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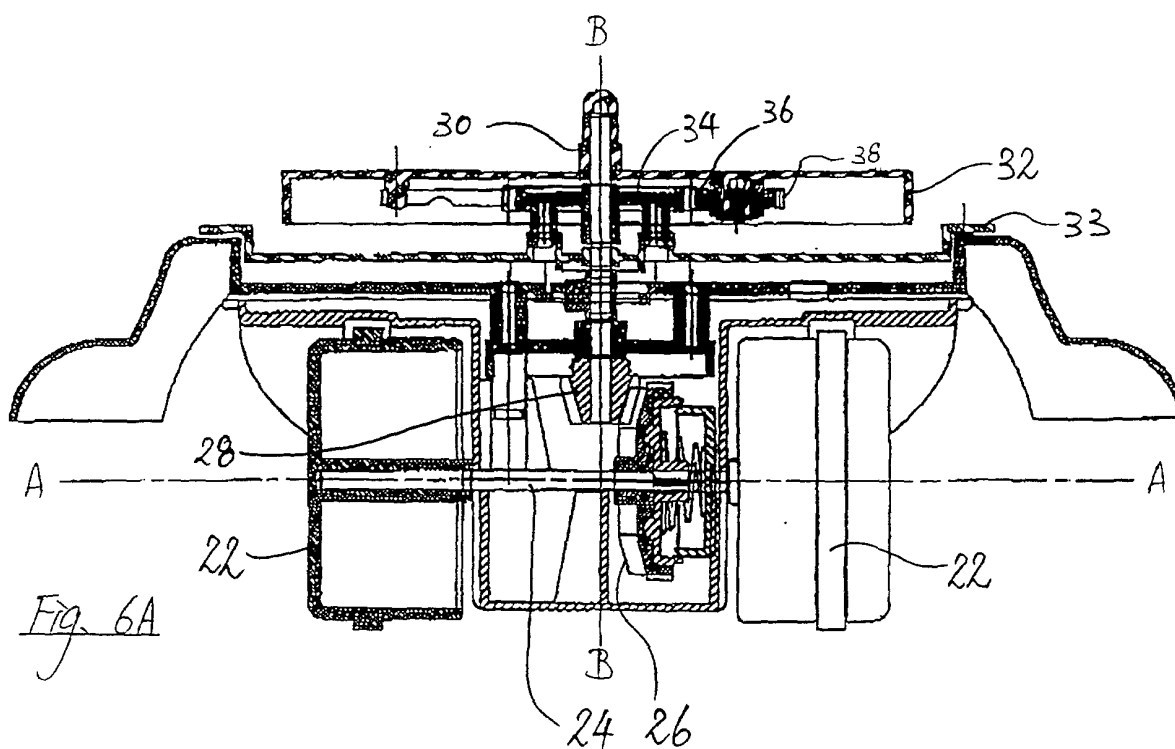
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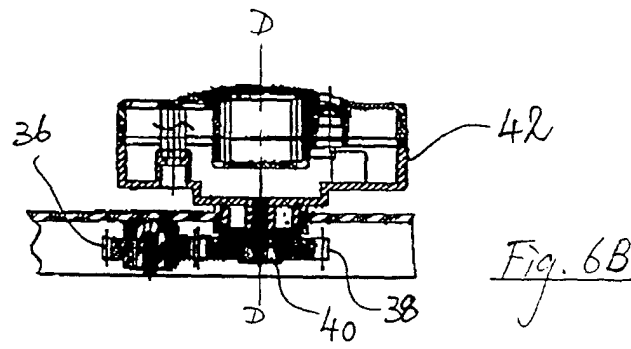
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(54) A light display apparatus

(57) A light display apparatus in the form of a push toy (1) is disclosed as including two rotatable wheels (22), a mounting platform (32) rotatable about an axis (B-B) in response to rotation of the wheels (22), three light emitting diodes (LEDs) (44a, 44b, 44c) carried by a lighting assembly (42) on the mounting platform (32), in which the lighting assembly (42) is rotatable an axis (D-D) offset from the axis (B-B) of rotation of the mount-

ing platform (32), in which the push toy (10) further includes an electric circuit for operating the LEDs (44a, 44b, 44c), which circuit including a signal generator (62) for generating electrical signals upon rotation of the lighting assembly (42), and the signal generator (62) includes a pair of contact pins (54) which alternately close and open the electric circuit during rotation of the lighting assembly (42).





## Description

**[0001]** This invention relates to a light display apparatus, such as a push toy which emits light during its movement.

**[0002]** There are in existence a number of push toys which emit light during movement thereof. For example, US Patent No. 5,030,160 (Klawitter) discloses a light display apparatus in the form of a child's push toy. A support platform rotates during rotation of wheels of the push toy. A light bracket is mounted on the support platform and rotatable about an axis offset from the axis of rotation of the support platform. A number of lights are provided on the light bracket and are energized to light up in response to movement of the wheels of the apparatus, so that a visual pattern is shown when the light bracket rotates about its own axis and revolves about the axis of rotation of the support platform. The apparatus includes a centrifugal switch mechanism which is adapted to close an electric circuit to energize the lights in response to rotation of the wheels.

**[0003]** It can, however, be noted that the structure and arrangement of the components of an apparatus according to Klawitter is rather complicated, which adds to the cost of production, and thus the price of the product. The chance of malfunctioning may also increase. In addition, since the operation of the switch mechanism depends on centrifugal force acting on a centrifugal actuator, the switch mechanism will close the circuit, and thus energize the lights, only when a certain rate of rotation of the platform is reached, i.e. only when the apparatus moves at or above a certain critical speed.

**[0004]** It is thus an object of the present invention to provide a light display apparatus in which the above shortcomings are mitigated, or at least to provide a useful alternative to the public.

**[0005]** According to the present invention, there is provided a light display apparatus including at least one rotatable wheel, a platform rotatable about a first axis in response to rotation of said at least one wheel, at least one lighting member carried by a light carrying member on said platform, wherein said light carrying member is rotatable about a second axis offset from said first axis of rotation of said platform, said apparatus further including means for generating electrical signals upon rotation of said light carrying member for operating said at least one lighting member, characterized in that said signal generating means includes a switching member which alternately closes and opens an electric circuit during rotation of said light carrying member.

