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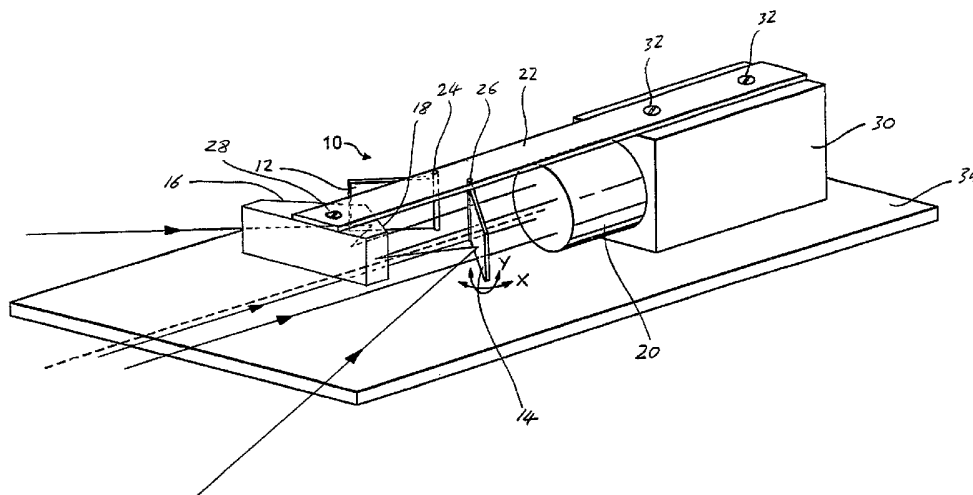
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(54) Title: IMPROVEMENTS IN OR RELATING TO SURVEILLANCE EQUIPMENT



(57) Abstract: The present invention provides viewing attachment for a camera apparatus, said camera apparatus having a field of view about a viewing axis, the attachment comprising a viewing means arranged to permit the camera apparatus to observe a first image lying inside of said camera field of view, and to direct into a portion of said field of view a second image lying in a further field of view outside of said camera field of view, said further field of view being about a further viewing axis angled to said camera viewing axis, wherein the viewing means includes a primary reflective surface positioned outside of the camera field of view and a secondary reflective surface positioned within the camera field of view, such that said camera is able to view said second image via said reflective surfaces at the same time as viewing the first image.

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Improvements In or Relating to Surveillance Equipment

The present invention relates to improvements in or relating to surveillance equipment and in particular, although not exclusively, to a multi view closed circuit television camera.

It is known to provide closed circuit television cameras for security purposes. Such cameras may be provided on premises or in the street to help prevent crime or to assist in the general security of buildings or areas. Information captured on video may be used as evidence in court and in this capacity the cameras provide a deterrent to criminals and may help to prevent crime.

It is further known to provide security cameras on motorways and at traffic signals. In this capacity the cameras may provide vital information about traffic flow or traffic incidents. The cameras may also help in determining fault in traffic accidents.

One of the main disadvantages of the prior art security cameras is that they can only see in the direction they are pointing and within the field of view afforded by the lens fitted to the camera. Sophisticated motor drives may be used to point the camera in a different direction but the cameras still only have one field of view. Such cameras are complex pieces of equipment and are expensive to purchase and install. The complexity of such heavy duty motor drives increasing the cost further. To provide adequate security camera coverage over a selected area many cameras are often required which can further increase the cost.

According to a first aspect of the invention there is provided a viewing attachment for a camera apparatus, said camera apparatus having a field of view about a viewing axis, the attachment comprising a viewing means arranged to permit the camera apparatus to observe a first image lying inside of said field of view, and to direct into a portion of said field of view a second image lying in a further field of view outside of said field of view, said further field of view being about a further viewing axis angled to said camera

viewing axis, wherein the viewing means includes a primary reflecting surface positioned outside of the field of view of the camera and a secondary reflective surface positioned within the field of view of the camera, said camera operable to view said second image via said reflective surfaces.

An attachment so arranged can provide a single lens camera apparatus with the capability of viewing outside the ordinary field of view of the lens. The attachment thus enables the camera to have a primary field of view afforded by the camera lens, and a secondary, supplementary field of view afforded by the viewing means. The provision of primary and secondary reflective surfaces ensures that the second image is not observed by the camera in a reversed manner with respect to the first image. The primary field of view being substantially about the normal of the lens and the supplementary field of view being substantially about an axis at an angle to the normal. This provides the advantage that the axis of the supplementary field of view and the normal are not parallel to provide the camera apparatus with enhanced viewing ability. The attachment can be retrofitted to an existing camera apparatus which improves the functionality of the camera apparatus. Consequently a camera provided with an attachment according to the present invention is provided with an enhanced field of view. Accordingly fewer cameras may be required to provide a given field of view. This has the advantage of reducing the cost of providing adequate security coverage.

The attachment includes a member attachable to a camera apparatus so as to lie substantially parallel to a lens of the camera apparatus, the member carrying a first bracket to which the primary reflective surface is mounted, and a second bracket to which the secondary reflective surface is mounted. Preferably both the first and second brackets are movably mounted to the member. In a preferred embodiment an intermediate bracket is provided between the first bracket and the primary reflective surface.

According to a second aspect of the invention there is provided a camera apparatus having a field of view about a viewing axis, the camera apparatus further including a viewing means operable to permit the camera apparatus to observe a first image lying

inside of said field of view, and to direct into a portion of said field of view a second image lying in a further field of view outside of said field of view, said further field of view being about a further viewing axis angled to said camera axis, wherein the viewing means includes a primary reflective surface and a secondary reflective surface, said camera operable to view said second image via said reflective surfaces.

A camera apparatus so provided incorporates the viewing means into the body of the camera device. In an alternative embodiment the viewing means may be incorporated into a protective housing which contains the camera. Such housings are typically provided so as to provide the camera with protection against weather factors such as rain.

