COMMONWEALTH OF AUSTRALIA

The Patents Act 1952

DECLARATION IN SUPPORT

of the (Convention) Application made by: STASTNY GESELLSCHAFT M.B.H.

(hereinafter termed "the applicant ") for a patent ~~(of addition)~~ for an invention entitled "DEVICE FOR PRODUCING LIGHT EFFECTS"

I/~~We~~ Erich Stastny,

of A-2521 Trumau, Parkstrasse 9, Austria

do solemnly and sincerely declare as follows:

~~I am / We are the applicant —~~; ~~or~~

I am /~~We are~~ authorised by the applicant to make this declaration on its/~~their~~ behalf.

The basic application as defined by sections 141 and 142 of the Act was/~~were~~ made

in Austria on 2nd February, 1987

~~in~~ ~~on~~

~~in~~ ~~on~~

by STASTNY U. SCHRÖGENDORFER GESELLSCHAFT M.B.H. (hereinafter termed "the basic applicant")

The basic application referred to in this paragraph is/~~are~~ the first application made in a Convention country in respect of the invention the subject of the application.

I/~~We~~ am/~~are~~

~~or~~

~~is/are~~ the actual inventor of the invention ~~and the facts upon which the applicant is/are entitled to make the application are as follows:~~ The basic applicant is a person who would, if a patent were granted upon an application made by me as inventor, be entitled to have the patent assigned to it and the basic applicant has changed its name to that of the applicant.

Declared at Oey-Hietzing this sixth day of September 1989

Signed: [signature]

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DEVICE FOR PRODUCING LIGHT EFFECTS

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(56) Prior Art Documents
US 4232304
US 4085932
US 3473429

(57) Devices are known for production of light effects, in which there is mounted a plurality of disks which are rotatable in relation to each other, with a light source located behind said disks which are either transparent or are perforated. A flowing light effect can be achieved with such a device.

The objective of the present invention is to develop a device of the type referred to initially for production of light effects in such a manner that, on the one hand, the driving of the rotating disks is simplified and, on the other hand, the device can be combined with a loudspeaker without substantially increasing the space required for accommodating the loudspeaker.

To achieve this objective, the proposal is put forward by the invention that the two perforated disks should be mounted over the area of the cavity of the loudspeaker membrane and that means should have at least one entrainment element which is affixed to either the rotating disk or the membrane and its free end is in frictional contact with either the membrane or the rotating disk so that a rotational movement of the disk is elicited because of the vibrations of the membrane.

.../2

CLAIM

1. A device for producing light effects, including two coaxially arranged perforated discs, one of said discs being driven with a rotary movement by means actuated by sound vibrations and at least one of said discs being illuminated by a light source, wherein said two discs are mounted over the area of the cavity of a membrane of a loudspeaker and wherein said means actually by sound vibrations include at least one entrainment element affixed to said rotating disc or to said membrane with the free end thereof in frictional contact with said membrane or with said rotating disc so that vibrations of said membrane cause relative rotation of said discs.

12. The device according to any one of Claims 1 to 11, wherein said light source is located within said cavity of said membrane of said loudspeaker.

14. The device according to any one of Claims 1 to 12, wherein that surface of said disc facing towards the observer is illuminated by a light source, the other rotating disc being provided with a light-reflecting coating on its surface facing towards the observer.

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610521

PCT

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Internationales Büro

INTERNATIONALE ANMELDUNG VERÖFFENTLICHT NACH DEM VERTRAG ÜBER DIE INTERNATIONALE ZUSAMMENARBEIT AUF DEM GEBIET DES PATENTWESENS (PCT)

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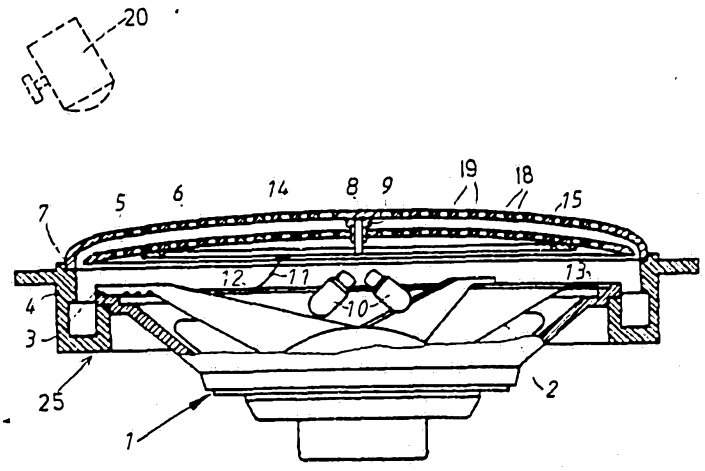
(81) Bestimmungsstaaten: AT (europäisches Patent), AU, BE (europäisches Patent), CH (europäisches Patent), DE (europäisches Patent), FR (europäisches Patent), GB (europäisches Patent), IT (europäisches Patent), JP, KR, LU (europäisches Patent), NL (europäisches Patent), SE (europäisches Patent).