**[0006]** An embodiment of the invention will now be described, by way of example only, and with reference to the accompanying drawings, in which:-

Fig. 1 is a side view of a light display apparatus, in the form of a push toy, according to the present invention;

Fig. 2 is a top view of the push toy shown in Fig. 1;

Fig. 3 is a top view of the push toy shown in Fig. 1 with the upper cover and mounting platform removed;

Fig. 4 is a side view of the push toy shown in Fig. 3; Fig. 5 is a top view of the push toy shown in Fig. 1 with the upper cover removed, and with the mounting platform shown in dotted line;

Fig. 6A is a sectional end view of the push toy shown in Fig. 5, with the light carrier removed;

Fig. 6B is a sectional view of the light carrier shown in Fig. 5 as mounted on the mounting platform;

Fig. 7 is a top view of the push toy shown in Fig. 1 with the upper cover removed, showing alternative positions of the light carrier;

Fig. 8A is a sectional view of the light carrier shown in Fig. 5 as mounted on the mounting platform, with the gear arrangement removed;

Fig. 8B is a cross sectional view of the lighting assembly and mounting platform taken along the line E-E in Fig. 8A, with the lighting assembly and mounting platform in a first position;

Fig. 8C is a cross sectional view of the lighting assembly and mounting platform taken along the line E-E in Fig. 8A, with the lighting assembly and mounting platform in a second position;

Fig. 9 is a top view of the push toy shown in Fig. 1 with the upper cover removed, and showing a visual pattern of light emitted by the lights;

Fig. 10 is a functional block diagram of a circuitry used in the push toy shown in Fig. 1; and

Fig. 11 is a circuit diagram of the circuitry shown in Fig. 10.

**[0007]** A light display apparatus, in the form of a push toy, according to the present invention is shown in Figs. 1 and 2, and generally designated as 10. The push toy 10 includes a bar 12 with an end portion 14 which may be grabbed by a hand of a user, e.g. a child, for pushing or pulling the push toy 10, as desired. The toy 10 has a body portion 16 in the general form of a bug. It should of course be understood that the body portion 16 may assume other forms of animals. The body portion 16 includes an upper cover 18 made of a non-opaque, e.g. transparent or translucent, plastics material allowing light to pass through. On the upper cover 18 are provided with a number of bulging areas 19 to more vividly mimic a bug. Three legs 20 are also provided on each lateral side of the body portion 16.

**[0008]** As shown in Figs. 3 to 6B, the toy 10 includes a pair of wheels 22 linked up by a shaft 24 for simultaneous rotational movement. Fixedly mounted about the shaft 24 is a beveled gear 26 which meshes with a corresponding beveled gear 28 fixedly mounted about a rotatable shaft 30. By way of such an arrangement, rotation of the wheels 22 about an axis A-A will cause the shaft 30 to rotate about an axis B-B, which is perpendicular to the axis A-A. The shaft 30 is fixedly secured through the centre of a mounting platform 32. Below the

mounting platform 32 and fixed to a lower body portion 33 is a gear 34, through which the shaft 30 freely extends. In this way, the gear 34 will remain stationary relative to the lower body portion 33 during movement of the wheels 22. The shaft 30 and the mounting platform 32 will thus rotate relative to the gear 34.

**[0009]** The gear 34 meshes with an intermediate gear 36 which is rotatable about a vertical axis offset from and parallel to the axis B-B. The intermediate gear 36 in turn meshes with a gear 38. The gear 38 is fixedly attached about a rotatable shaft 40 to the top end of which is fixed a lighting assembly 42. The shaft 40, and the lighting assembly 42 fixed thereto, are rotatable about a vertical axis D-D (see Fig. 6B), which is offset from and parallel to the axis B-B. As shown in Fig. 7, on an upper surface of the lighting assembly 42 are provided with three light emitting diodes (LEDs) 44a, 44b, 44c which may emit light during operation of the toy 10, in a manner to be discussed below.

**[0010]** As can be seen more clearly in Fig. 5, when the mounting platform 32 rotates relative to the lower body portion 33, and thus relative to the gear 34, in the clockwise direction (as shown by the arrow P), as the gear 34 remains stationary relative to the lower body portion 33, the intermediate gear 36 carried by the mounting platform 32 will rotate in an clockwise direction relative to the gear 34, as indicated by the arrow Q. This will cause the gear 38, and thus the lighting assembly 42 carried thereby, to rotate in the direction indicated by the arrow R. As the gear 38 and the lighting assembly 42 also rotate with the mounting platform 32 in the direction indicated by the arrow P, both the gear 38 and the lighting assembly 42 will revolve about the central shaft 30, while also revolving about the axis D-D.

**[0011]** The legs 20 are joined to spheres 46 via spindles (not shown) which are received within slots 48. The spheres 46 are of a diameter which is larger than the width of the slots 48. By way of such an arrangement, the spheres 46 can move within the confines of the slots 48, whereby the legs 20 are moved to mimic the motion of legs of a bug during movement of the toy 10.

**[0012]** Fig. 7 show three positions of the lighting assembly 42 during rotation of the mounting platform 32. When the mounting platform 32 rotates for 1/3 of a cycle, the lighting assembly occupies the position shown as 42'. It can be seen that, by this time, the lighting assembly has also self-rotated a full cycle, such that the LED 44a now occupies the position shown as 44a'. With a further 1/3 cycle of rotation of the lighting assembly, the lighting assembly occupies the position 42'', whereupon the lighting assembly has also completed a further cycle of rotation, so that the LED 44a now occupies the position 44a''. During such rotational movements of the platform 32 and the lighting assembly 42 (and thus the LEDs 44a, 44b, 44c), a visual pattern will be generated, as shown in the dotted lines in Fig. 9.

