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GB 0576582 A

(58) Field of Search
UK CL (Edition R) **E2A AAK ACAQ AMXE AMXJ**
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Online EPODOC JAPIO WPI

(54) Abstract Title
Latch mechanism for a door or window

(57) A latch mechanism for a hinged wing comprises a casing (10, Fig 8) defining a pivot axis 21, a bolt 22 pivotable about said axis, said bolt having a substantially radially extending projection 23 at the radial end thereof, and a cam plate 24 defining a cam track (28, Fig 7) engageable with said projection, where movement of the cam plate in the direction of the pivot axis results in pivoting of said bolt about said pivot axis. The cam track may be operable to move the bolt from an advanced to a withdrawn position only, while the bolt may be resiliently returned to the advanced condition by means of a hairpin spring 25 located at the pivot axis and having arms bearing one each on the bolt and the casing.

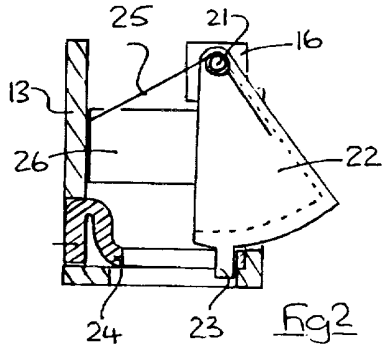

Fig2

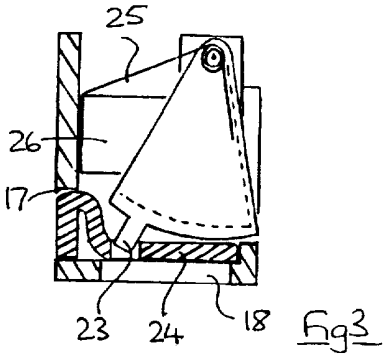

Fig3

The claims were filed later than the filing date but within the period prescribed by Rule 25(1) of the Patents Rules 1995.

At least one drawing originally filed was informal and the print reproduced here is taken from a later filed formal copy.

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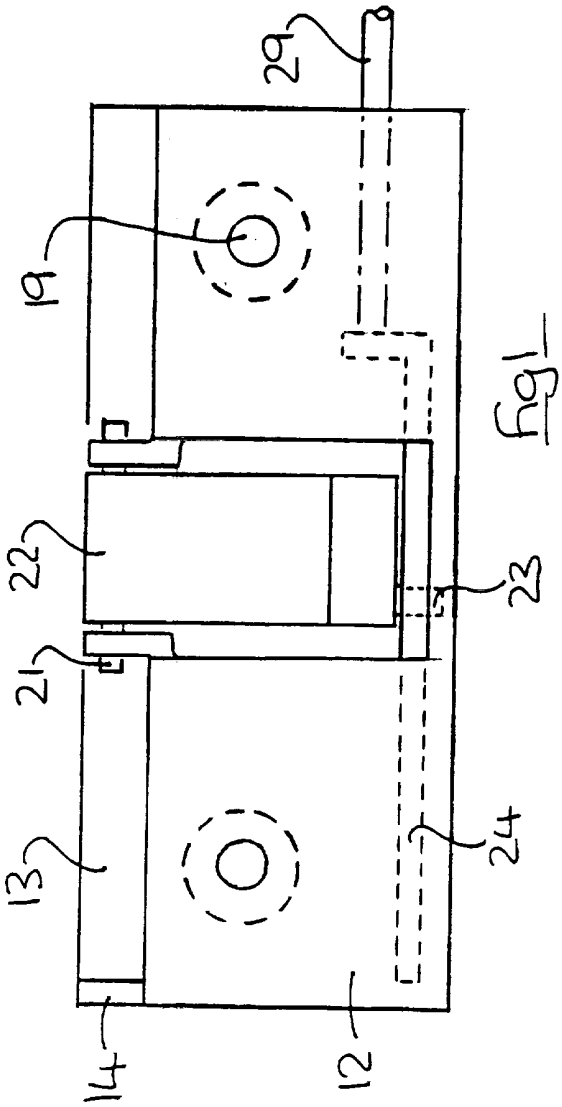

