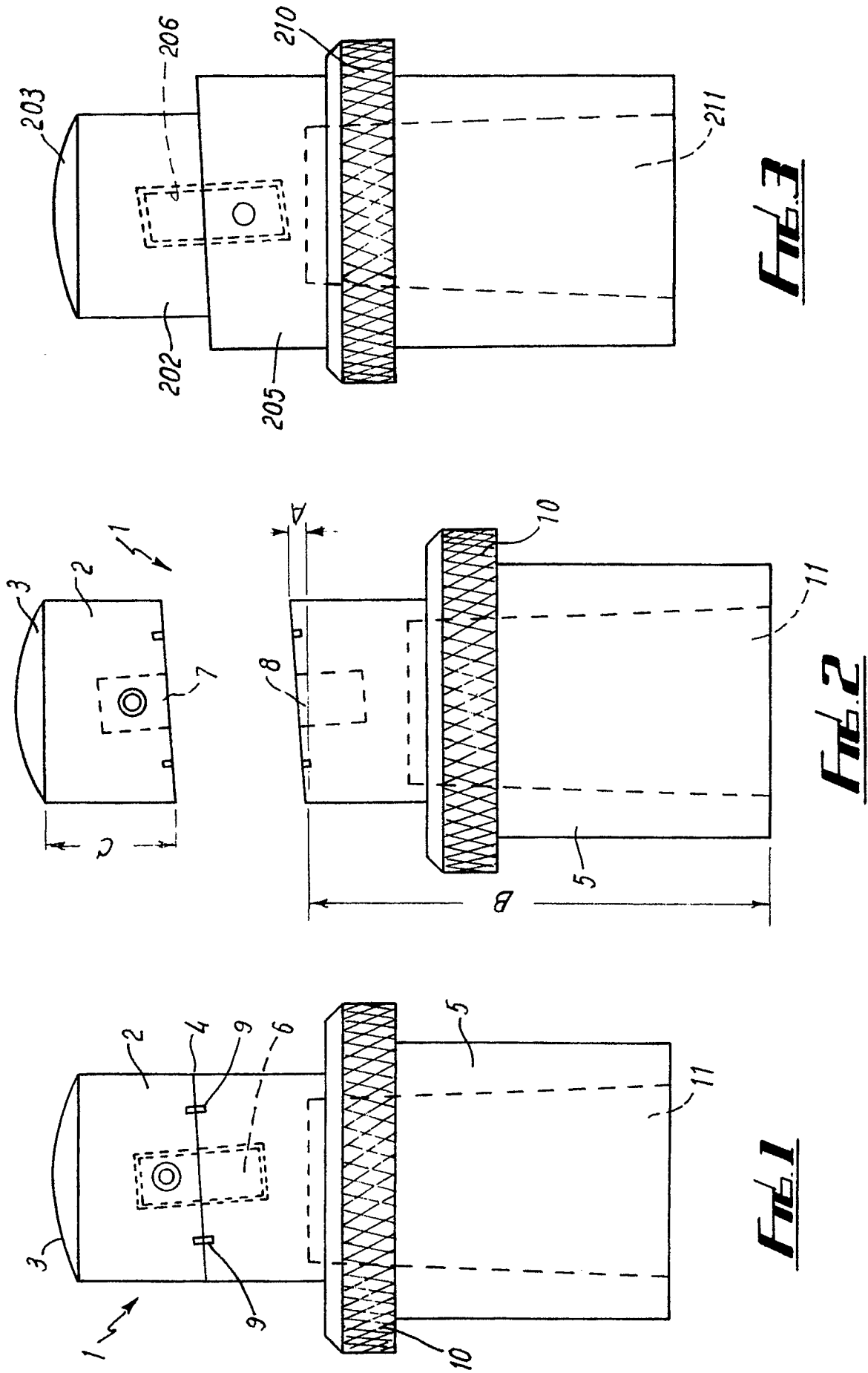
		(millimetres)
5	Diameter of cylindrical lower part	12.70
	Diameter of base of frustro-conical part	16.00
	Height of channel	13.50
	Width of channel	3.50
	Width of top surface	9.00
10	Height from centre of locating pin to centre of recess for bolt	6.00
	Height from centre of recess to base of knurl	12.50
	Radius of top surface	4.50
	Width of planar member	3.25
	Spherical radius of support surface	8.00
15	Diameter of support surface	9.00

The present invention thus provides simple yet accurate apparatus for positioning a lens whilst producing a bifocal, prismatic or torric lens.

Modifications and improvements may be incorporated without departing from the scope of the invention.