**[0013]** As shown in Fig. 8A, all the electrical components, including one or more batteries (not shown), an

electric circuit (to be discussed below) and LEDs (not shown in Fig. 8A), are housed within the lighting assembly 42. To enhance clarity of the drawings, the batteries, the physical electrical components and the electric circuit are not shown in this drawing. The lighting assembly 42 includes three cavities 50 (of which only one is shown in Fig. 8A), each having an upward open end 52. An LED 44a, 44b or 44c may be positioned within this cavity 50, so that light emitted by the LED 44a, 44b or 44c may pass through the open end 52, and be perceived by an onlooker.

**[0014]** Adjacent to the area where the lighting assembly 42 joins the mounting platform 32, there is provided a switching mechanism for operating the LEDs 44a, 44b, 44c. In particular, the lighting assembly 42 carries two contact pins 54, which rotate together with the lighting assembly 42. Fixedly attached to the mounting platform 32 are two electrical contact members 56. As the lighting assembly 42 rotates relative to the mounting platform 32, the contact pins 54 alternately come into contact (as shown in Fig. 8B) and out of contact (as shown in Fig. 8C) with the contact members 56, so as to alternately close and open an electric circuit, and thereby to generate electrical signals, for operating the lighting of the LEDs 44a, 44b, 44c.

**[0015]** A functional block diagram of an electric circuit which may be used in the present invention is shown in Fig. 10. The circuit includes a power source 60 which may be one or more dry batteries, for powering the circuit. A signal generator 62 is provided for generating electrical signals. This signal generator 62 may thus be the switching mechanism discussed above. Signals generated by the signal generator 62 are then amplified by an amplifier 64 for operating a power switch 66 to energize, and thus light up, the LEDs 44a, 44b, 44c. As the signals generated by the signal generator 62 are in pulses, the LEDs 44a, 44b, 44c will light up and shut down at the same frequency as the closing and opening of the switching mechanism. To enable the LEDs 44a, 44b, 44c to light up continuously, a delay 68 is provided.

**[0016]** A more detailed diagram of an electric circuit which may be used in the present invention is shown in Fig. 11. In this diagram:-

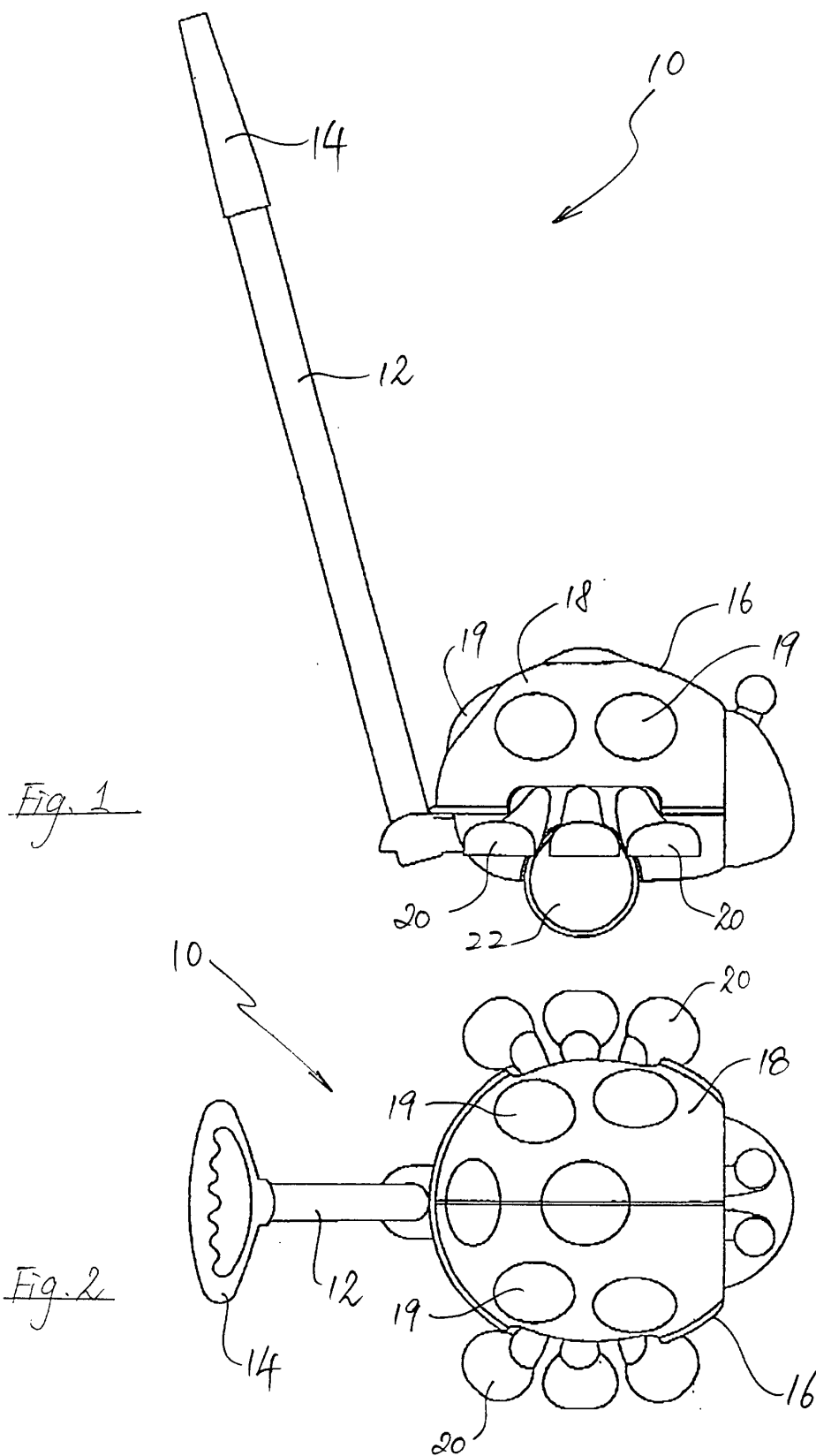
- a. the battery B1 corresponds to the power source 60;
- b. the switch S1 represents the switching mechanism which alternately closes and opens the electric circuit when the contact pins 54 come into and out of contact with the contact elements 56 alternately;
- c. the transistor Q2 corresponds to the power switch 66;
- d. the capacitors C3, C4 collectively constitute the delay 68.