Fig1

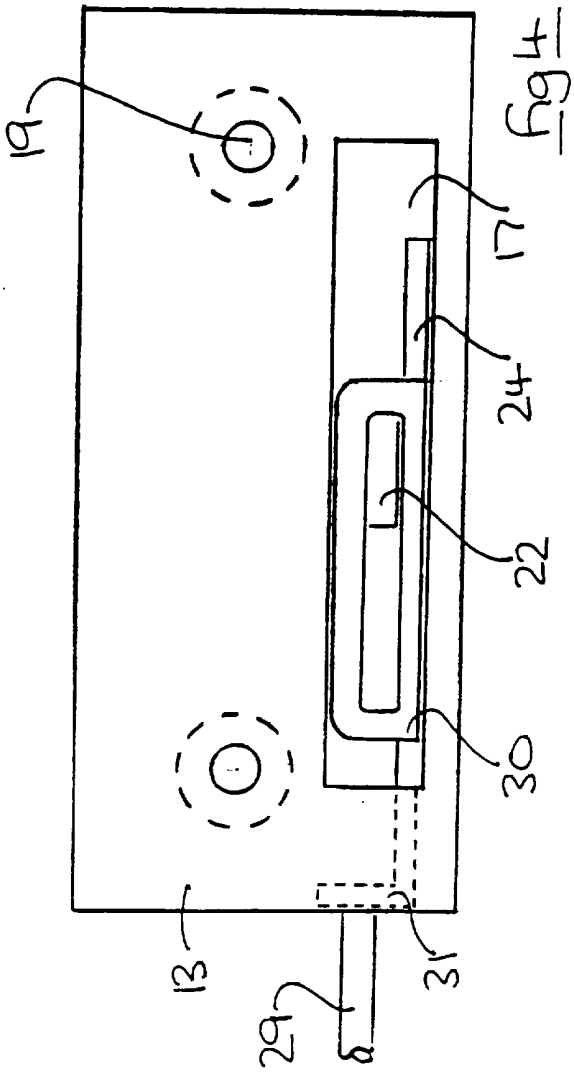

Fig4

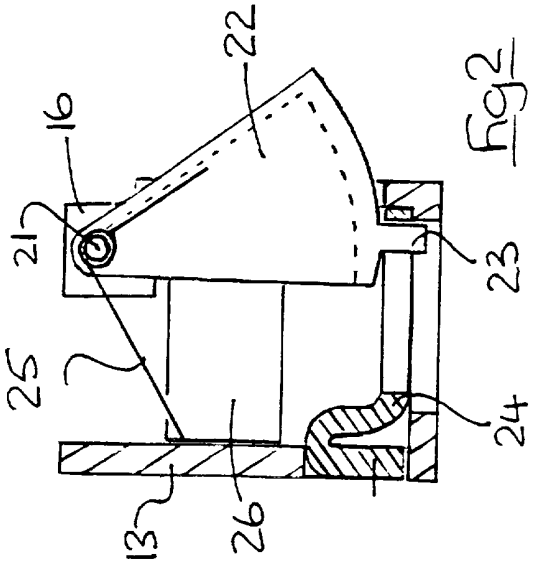

Fig2

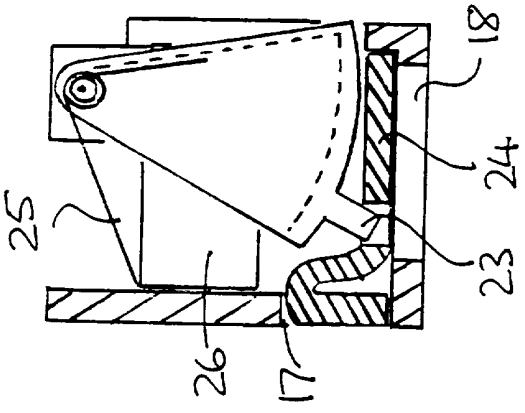

Fig3

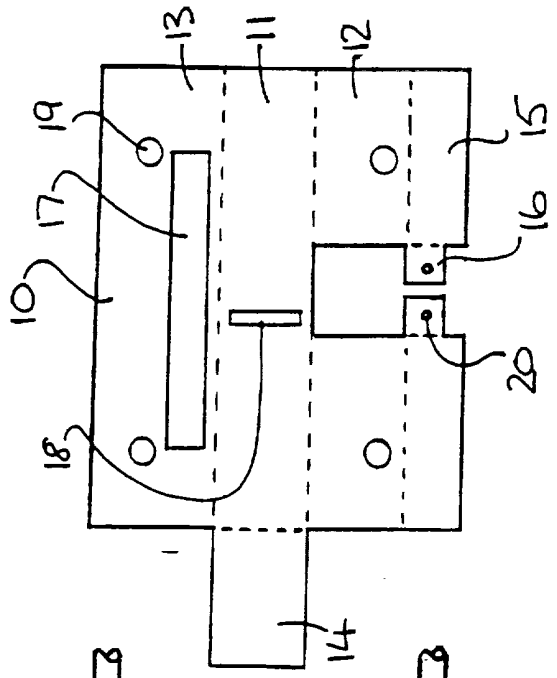

Fig 8

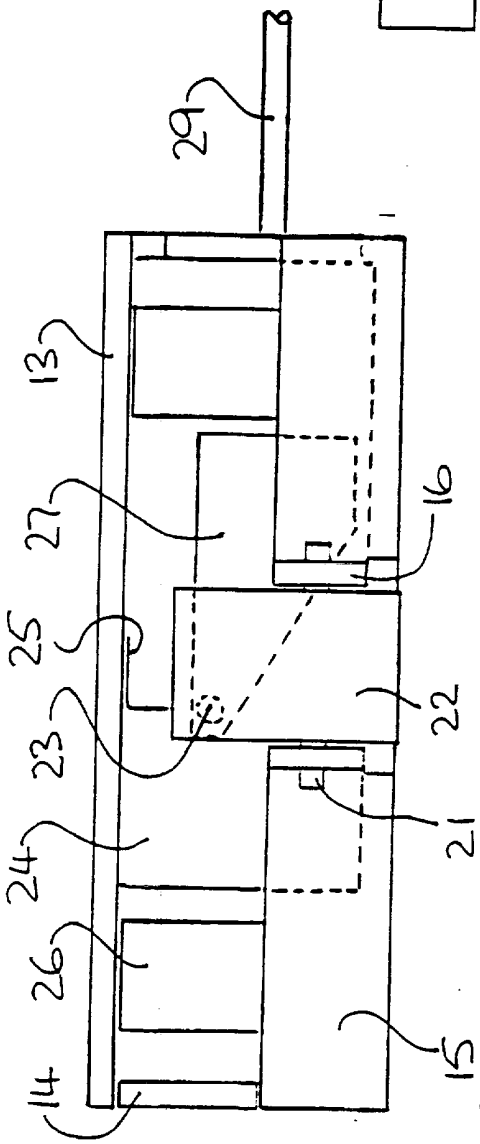

Fig 5