The camera apparatus may be of any suitable type. Preferably the camera apparatus is operable to relay a moving image. The camera apparatus may be of the type commonly referred to a close circuit television or CCTV camera. The camera apparatus may be a digital camera or a webcam device.

The reflective surfaces may be any suitably polished surface such as for example metal, glass, plastic, ceramic material or combination thereof forming a mirror. The reflective surface may be supported upon an appropriate substrate or backing.

The viewing means may be provided with a plurality of primary and secondary reflective surfaces. Said primary and secondary reflective surfaces may be arranged in any suitable configuration. In a preferred embodiment the viewing means comprise two primary and secondary reflective surfaces. The secondary reflective surfaces may be provided on a common body. The primary reflective surfaces are preferably spaced from one another having a gap therebetween. The gap provides the useful function of allowing the camera to observe within the field of view of the lens. The or each reflective surface may preferably be planar.

In an alternative embodiment the viewing means are adapted to conduct an image therethrough. Such a viewing means may comprise, for example, a prism or an optic fibre.

Preferably the or each primary reflective surface is movable relative to the camera apparatus. Such movement may be in any direction including, for example, towards and away from the camera apparatus, and up and down relative to the camera apparatus. Such movement may also enable the plane of the primary reflective surface to be adjusted relative to the camera apparatus and in a preferred embodiment the plane is adjustable by means of a pivot provided at one edge of the or each reflective surface. The or each primary reflective surface may alternatively be pivotable about one or more axes passing through the body or bodies thereof. Pivoting may thus be enabled in the vertical or horizontal direction or in both directions.

The movement of the or each primary reflective surface may be performed by hand. In an alternative embodiment the primary reflective surface may be movable by the provision of one or more motors. The motors may be of any appropriate type. This has the advantage that only the primary reflective surfaces are required to be motorised instead of the whole of the camera to enable viewing in different directions.

The or each secondary reflective surface may have a fixed orientation relative to the camera apparatus. In the case of more than one secondary reflective surface each secondary reflective surface is mounted on a common body, the common body being in spaced relation relative to the camera apparatus. The or each secondary reflective surface may be movable to a position out of the field of view of the camera lens. In such an embodiment the or each secondary reflective surface may be pivotably mounted so as to be movable out of the field of view of the camera lens.

The distances of each secondary reflective surface relative to the camera apparatus may be adjustable. Such adjustment may be achieved by hand or by the provision of one or more motors.

Preferably the viewing means can be moved out of the field of view of the camera apparatus. This provides the advantage that the whole normal field of view of the camera can be utilised uninterrupted if required. This may for example be useful when an incident is observed using the viewing means and then the camera apparatus is moved to view the incident with the whole field of view with the viewing means moved out of the field of view of the camera apparatus.

According to a third aspect of the invention there is provided a viewing attachment for an optical sensor, said optical sensor having a field of view about a viewing axis, the attachment comprising a viewing means operable to permit the optical sensor to observe a first image lying inside of said field of view, and to direct into a portion of said field of view a second image lying in a further field of view outside of said field of view, said further field of view being about a further viewing axis angled to said optical sensor viewing axis, wherein the viewing means includes a primary reflective surface and a second reflective surface, said optical sensor operable to view said second image via said reflective surfaces.

According to a fourth aspect of the invention there is provided an optical sensor apparatus having a field of view about a viewing axis, the optical sensor apparatus further including a viewing means operable to permit the optical sensor apparatus to observe a first image lying inside of said field of view, and to direct into a portion of said field of view a second image lying in a further field of view outside of said field of view, said further field of view being about a further viewing axis angled to said optical sensor viewing axis, wherein the viewing means includes a primary reflective surface and a second reflective surface, said optical sensor operable to view said second image via said reflective surfaces.

The optical sensor may be configured to detect the presence or absence of light impinging thereon. The sensor may be operable to detect changes in the intensity of light impinging thereupon. The sensor may be configured to detect light within the visible spectrum and additionally may detect infra red and ultraviolet radiation. The

sensor apparatus and attachment of the third and fourth embodiments may include an illumination means operable to transmit electromagnetic energy along the viewing axes.

It will be understood that the additional features of the first and second aspects are equally applicable to the third and fourth aspects of the present invention.

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 1a shows a perspective view of a closed circuit television camera attachment according to the present invention;

Figure 1b shows a diagrammatic representation of a television screen for a closed circuit television camera fitted with the attachment of figure 1a;

Figure 2 shows a perspective view of an attachment according to the present invention with a motor drive;

Figure 3 shows a perspective view of an alternative embodiment to the attachment of figure 1a;

Figure 4 shows a perspective view of a further embodiment of an attachment according to the present invention;

Figures 5a and 5b show simplified side views of the attachment of figure 4; and

Figures 6a, 6b and 6c show views which may be observed with the attachment of figures 4, 5a and 5b.

Referring firstly to Figure 1a there is shown an attachment for a closed circuit television camera in accordance with the present invention, generally designated 10. The attachment 10 comprises two primary mirrors 12, 14 and two secondary mirrors 16, 18. The primary mirrors 12, 14 are spaced apart so as to provide a channel therethrough and are adjustably fixed relative to the camera lens 20 by a beam 22. The primary mirrors 12, 14 are mounted at rotational mounting points 24, 26 which provides for pivotable movement of each primary mirror 12, 14 in directions X and Y. The rotational mounting points 24, 26 may be provided with locking bolts to lock the primary mirrors

12, 14 in a desired position. The beam 22 is attached to a camera 30 with screws 32. The secondary mirrors 16, 18 are fixed relative to the camera 30 with screws 28 at a distance of approximately 25mm from the lens 20. The camera 30 is mounted on a base 34.