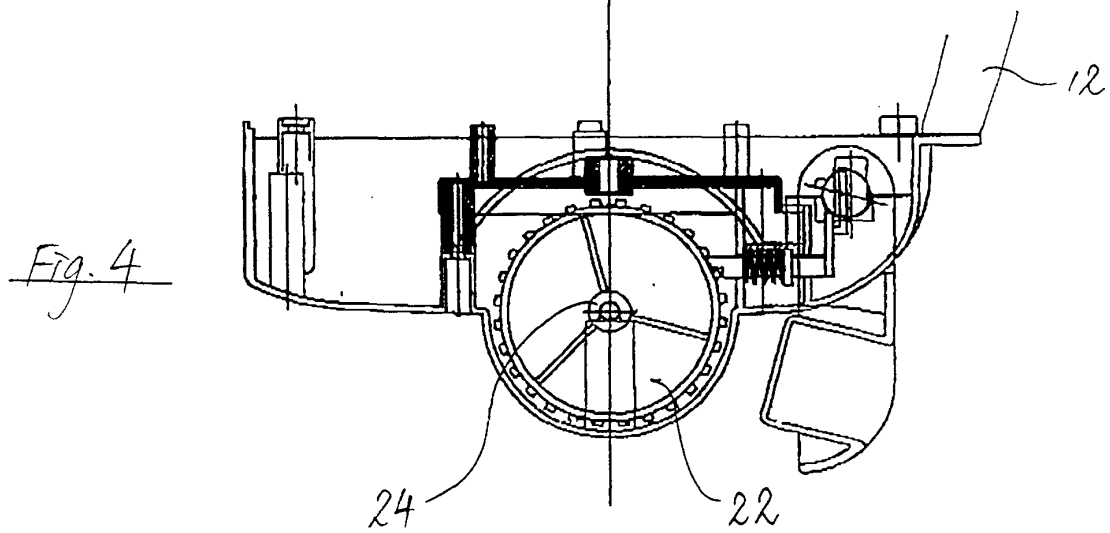
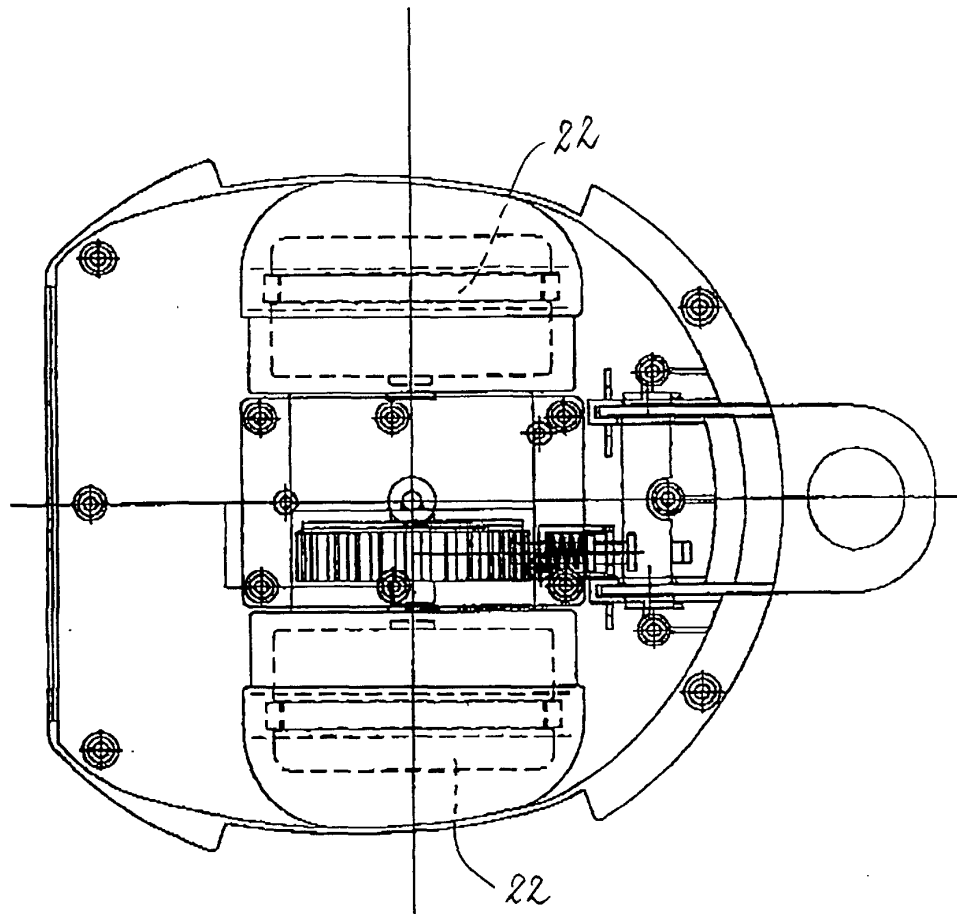
**[0017]** It should be understood that the above only illustrates an example whereby the present invention may be practiced, and that various modifications and al-