Claims

- 1 Apparatus for making a contact lens, said apparatus comprising a lens holder mounted on a support, said support being adjustable to position the lens in a desired orientation relative to a machining tool.
- 2 Apparatus as claimed in Claim 1, wherein the support comprises a stem having an oblique sectional junction such that the stem is in two pieces each of asymmetrical height, one piece being rotatable on and in relation to the other.
- 3 Apparatus as claimed in Claim 2, wherein the two pieces of the stem are interconnected and axially located to one another by a pin which is orthogonally arranged with respect to the oblique sectional junction; the pin defining the axis of rotation of one piece on the other.
- 4 Apparatus as claimed in Claim 3, wherein the stem pieces are a head and a base, the head bearing the curved surface and the base being fixed and provided with means for attachment to the support of a lathe and/or of a polishing tool.
- 5 Apparatus as claimed in Claim 4, wherein the pieces are rotationally located one to another by at least one locating pin.
- 6 Apparatus as claimed in any of Claims 2 to 5, wherein the stem is selected from a number of alternative stems, each alternative stem having a differently angled oblique sectional junction, which as a consequence varies the asymmetry of the height of each piece of the stem.
- 7 Apparatus as claimed in Claim 1, wherein the support on which the lens holder is mounted is in two complementary pieces, one upper piece termed the "head" and one lower piece termed the "base", the head being rotatable on the base about an axis transverse to the longitudinal axis of the base.
- 8 Apparatus as claimed in Claim 7, wherein the upper surface of the head forms the lens holder and the lower portion of the head comprises a planar member extending away from said upper surface.
- 9 Apparatus as claimed in Claim 8, wherein the base has a complementary recess for receiving the planar member.
- 10 Apparatus as claimed in Claim 9 wherein said recess is a channel bounded by two walls.
- 11 Apparatus as claimed in Claim 11, wherein a pivot pin is provided to allow the planar member to pivot within the channel.
- 12 Apparatus as claimed in Claim 11, wherein a securing pin is provided to bear upon and so fix the planar member in any required position.