In operation the primary mirrors 12, 14 of the attachment in Figure 1a are positioned relative to the camera lens 20 to enable the lens 20 to observe outside of the ordinary field of view of the lens 20. In Figure 1a the primary mirrors 12, 14 are positioned at approximately 105° to the normal and the secondary mirrors 16, 18 are fixed at approximately 110° to the normal so that the lens 20 can observe at an angle of approximately 170° to the normal. The mirrors 12, 14 are adjustable by hand and are provided with sufficient friction to inhibit them from being moved under typical operation of the camera 30.

The attachment 10 illustrated in Figure 1a having adjustable primary mirrors 12, 14 and statically fixed secondary mirrors 16, 18 is particularly useful for traffic signal cameras where one camera 30 can be used to survey a number of directions at one time e.g. up and down the same street. The attachment 10 can also be used to observe two streets which are perpendicular to one another e.g. a cross roads with traffic lights.

Referring now to Figure 1b there is shown a diagrammatic representation of a television screen for a camera fitted with the attachment of Figure 1a, generally designated 40. The screen 40 has three segments A, B and C. The segment A corresponds to the view observed from the left hand primary mirror 14. The segment B corresponds to the view observed from the right hand primary mirror 12. The segment C corresponds to the view in the straight ahead direction below the primary and secondary mirrors 12, 14, 16 and 18.

Referring now to Figure 2 there is shown an alternative embodiment for an attachment for a closed circuit television camera in accordance with the present invention, generally designated 50. Features similar to the attachment illustrated in Figure 1a have like reference numerals. The based 34 has a mirror mounting, generally designated 52.

The beam 32 is provided with a rack 54 thereon, and a motor 56 mounted on the camera to move the secondary mirrors 16, 18 in the fore and aft direction. Fore and aft movement of the secondary mirrors 16, 18 relative to the lens 20 can be used to provide a zoom function of the camera 30.

The mirror mounting 52 shown in Figure 2 comprises a gimbals mechanism having a trough 58 pivotably mounted with bearings 60 on two trough supports 62, the trough supports 62 fixed to the base 34. The trough 58 houses respective drives 64, 66 for the primary mirrors 12, 14. The trough 58 can be controlled about an axis 68 to provide improved coverage by the lens 20. The trough 58 can also be moved in a fore and aft direction relative to the camera (not shown) to control the distance of the primary mirrors 12, 14 relative to the camera 30.

In operation the drives 64, 66 of the attachment 50 illustrated in Figure 2 can be driven independently. The drives 64, 66 can be controlled with a joystick (not shown) by an operator in a control room to obtain views of a number of areas around the camera 30. It will be appreciated that the attachments 10, 50 illustrated in Figures 1a and 2 respectively can be adapted to fit any existing security or traffic camera. Alternatively the attachments 10, 50 may be encapsulated within the body of the camera and sold as complete units.

The attachments 10, 50 illustrated in Figures 1a and 2 respectively may have numerous set of primary and secondary reflective surfaces so that one camera can be made to view in multiple directions. This may significantly reduce the installation cost of security or traffic light cameras which in turn may reduce the maintenance costs of such systems.

Now referring to Figure 3 there is shown a perspective view of an alternative embodiment to the attachment of Figure 1a. Like features to the attachment of Figure 1a are shown with like reference numerals. In Figure 3 the beam 22 is movably attached to the camera 30 with a hand operable screw 80. The hand operable screw 80 has a flange 82 which is adapted to contact the periphery of an elongate hole 84 in the beam 22. In this manner the beam 22 can be adjusted manually to provide for fore and aft movement of the secondary mirrors 16, 18 relative to the lens 20.

The beam 22 in Figure 3 has lateral extensions 86, 88 associated with a respective primary mirror 12, 14. Each of the extensions 86, 88 has a respective arcuate hole 90, 92 which are adapted to receive a respective hand operable screw 94, 96. The hand operable screws 94, 96 permit the position of the primary mirrors 12, 14 to be adjusted and set.

Referring now to figures 4 to 5b there is shown a further embodiment of an attachment, generally designated 100 for a close circuit television camera 102. The attachment 100 is operable in the same manner as that for the previously described embodiments by permitting the camera to view images which are outside of the field of view of the camera lens. The attachment 100 includes a bracket 104 fitable to the casing 106 of the camera 102 which includes a jib or extension portion 108 which extends forward from the casing 106 substantially parallel to the lens 110 of the camera 102. In the embodiment shown the bracket 104 is connected to the casing 106 by a set screw 116 which passes through a slot 118 of the bracket 104. The provision of the set screw and slot 116,118 permits the position of the bracket 104 on the casing 106 to be altered as indicated by arrow 120. It will be appreciated that the bracket 104 may be attached to the casing 106 by other suitable means. It will further be appreciated that the bracket 104 need not be mounted to the casing 106. For example, the bracket 104 may be mounted to a pole or mounting arrangement to which the camera 102 is fitted.

Mounted to the jib 108 is a mirror assembly, generally designated 112. The mirror assembly 112 is pivotably mounted to the end of the jib 108 distal to the casing 106 and is movable as indicated by arrow 114. The mirror assembly 112 includes two primary mirrors 122,124 and two secondary mirrors 126,128. The mirrors 122,124,126,128 are arranged in the same manner described with reference to the preceding embodiments whereby light impinging upon a primary mirror 122,124 is reflected onto a secondary mirror 126,128 which in turn reflects the light into the camera lens 110.

The mirrors 122,124,126,128 are mounted on an arrangement of brackets. Firstly there is provided a substantially "Y" shaped main bracket 130 which is pivotably connected

to the jib 108. Depending from each arm of the main bracket 130 is a mirror bracket 132 to each of which is connected a primary mirror 122,124. The secondary mirrors 126,128 are mounted to the stem of main bracket 130. Each mirror bracket 132 is connected to the main bracket 130 by a set screw 134 which extends through an arcuate slot 136 of the main bracket 130. Each primary mirror 122,124 is connected to its respective mirror bracket 132 by a further set screw 138 which extends through an arcuate slot 140 provided in a mounting flange 142 provided on the rear surface of the mirror 122,124.