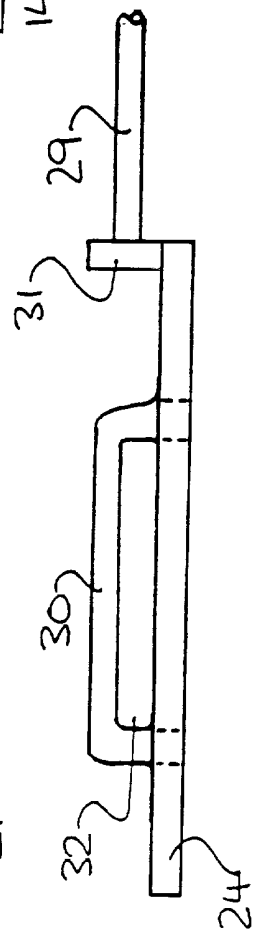

Fig 6

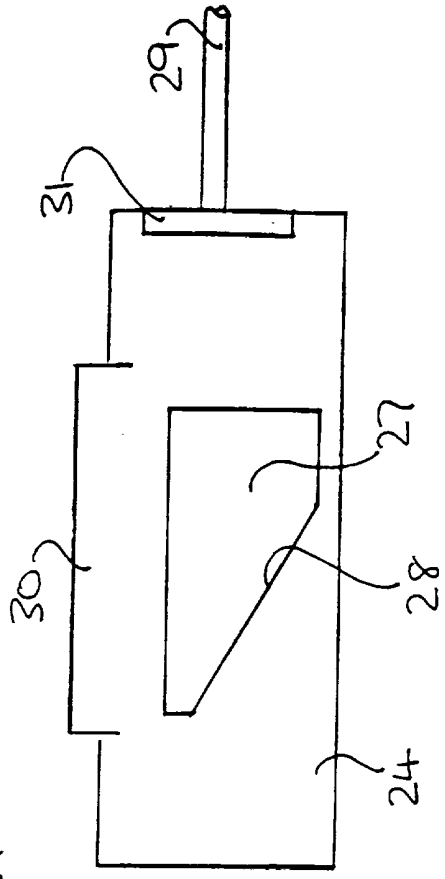

Fig 7

DOOR AND WINDOW LATCH

This invention relates to furniture for doors, windows and the like, and particularly to a bolt for securing a hinged leaf.