(54) Title: DEVICE FOR PRODUCING LIGHT EFFECTS

(54) Bezeichnung: VORRICHTUNG ZUR ERZEUGUNG VON LICHTEFFEKTEN

(57) Abstract

A device for a loudspeaker (1) used at the same time to produce light effects has a membrane (2) and light sources (10). The opening of the membrane (2) is covered by a rotating perforated disk (5) and by a stationary perforated disk (6). The rotation of the rotating disk (5) produces the desired light effects by covering in a changeable manner the holes of both disks (5, 6). The rotation is effected by entrainment elements (11) secured to the membrane (2) and the free extremity of which lies on the rotating disk (4). The vibrations produced when the loudspeaker (1) is in operation cause said elements (11) to slide, their movement being transferred by frictional engagement to the disk (5), rotating the same.



(57) Zusammenfassung

Eine Vorrichtung mit einem Lautsprecher (1), der gleichzeitig zur Erzeugung von Lichteffekten dient, weist eine Membrane (2) und Lichtquellen (10) auf. Die Öffnung der Membrane (2) ist durch eine rotierende Lochscheibe (5) und durch eine feststehende Lochscheibe (6) abgedeckt. Durch die Drehbewegung der rotierenden Scheibe (5) ergeben sich durch die wechselnde Überdeckung der Löcher in den beiden Scheiben (5, 6) die gewünschten Lichteffekte. Diese Rotation wird dadurch bewirkt, daß an der Membrane (2) Mitnehmer (11) befestigt sind, deren freies Ende an der rotierenden Scheibe (4) anliegt. Durch die beim Betrieb des Lautsprechers (1) auftretenden Erschütterungen ergibt sich eine Verschiebung der Mitnehmer (11), die durch Reibungsschluß auf die Scheibe (5) übertragen wird und diese in Drehbewegung versetzt.

Device for producing light effects

The present invention relates to a device for production of light effects, having two coaxially arranged perforated disks, one of said disks being driven with a rotary movement by means actuated by sound vibrations, and at least one of them is illuminated by a light source.

Devices are known for production of light effects, in which there is mounted a plurality of disks which are rotatable in relation to each other, with a light source located behind said disks which are either transparent or are perforated. A flowing light effect can be achieved with such a device.

At functions in which singing or music is broadcast through loudspeakers, it is frequently desirable to produce light effects in addition to the sound. Formerly this was achieved with the use of a plurality of generally different-coloured light sources which were installed separately from the loudspeakers and supplied intermittently with electric current. This requires a complicated electronic control system.

A device has become known from the US Patent US-A-4 232 304 which has two disks which are driven to rotate in opposite directions are illuminated by one light source. The rotational driving of the disks is effected with a pawl-and-detent mechanism by means of a vibrating bearing axle which is coupled to an electric coil disposed in the field of a permanent magnet. If electrical signals, for example from the output of radio equipment, a disk player or a tape recorder, are transmitted to the coil, an axial vibratory motion of the bearing axle is induced by the oscillations of the coil, resulting in rotation of the two disks. The disadvantage of this known arrangement is the expensive construction and the amount of space required to house the configuration. The rotation of the two disks certainly does occur in dependence upon the sound vibrations but, in order to achieve this rotation, it is not only necessary to have a separate vibratory system, independent of the loudspeakers which give rise to sound vibrations but, in addition, expensive constructional elements for translation of the vibrations into rotary movements are required.

The objective of the present invention is to develop a device of the type referred to initially for production of light effects in such a manner that, on the one hand, the driving of the rotating disks is simplified and, on the other hand, the device can be combined with a loudspeaker without substantially increasing the space required for accommodating the loudspeaker.