The arrangement of set screws 134,138 and arcuate slots 136,140 enables the primary mirrors 122,124 to be swung relative to the secondary mirrors 126,128 as indicated by arrow X, rolled relative to the secondary mirrors 126,128 as indicated by arrow Y, and moved towards and away from the secondary mirrors 126,128 as indicated by arrow Z. It will thus be appreciated that the position of the primary mirrors may be readily adjusted to ensure that the desired view is presented to the camera lens 110 and further that the attachment 100 can be readily adapted to suit cameras of differing configurations.

As noted above, the mirror assembly 112 is pivotably connected to the jib 18. Accordingly the mirror assembly 112 as a whole may be moved from the position shown in figure 5a whereupon the mirrors 122,124,126,128 are arranged to feed additional views into an upper portion of the camera lens 110, to the position shown in figure 5b whereupon the mirror assembly 112 is unable to direct additional views to the camera lens 110. It will be understood that when the mirror assembly 112 is in the position shown in figure 5b the view of the camera lens 110 is unobstructed as the view of the camera lens 110 passes through the branch of the "Y" shaped main bracket 130. The inclination angle of the mirror assembly 112 may be set at an angle between the extremes shown in figures 5a and 5b so as to assist in the setting of the mirrors 122,124,126,128 at desired positions to direct the required views into the camera lens 110.

In an alternative embodiment the secondary mirrors 126,128 may be pivotably connected to the jib 108 independently of the main bracket 130 which carries the primary mirrors 122,124. In such an embodiment the secondary mirrors 126,128 may be pivoted out of the field of view of the camera lens 110 as indicated by arrow 144.

While the mirror orientation and inclination of the mirror assembly 112 described with reference to figures 4 to 5b is intended to be manually adjusted, it will be understood that such adjustment may be made remotely with the provision of appropriately configured drives and motors.

Whilst a preferred embodiments for the device have been described it will be appreciated that many other designs of the attachment exist that would have the desired effect of the invention with the proviso that the camera is provided with a secondary reflective surface in the field of view of the camera lens and a primary reflective surface to direct an image into the camera via the secondary reflected surface. It will further be appreciated that the principles of the present invention may be utilised for other applications whereupon it is required to direct light to an appropriately configured collector. Such alternative applications may include the direction of, for example, infra red or laser light to an appropriate receiver. The principles of the present invention may thus be utilised in such applications as, for example, movement sensors and remote traffic sensors. The above described embodiments illustrate attachments where there are provided two pairs of primary and secondary mirrors which enable to additional views to be directed into the camera lens. It will be appreciated that only a single pair of primary and secondary mirrors may be employed where only one additional view is required.

It will also be appreciated that an attachment according to the present invention may be mounted to the underside of a camera apparatus. In such an embodiment the camera would be provided with a view illustrated in figure 6c where segment A corresponds to the view observed from the left hand primary mirror. Segment B corresponds to the view observed from the right hand primary mirror, and segment C corresponds to the view in the straight ahead direction above the primary and secondary mirrors. This is in

contrast to the view illustrated in figure 6b where the attachment is mounted to top of the camera, and the view illustrated in figure 6a where either the mirror assembly as a whole or the secondary mirrors are pivoted in a manner such that the view of the camera lens¹ is not obstructed.

It will further be appreciated that a viewing apparatus according to the present invention may be provided as a retro-fittable device for an existing camera or, alternatively, may be fitted to or otherwise incorporated into a new camera during the manufacture thereof.

Claims

1. A viewing attachment for a camera apparatus, said camera apparatus having a field of view about a viewing axis, the attachment comprising a viewing means arranged to permit the camera apparatus to observe a first image lying inside of said camera field of view, and to direct into a portion of said field of view a second image lying in a further field of view outside of said camera field of view, said further field of view being about a further viewing axis angled to said camera viewing axis, wherein the viewing means includes a primary reflecting surface positioned outside of the camera field of view and a secondary reflective surface positioned within the camera field of view, such that said camera is able to view said second image via said reflective surfaces at the same time as viewing the first image.
2. A viewing attachment as claimed in claim 1 wherein the attachment includes a member attachable to a camera apparatus so as to lie substantially parallel to the viewing axis of the camera apparatus, the member carrying the primary and secondary reflective surfaces.
3. A viewing attachment as claimed in claim 2 wherein the member includes a first bracket to which the primary reflective surface is mounted, and a second bracket to which the secondary reflective surface is mounted.
4. A viewing attachment as claimed in claim 3 wherein both the first and second brackets are movably mounted to the member.
5. A viewing attachment as claimed in claim 3 or claim 4 wherein an intermediate bracket is provided between the first bracket and the primary reflective surface.
6. A viewing attachment as claimed in any preceding claim wherein the reflective surfaces each comprise a mirror.

7. A viewing apparatus as claimed in any preceding claim wherein the primary reflective surface is movable relative to the camera apparatus.
8. A viewing apparatus as claimed in claim 7 wherein the primary reflective surface is movable by hand.
9. A viewing apparatus as claimed in claim 7 wherein the primary reflective surface is movable by a motor.
10. A viewing apparatus as claimed in any preceding claim wherein the secondary reflective surface has a fixed orientation relative to the camera apparatus.
11. A viewing apparatus as claimed in any of claims 1 to 9 wherein the secondary reflective surface is movable to a position out of the camera field of view.
12. A viewing apparatus as claimed in any preceding claim wherein the viewing means in its entirety is movable out of the field of view of the camera apparatus.
13. A viewing apparatus as claimed in any preceding claim wherein the viewing means are provided with two primary and two secondary reflective surfaces.
14. A viewing apparatus as claimed in claim 13 wherein the secondary reflective surfaces are provided on a common body.
15. A viewing apparatus as claimed in claim 13 or claim 14 wherein the primary reflective surfaces are provided on opposing sides of the camera viewing axis.
16. A camera apparatus including a viewing apparatus as claimed in any preceding claim.
17. A camera apparatus as claimed in claim 16 wherein the viewing apparatus is incorporated into a body of the camera apparatus

18. A camera apparatus as claimed in claim 16 wherein the viewing apparatus is incorporated into housing containing the camera apparatus.