Emergency doors of buildings usually have a horizontal bar at mid height on the inner face, and which can be pushed towards the door to release the door latch. Such doors open outwards.

In order to improve stability and security emergency doors may have bolts extending vertically to engage the horizontal (top) limb of the door frame, and the ground. These bolts are withdrawn simultaneously as the door latch is released.

Vertical bolts can be somewhat inconvenient since a socket is required at ground level. This socket must be formed in-situ, and frequently in very hard material such as concrete.

A better solution provides top and bottom door latches which engage an upright limb of the frame. Such latches are located close to the top and bottom edges of the door and are actuated by vertically extending pull rods which are similar to the vertical bolts described above. One problem with this solution is that a means is required for converting vertical motion of the pull rods into horizontal motion of the latching bolt. Prior solutions are complex, frequently relying on mechanisms incorporating gear teeth.

What is required is a simple low cost latch which can withstand the high forces often imposed on emergency doors, yet is reliable and strong. Such a latch should be adaptable for use in any installation where a right angle release mechanism is required, and be capable of receiving a variety of finishes to suit interior decor and other door and window furniture.

According to the invention, there is provided a latch mechanism for a hinged leaf of a door, window or the like, the mechanism comprising a casing defining a pivot axis, and having a bolt pivotable about said axis, the bolt having a substantially radially extending projection

at the radial extremity thereof, and the mechanism further including a cam plate defining a cam track engageable with said projection, whereby movement of said cam plate in the direction of said pivot axis results in pivoting of said bolt about said pivot axis.

Such a mechanism has a low cost of production since the cam plate and casing can be formed of e.g. phosphated mild steel plate. The design of the bolt is a function of latches in general, and the invention merely requires the addition of a projection, which can be incorporated in the usual die casting.

Preferably the cam track is operable to move the bolt from an advanced to a withdrawn condition only, and the bolt is resiliently returned to the advanced condition. This construction is especially suitable for slam-type doors where independent movement of the bolt is necessary.

The bolt is preferably resiliently returned by a hairpin spring located at the pivot axis and having arms bearing one each on the bolt and the casing.

In a preferred embodiment the casing comprises a flat base plate against which the cam plate slides, and an upstanding front wall in which the bolt is pivoted. The base plate may also include an upstanding rear wall to define a generally 'U' shaped casing in which the bolt is accommodated in the withdrawn condition. The hairpin spring preferably bears on this rear wall.

The rear wall may include a window adjacent the base thereof, and in which the cam plate is adapted to slide, the upper window edge preventing upward movement of the cam plate. Preferably the cam plate comprises a planar portion defining said cam track, and an upright portion extending perpendicular to said planar portion, the upright portion being slidable in said window in the direction of the pivot axis. The upright portion preferably terminates adjacent said base plate.

Fixing apertures may be provided in said front wall. If a rear wall is provided corresponding fixing apertures may be provided therein. Preferably spacers are provided

between the front and rear walls to resist crushing loads. In the preferred embodiment these spacers are hollow cylinders, and located about said fixing holes.

The casing may include one or two end walls to improve rigidity thereof; the end walls may be folded from a sheet metal blank defining said casing.

The cam plate is connected to an operating rod or lever in any suitable manner, access thereto being via the open end of the casing in the direction of the pivot axis, or through an aperture in an end wall thereof.

Other features of the invention will be apparent from the following description of a preferred embodiment shown by way of example only in the accompanying drawings in which:

Figure 1 is a front elevation of a latch according to the invention;

Figure 2 is a cross-sectional view on line 2-2 of Fig. 1 and showing the bolt in the advanced condition;

Figure 3 corresponds to Fig. 2 and shows the bolt in a withdrawn condition;

Figure 4 is a rear elevation corresponding to Fig. 3;

Figure 5 is a plan corresponding to Fig. 3;

Figure 6 is a side elevation of the cam plate of the invention;

Figure 7 is a plan corresponding to Fig. 6; and

Figure 8 is a plan of a casing blank on a reduced scale.