To achieve this objective, the proposal is put forward by the invention that the two perforated disks should be mounted over the area of the cavity of the loudspeaker membrane and that means should have at least one entrainment element which is affixed to either the rotating disk or the membrane and its free end is in frictional contact with either the membrane or the rotating disk so that a rotational movement of the disk is elicited because of the vibrations of the membrane.

With the device in accordance with the present invention, just as in the case of the US Patent US-A-4 232 304, sound vibrations are employed for driving the rotating disk, but the drive is derived directly from the vibrations of the membrane of a loudspeaker and is implemented by means of entrainment elements which transmit the vibrations of the membrane to the rotating disk by frictional engagement therewith. It has been found, ...(continue here with the original page 2)..

configuration of such a entrainment element, that the desired rotary movement of the rotating disk can be evoked by frictional entrainment, particularly in the frequency range of the loudspeaker between 60 and 120 Hz.

The combination of the device for production of light effects and a loud speaker has the advantage that the two can be accommodated in one housing in common, so that the size of the housing required to accommodate the loudspeaker does not have to be increased. The device in accordance with the present invention can be used in all those situations where loudspeaker broadcasts are to be combined with light effects, such as at performances by singers or musicians where pick-up microphones are employed, in discotheques, or at similar functions.

In accordance with a preferred embodiment of the invention, the rotating disk covers the entire area of the opening of the membrane of the loudspeaker to give the best possible effect.

Within the scope of the invention, the entrainment element can consist of a wire bent in the form of a helical curve. With this embodiment, the free end of the wire is in tangential contact with the surface of the rotating disk, which ensures the transformation of the vibratory movement of the loudspeaker membrane into the rotary movement of the rotating disk. It is expedient for the disk to be provided with a ring on the side facing towards the membrane for frictional engagement with the entrainment element. This ring provides reinforcement of the disk in the annular region where the entrainment element comes into contact with the disk, thus avoiding any deformation of the disk in this region and providing the completely flat surface for contact with the entrainment element which is essential for the impeccable functioning of the device in accordance with the present invention. The entrainment element can be affixed to the membrane with an adhesive, preferably an epoxy resin adhesive. This ensures a secure connection between the entrainment element, which can be made of metal for example, and the loudspeaker membrane. In accordance with a further feature of the invention, the free end of the entrainment element which is in contact with the rotating disk is provided with a cap of sound-deadening material made, for example, from rubber or a

rubber-like material. This eliminates the generation of disturbing noises which could otherwise be caused by the pushing action of the entrainment element against the rotating disk.

In accordance with another especially favourable form of embodiment of the invention, the entrainment element can consist of a bundle of fibres, preferably carbon fibres, which are disposed at an angle to the axis of the loudspeaker membrane. This bundle of fibres is preferably affixed to the rotating disk and its free end engages with an outer ring on the loudspeaker membrane. This type of fibre bundle transmits the vibrations of the membrane reliably to the rotating disk, without disturbing noises and without mechanical stressing of either the membrane or the disk.

The light source can be located within the cavity of the loudspeaker membrane, in which case the membrane is provided with a light-reflecting coating. This type of embodiment has the advantage that no additional space is required for accommodating the light source because, with the large-sized loudspeakers which are used in practice, there is adequate space available within the membrane cavity for accommodating the light source. In addition, in such a situation, the membrane also serves as the light reflector. The light which is emitted from the light source passes out through the perforations in the rotating disk and the desired light effects are produced by the continually changing overlapping of the two disks during the rotary movement of the rotating disk. However, the light source can be located outside the membrane cavity or outside the housing accommodating the loudspeaker, so that the surface of the disk which is facing towards the observer is illuminated by a light source, for example a spotlight. In this case, the other rotating disk must be provided with a light-reflecting coating on its surface which is facing the observer. In this case also, the rotation of the rotating disk will give rise to different amounts of reflection, thus giving rise to the desired light effects. Additional effects can be elicited by providing the rotating disk with a bent-over perimeter having perforations or cut-out portions towards which light is directed from at least one light source.

An example of embodiment of the invention is illustrated diagrammatically in the drawings, in which:

Fig. 1 is cross-section along the line I - I in Fig. 2 through a first embodiment of the device in accordance with the present invention,

Fig. 2 is a plan of the device in accordance with the present invention with the outside disk removed and the inside disk is partly broken away,

Fig. 3 is a section along the line III - III in Fig. 2,

Fig. 4 is a second embodiment of the device in accordance with the present invention in cross-section similar to Fig. 1.