19. A camera apparatus as claimed in claim 16 wherein the viewing apparatus is attached to a mounting of the camera apparatus.

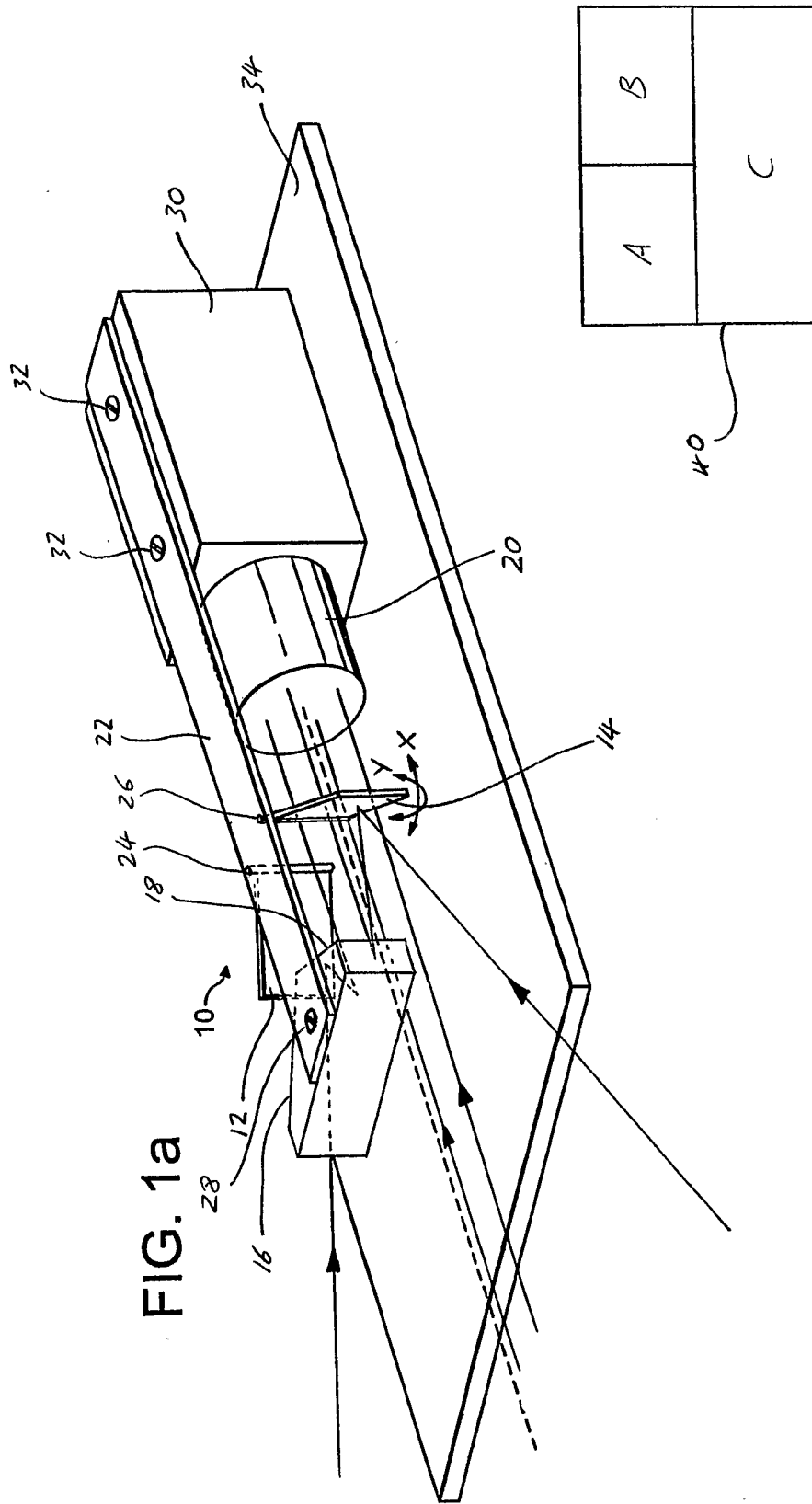
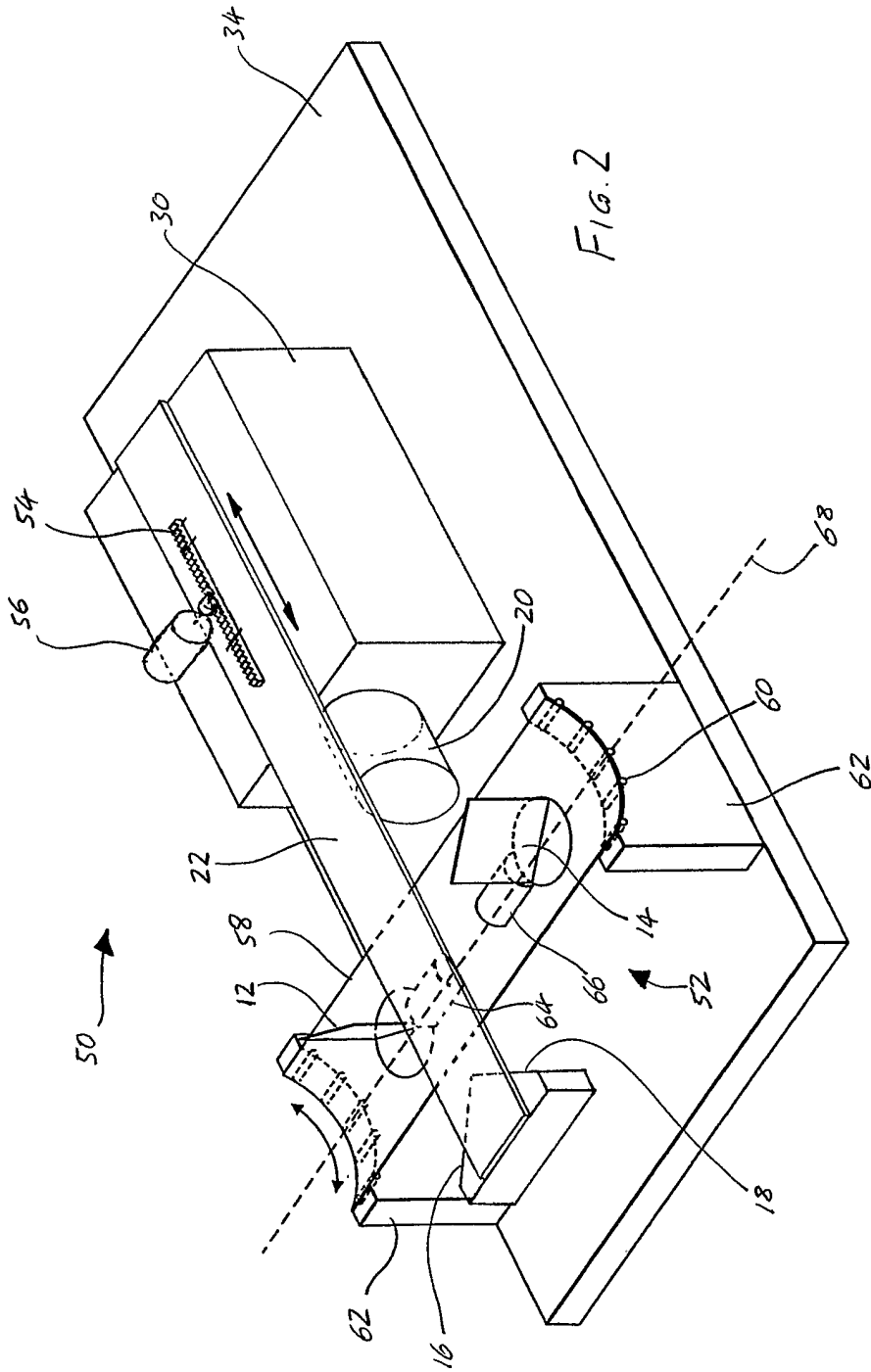
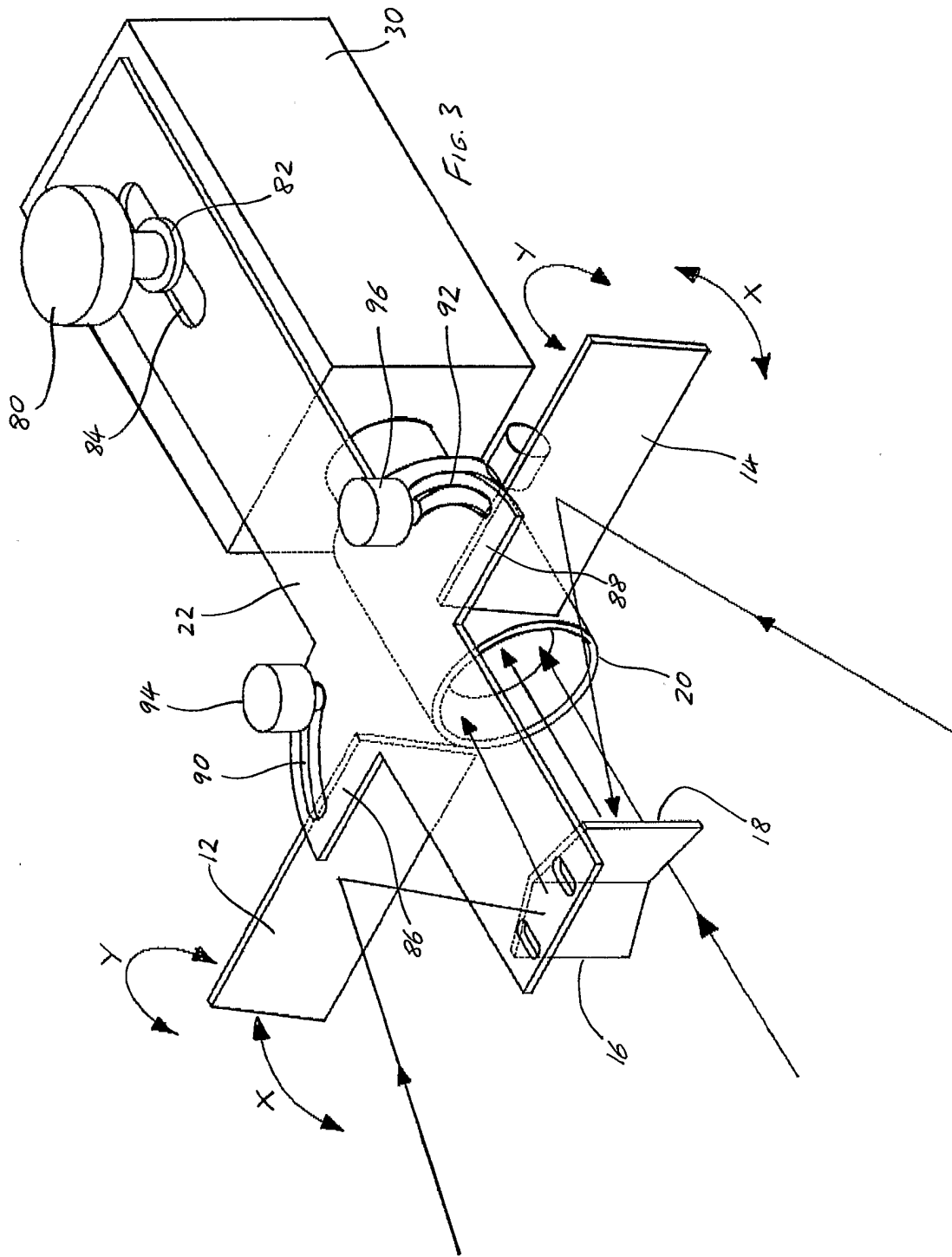
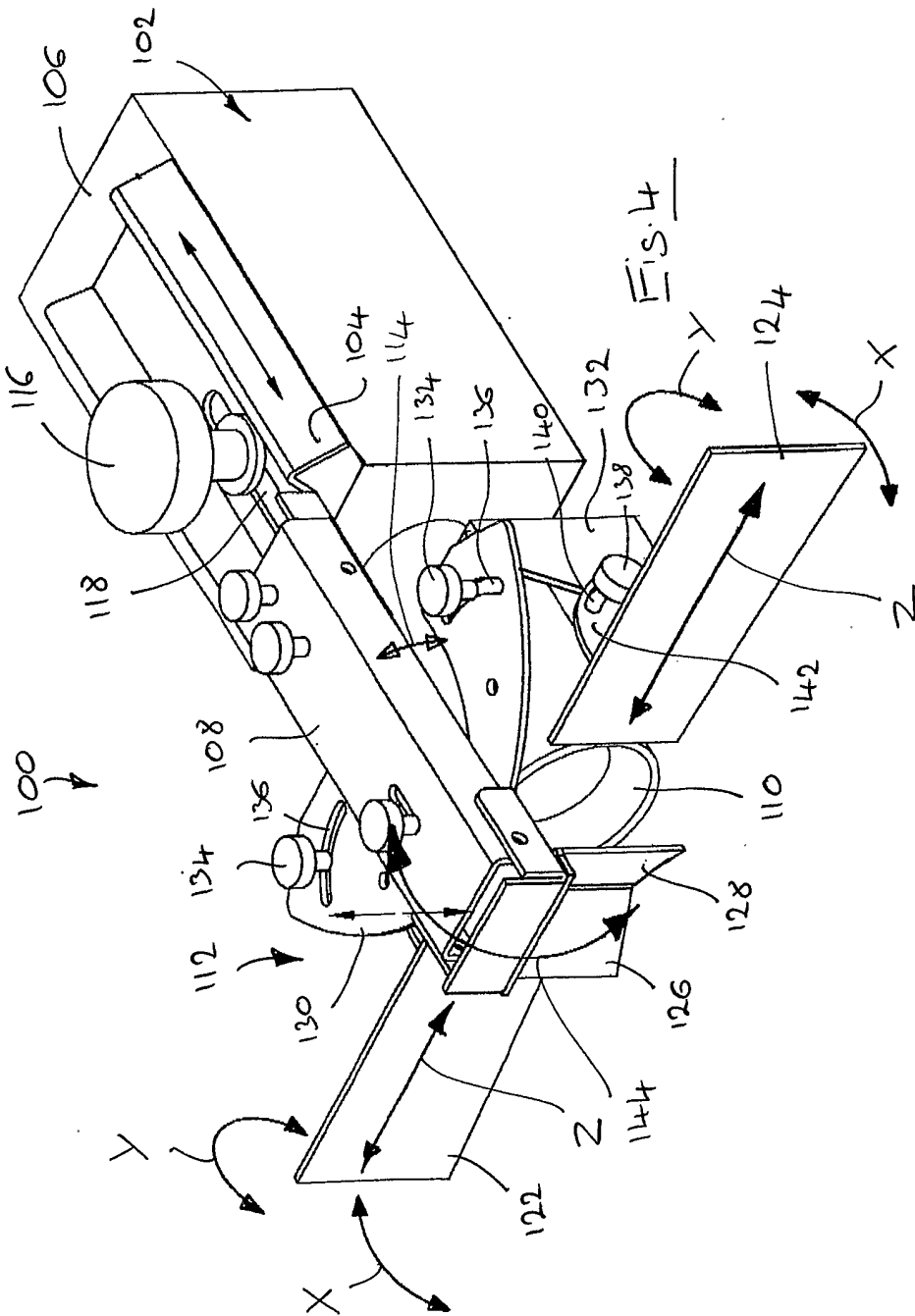