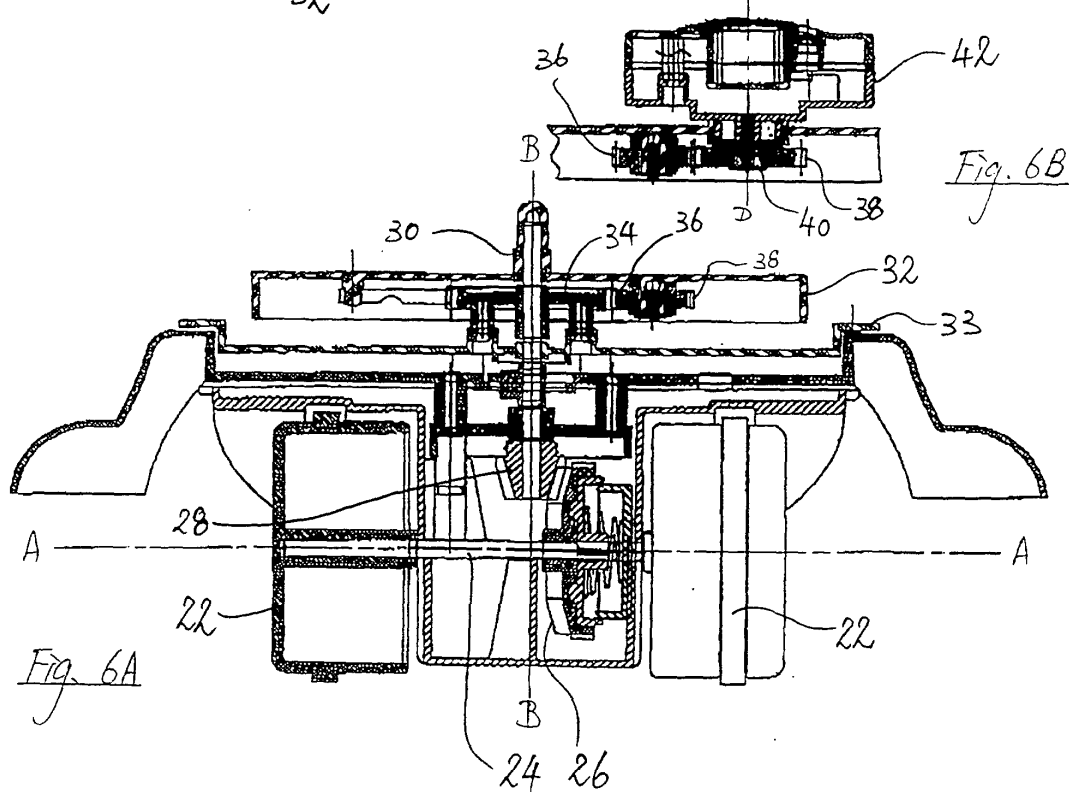
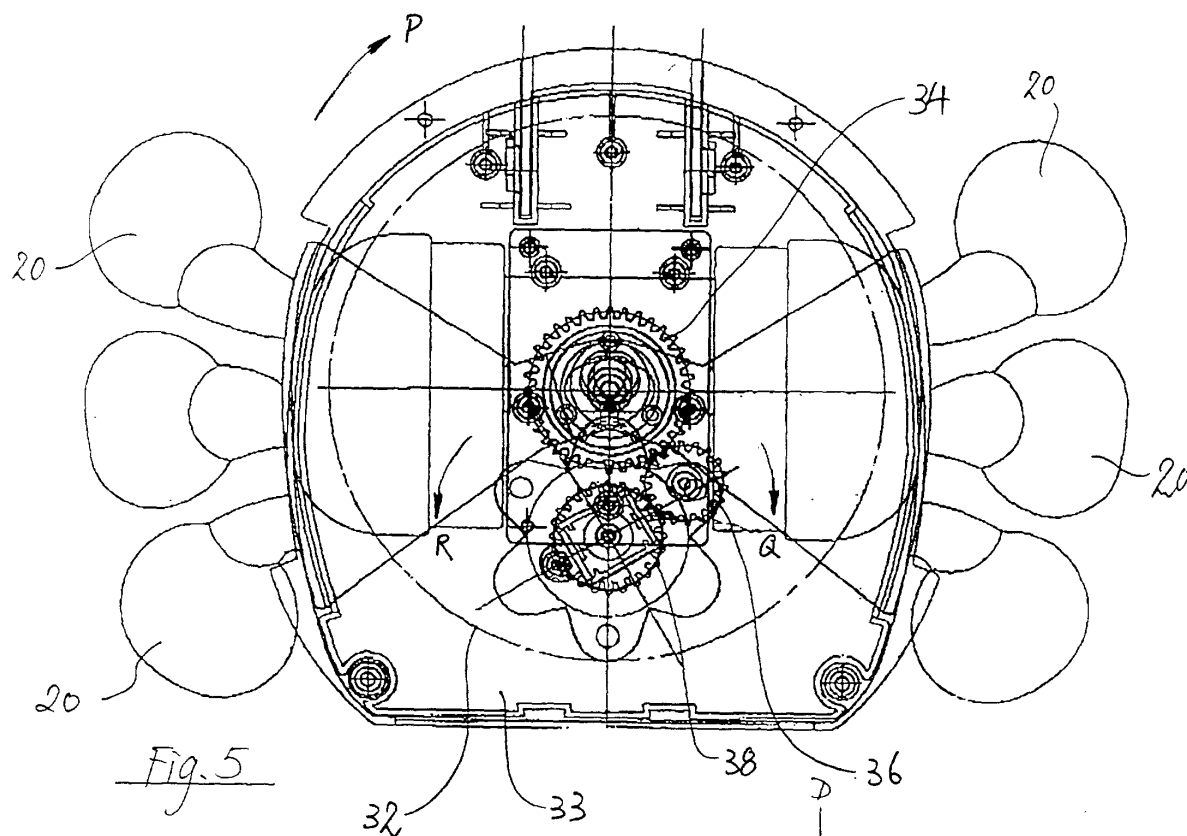
terations may be made thereto without departing from the spirit of the invention.