The drawings accompanying this specification are schematic, and some features and clearances have been enlarged to enhance clarity.

Figure 8 illustrates a sheet metal blank adapted to form the casing 10 of a latch according to the invention. The blank comprises a base 11, front wall 12, rear wall 13, end wall 14, support walls 15 and pivot pin walls 16; fold lines are indicated by dashes. The blank includes a number of openings comprising a slide aperture 17, clearance slot 18, fixing holes 19 and pivot pin holes 20.

Figures 1 and 2 illustrate the casing 10 in a folded-up condition, and having an approximately rectangular section.

The support walls 15 are bent inwards at right angles and the pivot pin walls 16 bent upwards (as viewed) to support the pivot pin 21 of a bolt 22. The pin 21 may be of any suitable type, and be secured in any suitable manner, for example by friction fit in the pivot pin holes 20. The end wall 14 is optional, and if included may be pegged or otherwise fixed to the front and rear walls to improve strength and rigidity of the casing 10.

As illustrated the bolt 22 is approximately the shape of a sector of a circle and has a cylindrical projection 23 at the outer circumferential face thereof. This projection 23 engages a cam plate 24 (to be described), and the base 11 includes a clearance slot 18 to allow free pivoting of the bolt 22. With suitable attention to geometry it may be possible to foreshorten the projection 23, thereby eliminating the need for the clearance slot 18. The slot 18 may however be useful in providing additional lateral stability for the bolt 22.

The bolt 22 is hollow on the inside face to reduce material content. A hairpin return spring 25 is located about the pivot pin 21, and the arms of the spring bear on the hollow face of the bolt and on the rear wall 13, as illustrated, to urge the bolt outwards of the casing 10.

Loose cylindrical spacers 26 extend between the front and rear walls 12,13 to improve rigidity and prevent crushing when fixing screws are passed through the fixing holes 19.

A cam plate 24 is slidable in the bottom of the casing 10 against the inner face of the base 11. An aperture 27 defines a cam face 28 for engagement with the projection 23, and it

will be apparent that endwise movement of the cam plate 24 causes pivoting of the bolt 22 from the position illustrated in Figure 2 to that illustrated in Figure 3.

A pull rod 29 is attached to an upturned end 31 of the cam plate 24 by any suitable method, for example screw-threading, and thus the motion of the pull rod is turned through a right angle for movement of the bolt.

Return motion of the bolt and cam plate is by action of the hairpin spring 25. However it will be apparent that positive return of the bolt could be effected by a second cam face of the cam plate 24. Such a positive return is not suitable for a slam door, where inward movement of the bolt independent of the cam plate is required. It may however be useful in other kinds of installations, such as latches of windows or non-slam doors.

The casing 10 is somewhat slim, and in order to improve stability the rear edge 30 of the cam plate is bent into an inverted 'U' shape as best illustrated in Figures 2-4. This rear edge 30 slides in the slide aperture 17, and prevents upward movement of the cam plate 24 (as viewed); the front edge of the cam plate is located below the bolt 22, and thus trapped against upward movement. The rear edge 30 has a slot 32 to aid bending thereof.

It will be appreciated that, as illustrated, the only handed parts of the assembly are the cam plate 24 and the end wall 14. As explained above, the end wall can be omitted, and a universal cam plate having an upturned end 31 at either end, and a mirror cam track would make the assembly fully reversible.

The projection 23 serves the purpose of providing a means of moving the bolt, and is also located at the maximum radius from the axis of the pivot pin, thus requiring only a low operational force. Furthermore the projection also serves to limit outward movement of the bolt under the action of the spring 25, making a separate stop unnecessary.

The cam plate 24 and casing 10 are simple pressings of e.g. phosphated mild steel. The pivot pin 21 and spacers 26 can be cropped from bar stock, and the bolt 22 is conventional. The assembly is thus of very inexpensive construction.

A simple cover in the form of an inverted trough can be placed over the assembly for decorative purposes, and this requires only apertures for the bolt 22 and for the pull rod 29. Such a cover can be made of any suitable material to suit the interior decor and other door furniture, for example a self coloured plastic moulding, or a painted or plated aluminium die casting.