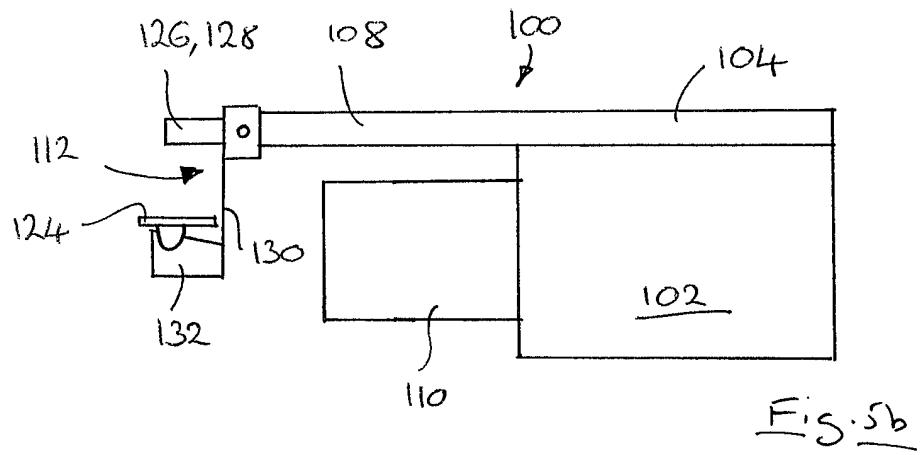
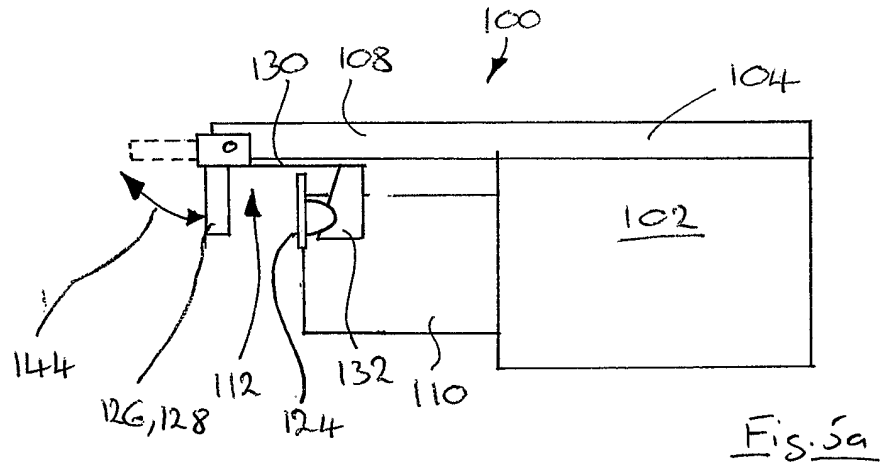
FIG. 1a