#### Claims

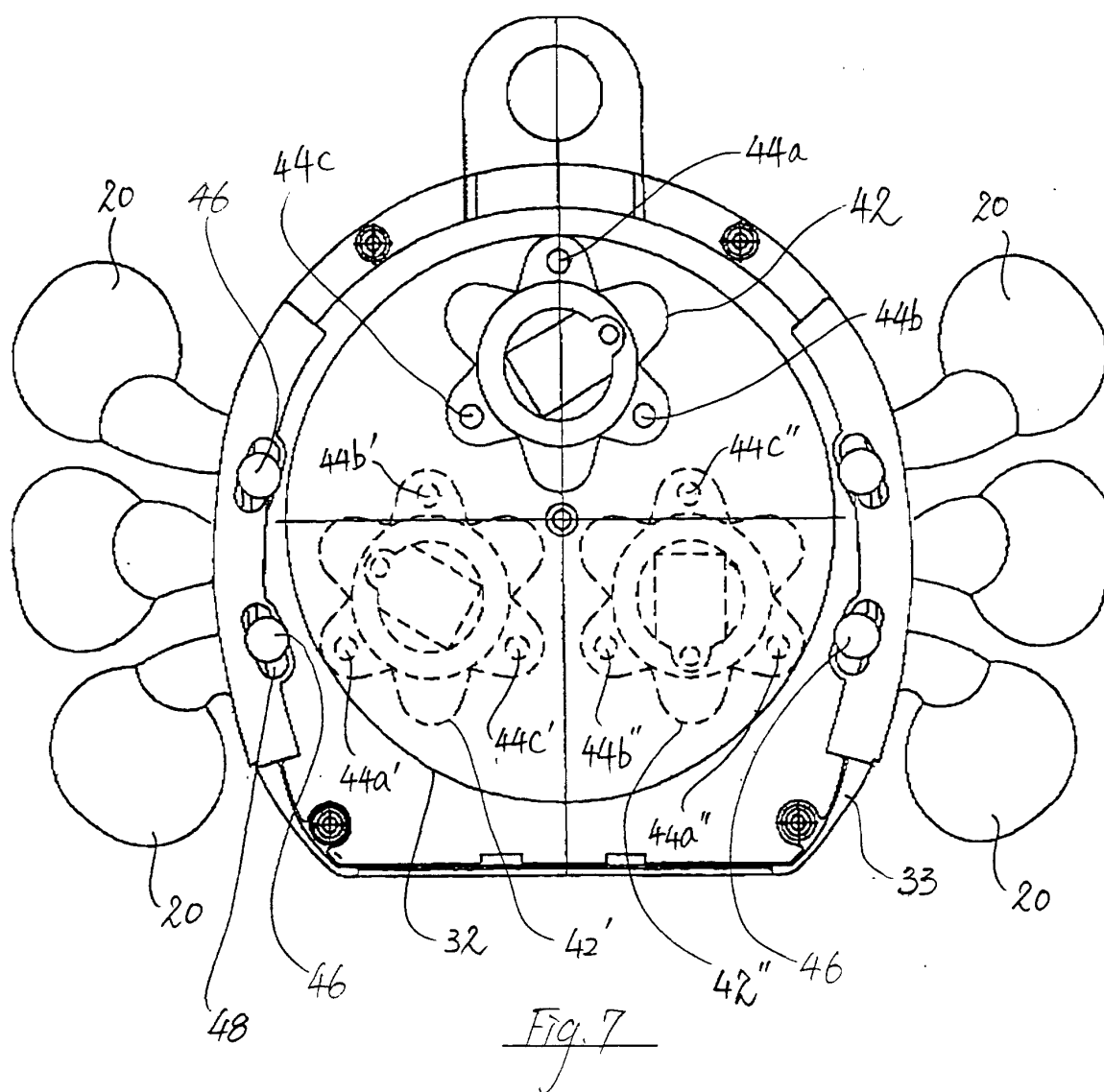
1. A light display apparatus (10) including at least one rotatable wheel (22), a platform (32) rotatable about a first axis (B-B) in response to rotation of said at least one wheel (22), at least one lighting member (44a, 44b, 44c) carried by a light carrying member (42) on said platform (32), wherein said light carrying member (42) is rotatable about a second axis (D-D) offset from said first axis of rotation (B-B) of said platform (32), said apparatus (10) further including means (62) for generating electrical signals upon rotation of said light carrying member (42) for operating said at least one lighting member (44a, 44b, 44c), **characterized in that** said signal generating means (62) includes a switching member which alternately closes and opens an electric circuit during rotation of said light carrying member (42). 10
2. An apparatus according to Claim 1 further **characterized in that** at least one first electric contact member (54) is carried by said light carrying member (42) and at least one second electric contact member (56) is carried by said platform (32). 25
3. An apparatus according to Claim 2 further **characterized in that** said at least one first and second contact members (54, 56) alternately come into contact and out of contact during rotation of said light carrying member (42). 30
4. An apparatus according to Claim 1 or 3 further **characterized in that** said light carrying member (42) is rotatable relative to said platform (32). 35
5. An apparatus according to Claim 2 further **characterized in that** two said first contact members (54) are carried by said light carrying member (42) and two said second contact members (56) are carried by said platform (32). 40
6. An apparatus according to Claim 5 further **characterized in that** said two first contact members (54) and said two second contact members (56) come into contact with each other twice for each cycle of rotation of said light carrying member (42) relative to said platform (32). 45
7. An apparatus according to Claim any of the preceding claims further **characterized in** including means (64) for amplifying said signals generated by said signal generated means. 50
8. An apparatus according to any of the preceding claims further **characterized in** including a power switch (66). 55
9. An apparatus according to any of the preceding claims further **characterized in** including delaying means (68) for allowing the at least one lighting member to light up continuously during closing and opening of said switching member. 10
10. An apparatus according to any of the preceding claims further **characterized in** being in the form of a push toy (10). 15