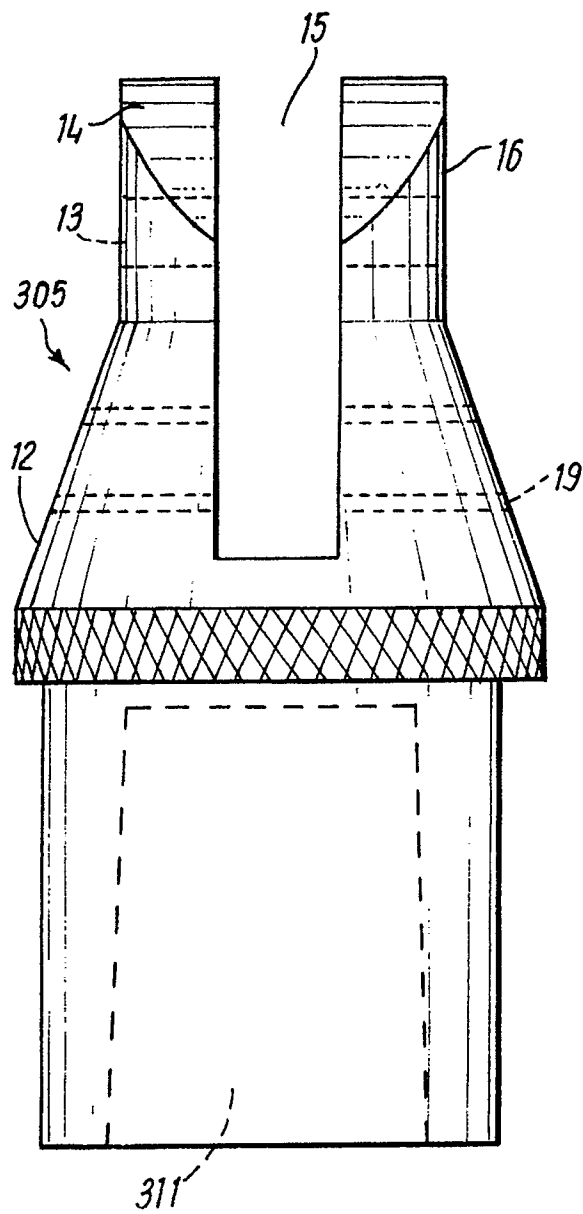


FIG. 4

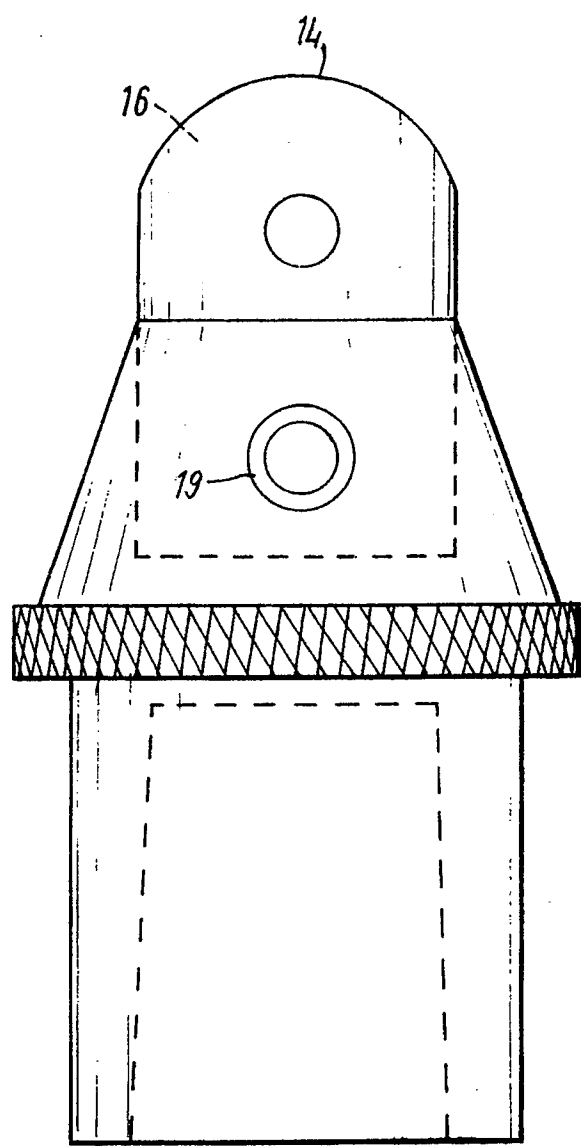


FIG. 5

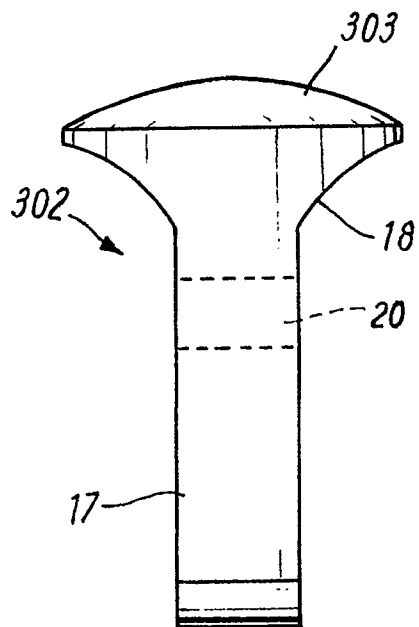


Fig. 6

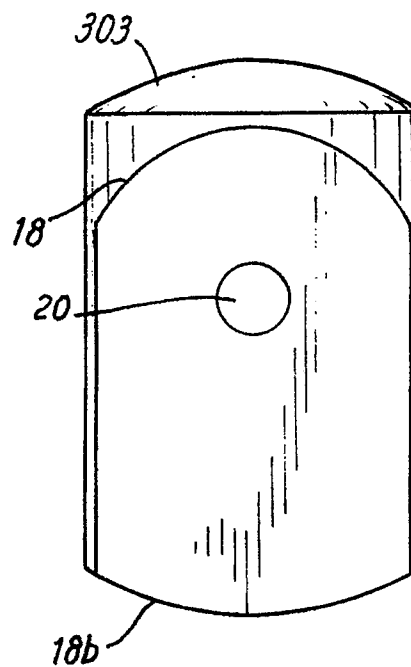


Fig. 7a

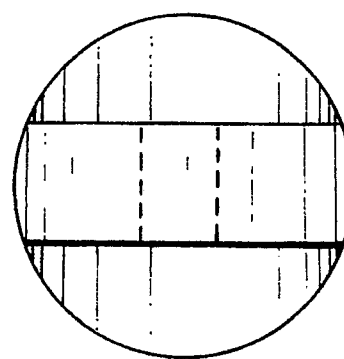


Fig. 7b



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EUROPEAN SEARCH REPORT

Application Number

DOCUMENTS CONSIDERED TO BE RELEVANT			EP 90308330.1
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int. Cl.5)
X	<u>FR - A1 - 2 253 605</u> (TEXTRON) * Fig. 7,8 *	1,2,3, 4,5	B 24 B 13/005
X	<u>US - A - 1 436 626</u> (SPAANDER) * Fig. 2 *	1	
A		2,3,4, 5,7,8, 9,10, 11,12	
X	<u>US - A - 1 274 591</u> (QUIMBY) * Fig. 2 *	1	
A		2,3,4, 5,6	
X	<u>GB - A - 714 033</u> (ANGENIEUX) * Totality *	1	
A		7,8,9, 10,11, 12	TECHNICAL FIELDS SEARCHED (Int. Cl.5) B 24 B G 02 C
The present search report has been drawn up for all claims			
Place of search VIENNA		Date of completion of the search 12-11-1990	Examiner GLAUNACH
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			