Claims

1. A latch mechanism for a hinged leaf of a door, window or the like, the mechanism comprising a casing defining a pivot axis, and having a bolt pivotable about said axis, the bolt having a substantially radially extending projection at the radial extremity thereof, and the mechanism further including a cam plate defining a cam track engageable with said projection, whereby movement of said cam plate in the direction of said pivot axis results in pivoting of said bolt about said pivot axis.

2. A latch mechanism as claimed in claim 1, wherein the cam track is operable to move the bolt from an advanced to a withdrawn condition only.

3. A latch mechanism as claimed in claim 2, including a spring to return said bolt from said withdrawn condition to said advanced condition.

4. A latch mechanism as claimed in any preceding claim, wherein the casing comprises a flat base plate against which the cam plate slides, and an upstanding front wall in which the bolt is pivoted.

5. A latch mechanism as claimed in claim 4, wherein the base plate includes an upstanding rear wall to define a generally 'U' shaped casing in which the bolt is accommodated in the withdrawn condition.

6. A latch mechanism as claimed in claim 5, wherein the spring is a hairpin spring located at the pivot axis and having arms bearing one each on the bolt and the casing.

7. A latch mechanism as claimed in claim 6, wherein the hairpin spring bears on said upstanding rear wall.

8. A latch mechanism as claimed in any of claims 5 to 7, wherein the rear wall includes a window adjacent the base thereof, and in which the cam plate is adapted to slide, the upper window edge preventing upward movement of the cam plate.

9. A latch mechanism as claimed in claim 8, wherein the cam plate comprises a planar portion defining said cam track, and an upright portion extending perpendicular to said planar portion, the upright portion being slidable in said window in the direction of the pivot axis.

10. A latch mechanism as claimed in claim 9, wherein the upright portion terminates adjacent said base plate.

11. A latch mechanism as claimed in any of claims 5 to 10, wherein front fixing apertures are provided in said front wall.

12. A latch mechanism as claimed in any of claims 5 to 11, wherein rear fixing apertures are provided in said rear wall.

13. A latch mechanism as claimed in any of claims 5 to 12, wherein spacers are provided between the front and rear walls to resist crushing loads therebetween.

14. A latch mechanism as claimed in claim 13, wherein the spacers are hollow cylinders.

15. A latch mechanism as claimed in claim 13 when dependent upon claims 11 and 12, wherein the spacers are hollow cylinders, said front and rear fixing apertures are aligned, and said spacers are located about said fixing apertures.

16. A latch mechanism as claimed in any preceding claim, wherein the casing includes an end wall to improve the rigidity thereof.

17. A latch mechanism as claimed in claim 16, wherein the end wall is folded from a sheet metal blank defining said casing.

18. A latch mechanism as claimed in any preceding claim, wherein the cam plate is adapted for connection to an operating rod.

19. A latch mechanism as claimed in any of claims 1 to 7, wherein the cam plate is adapted for connection to an operating lever.

20. A latch mechanism as claimed in claim 18 or claim 19, wherein the operating rod or lever extends through an open end of the casing in the direction of the pivot axis.

21. A latch mechanism as claimed in claim 18 or claim 19, wherein the operating rod or lever extends through an aperture in an end wall of the casing.

22. A latch mechanism substantially as thereinbefore described with reference to or as shown in the accompanying drawings.

Application No:	GB 9914933.8	**Examiner:**	Richard Collins
Claims searched:	1 to 22	**Date of search:**	8 November 2000

Patents Act 1977
Search Report under Section 17

Databases searched:

UK Patent Office collections, including GB, EP, WO & US patent specifications, in:

UK Cl (Ed.R): E2A AAK(A), ACAQ(A), AMXE(A), AMXJ(A).

Int Cl (Ed.7): E05C 3/16.

Other: Online EPODOC, JAPIO, WPI.

Documents considered to be relevant:

Category	Identity of document and relevant passage	Relevant to claims
X	GB 0576582 A (WILMOT-BREEDEN) see figures 1 and 2 and related description.	1-3,18,19

X	Document indicating lack of novelty or inventive step	A	Document indicating technological background and/or state of the art.
Y	Document indicating lack of inventive step if combined with one or more other documents of same category.	P	Document published on or after the declared priority date but before the filing date of this invention.
&	Member of the same patent family	E	Patent document published on or after, but with priority date earlier than, the filing date of this application.