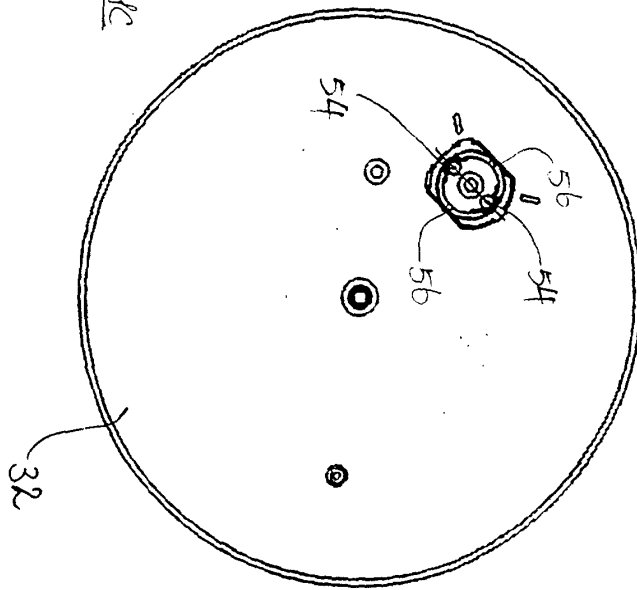




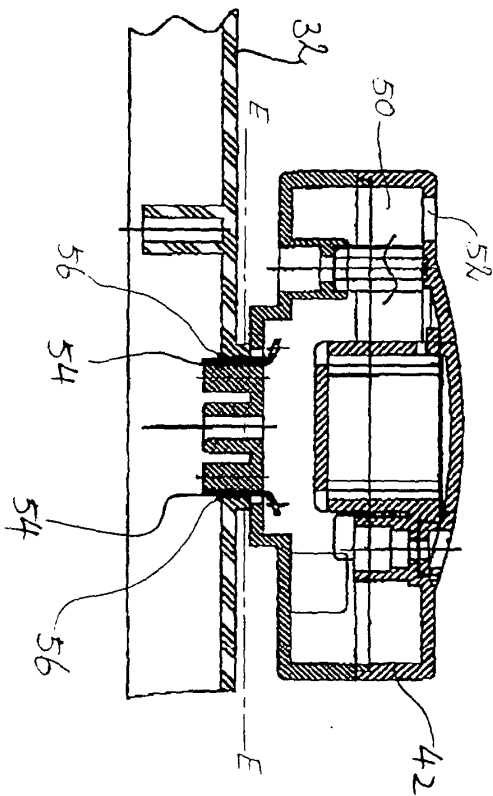




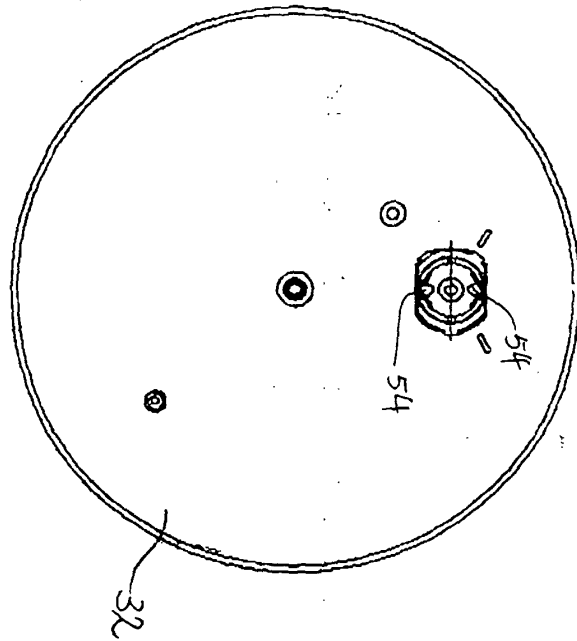
*Fig. 4c*



*Fig. 4A*



*Fig. 4B*



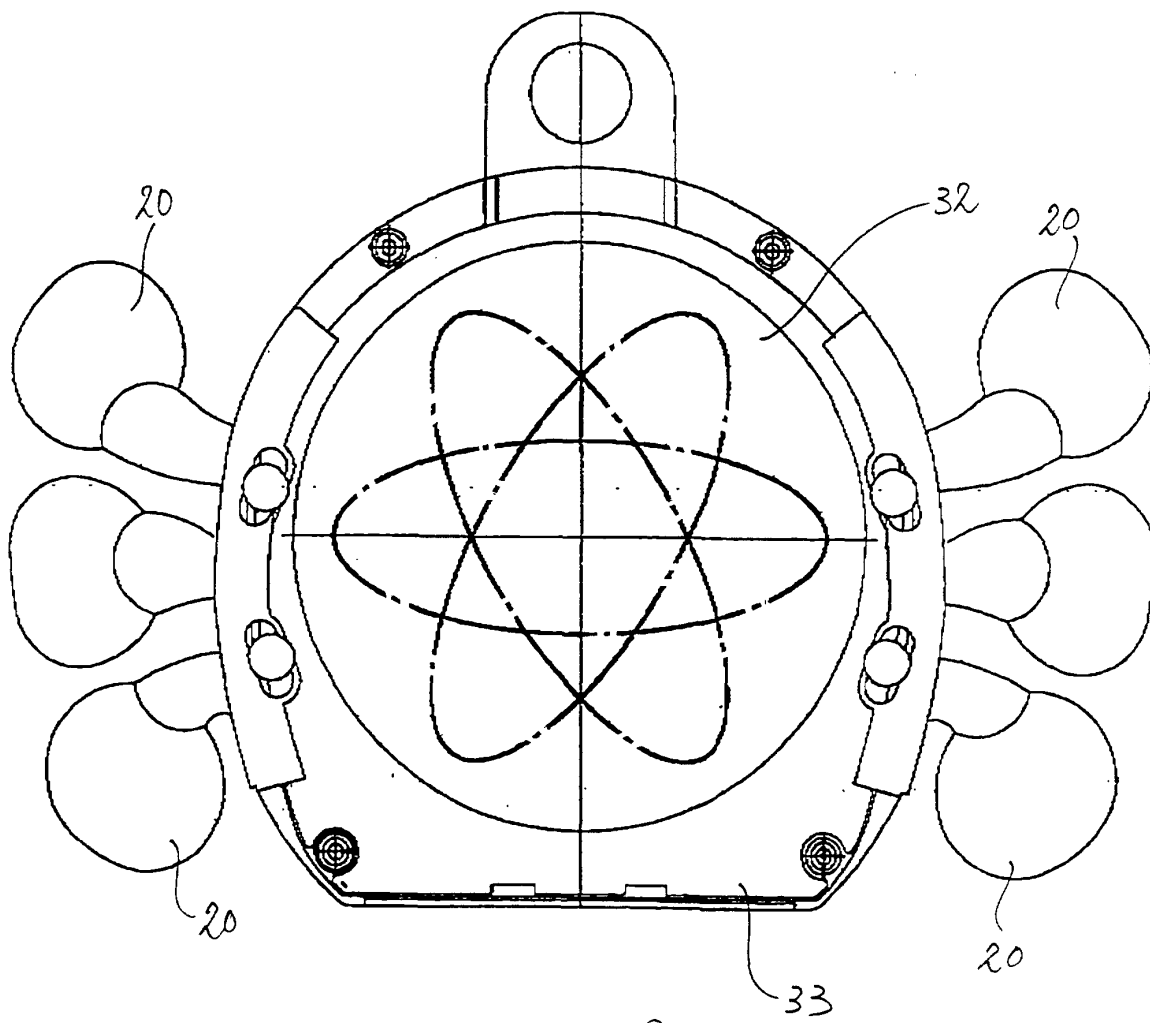


Fig. 9

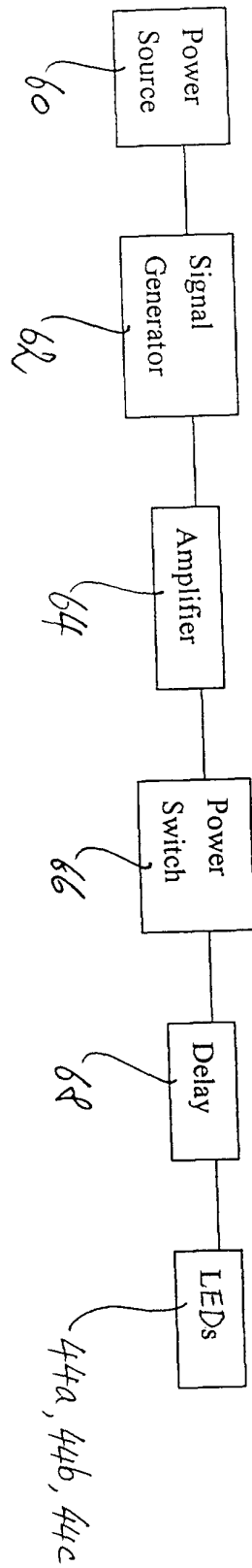


Fig. 10

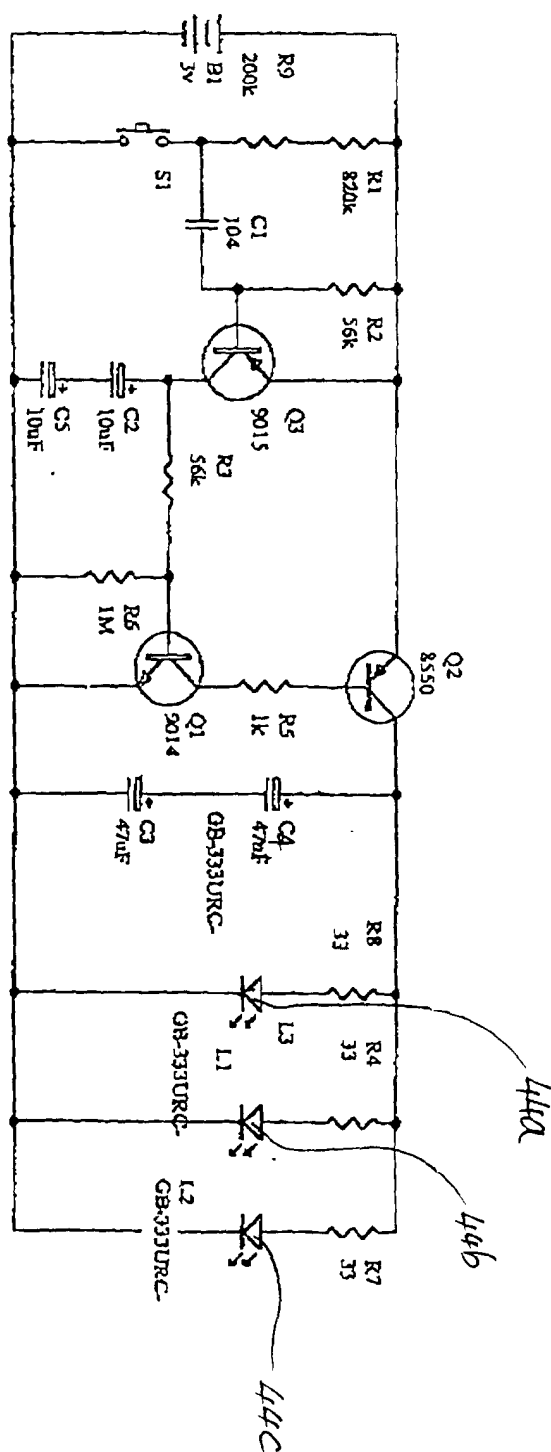


Fig. 11



European Patent  
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# EUROPEAN SEARCH REPORT

Application Number  
EP 00 31 0175

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.7)
D,A	US 5 030 160 A (KLAWITTER) 9 July 1991 (1991-07-09) * the whole document *	1,10	A63H33/00 A63H17/32
A	US 4 209 941 A (BOURQUE) 1 July 1980 (1980-07-01) * the whole document *	1,3	
A	FR 1 282 194 A (PITHIQUOUD) 1 June 1962 (1962-06-01) * page 2, column 1, line 47 - column 2, line 14; figure 4 *	1-3	
			TECHNICAL FIELDS SEARCHED (Int.Cl.7)
			A63H
The present search report has been drawn up for all claims			
Place of search <b>THE HAGUE</b>		Date of completion of the search <b>11 April 2001</b>	Examiner <b>Vanrunxt, J</b>
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			

EPO FORM 1503 03 B2 (P04/01)

**ANNEX TO THE EUROPEAN SEARCH REPORT  
ON EUROPEAN PATENT APPLICATION NO.**

EP 00 31 0175

This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report. The members are as contained in the European Patent Office EDP file on  
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11-04-2001

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US 5030160 A	09-07-1991	NONE	
US 4209941 A	01-07-1980	NONE	
FR 1282194 A	01-06-1962	NONE	

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For more details about this annex : see Official Journal of the European Patent Office, No. 12/82