FIG. 1b









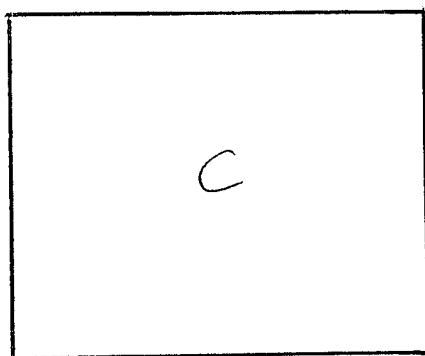


Fig. 6a

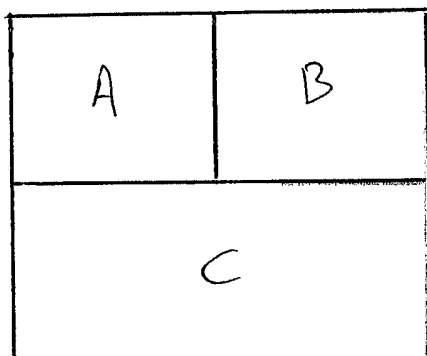


Fig. 6b

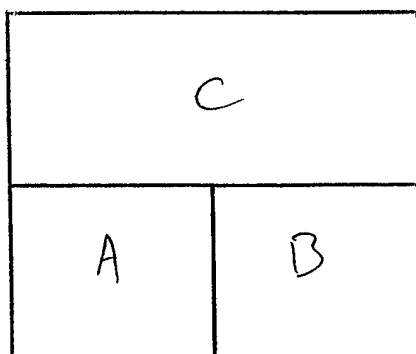


Fig. 6c

INTERNATIONAL SEARCH REPORT

Inter	Application No
PCT/GB2005/001485	

A. CLASSIFICATION OF SUBJECT MATTER
 IPC 7 H04N5/225

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)
 IPC 7 H04N G08B

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

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

EPO-Internal, WPI Data

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 4 288 819 A (WILLIAMS ET AL) 8 September 1981 (1981-09-08)	1,6-8, 10,12, 16,19 2-5,9,11
Y	column 1, line 4 - column 2, line 9 column 2, line 34 - column 3, line 59 column 4, line 7 - line 20 figures 1,2	
X	----- EP 0 751 041 A (FURUTA, YOSHIHISA) 2 January 1997 (1997-01-02) column 6, line 47 - column 9, line 16	1,2,6, 10,13-18
Y	----- US 4 167 756 A (SMITH ET AL) 11 September 1979 (1979-09-11) column 2, line 65 - column 3, line 29	2-5
	----- -/-	

Further documents are listed in the continuation of box C.

Patent family members are listed in annex.

* Special categories of cited documents :

- "A" document defining the general state of the art which is not considered to be of particular relevance
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Date of the actual completion of the international search

10 June 2005

Date of mailing of the international search report

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Authorized officer

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INTERNATIONAL SEARCH REPORT

Int'l Application No
PCT/GB2005/001485

C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category °	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	US 4 058 831 A (SMITH ET AL) 15 November 1977 (1977-11-15) column 3, line 2 - column 4, line 3 -----	9
Y	GB 2 368 221 A (LEE SCOTT * FRIEND) 24 April 2002 (2002-04-24) figure 10 page 19, line 26 - line 32 -----	11

INTERNATIONAL SEARCH REPORT

Inte | Application No
PCT/GB2005/001485

Patent document cited in search report		Publication date	Patent family member(s)	Publication date
US 4288819	A	08-09-1981	NONE	
EP 0751041	A	02-01-1997	AU 5620296 A EP 0751041 A2 JP 9104291 A US 5756988 A	09-01-1997 02-01-1997 22-04-1997 26-05-1998
US 4167756	A	11-09-1979	US 4058831 A CA 1076404 A1	15-11-1977 29-04-1980
US 4058831	A	15-11-1977	CA 1076404 A1 US 4167756 A	29-04-1980 11-09-1979
GB 2368221	A	24-04-2002	AU 4082801 A AU 8421101 A WO 0168540 A2 WO 0219009 A2 AU 7264701 A WO 0208817 A2 GB 2365143 A	24-09-2001 13-03-2002 20-09-2001 07-03-2002 05-02-2002 31-01-2002 13-02-2002