The device as shown in Figs. 1 and 2 depicts a loudspeaker 1 with a membrane 2. The rim 3 of the loudspeaker and the peripheral ring 16 of the membrane 2 are fastened to a circular frame 4 which can form part of the housing for the device. The area of the cavity of membrane 2 is covered by the rotating disk 5 and by the outer fixed disk 6. Both disks 5, 6 have openings 18 and 19 in them. These disks are expediently fabricated as perforated disks or as loudspeaker grids. The fixed disk 6 is supported by a flange 7 on the frame 4 and it has a central bearing stud to carry the bearing for the rotating disk 5 which rotates around the axis 17 of the loudspeaker and the device. Light sources 10 are located within the cavity of the membrane 2. When the rotating disk 5 is rotating, the openings 18, 19 in the two disk 5, 6 continually overlap to produce light effects which are visible from the outside. The openings in these disks also allow the sound waves from the loudspeaker 1 to pass out through them.

Several entrainment elements 11 are provided to produce the rotation of the rotating disk 5. Each entrainment element consists of a wire in the form of helical coil which is affixed to a peripheral ring 13, which projects outwards around the truncated conical portion of the membrane 2, by means of an

adhesive, for example an epoxy resin adhesive. The free end of each entrainment element 11 is furnished with a cap 14, made from sound-deadening material, which is in contact with a flat annulus 15 attached to the rotating disk 5 on the side facing towards the membrane 2. Because of the vibrations of the membrane 2, in particular at frequencies in the range from 60 to 120 Hz, the entrainment element 11 is set in motion and this is transmitted through the cap 14 to the disk 5 by frictional contact in such a manner that the disk 5 is caused to rotate around the axis 17, without the need for having an electric motor or similar drive mechanism for this purpose.

In the embodiment shown in Fig. 4, entrainment elements 21 are provided to rotate the disc 5, but these elements are formed like paint brushes from bundles of carbon fibres. Each of these bundles of fibres is fastened to the disk 5 by means of its ferrule 22 in such a way that the axis of the fibre bundle is inclined at an angle to the axis 17, The free ends of the entrainment elements 21 formed by the carbon fibre bundles are in contact with the peripheral ring 16 around the membrane 2. This peripheral ring can be relatively rigid but, nonetheless, it transmits the vibrations of the membrane 2 to the entrainment elements 21, of which there are expediently three or four disposed at regular intervals around the peripheral ring 16.

High-capacity light-emitting diodes, expediently of different colours, are located within the housing 25, but outside the area occupied by the membrane 2. These light-emitting diodes are disposed around the perimeter of the housing 25 in sloping positions so that the light beam is directed towards the axis 17 and the central bearing stud 8. The rotating disk 5 has a bent-over flange 23, with perforations or cut-out portions 24, around its perimeter, so that there is alternating ingress of light, from the light sources 10, to the inside of the rotating disk 5. This makes it possible to achieve additional effects, especially when different-coloured light sources are employed. The light sources 10 are covered and protected by the outer fixed disk 6 which is firmly, but detachably, affixed to the housing 25.

In a modified form of embodiment, no light sources 10 are provided within the cavity of the membrane 2, but instead, the device is illuminated by an external light source, for example by at least one spotlight 20, the light from which is incident upon the outside surface of the fixed disk 6. The surface of the rotating disk 5 which faces towards the fixed disk 6 is provided with a light-reflecting coating which reflects the incident light from the spotlight 20 so that analogous light effects can be achieved.

In order to gain better utilisation of the light emitted by the light sources 10, the membrane 2 can also be provided with a light-reflecting coating.

The claims defining the invention are as follows:

1. A device for producing light effects, including two coaxially arranged perforated discs, one of said discs being driven with a rotary movement by means actuated by sound vibrations and at least one of said discs being illuminated by a light source, wherein said two discs are mounted over the area of the cavity of a membrane of a loudspeaker and wherein said means actually by sound vibrations include at least one entrainment element affixed to said rotating disc or to said membrane with the free end thereof in frictional contact with said membrane or with said rotating disc so that vibrations of said membrane cause relative rotation of said discs.

2. The device according to Claim 1, wherein said rotating disc covers the area of said cavity of said membrane of said loudspeaker.

3. The device according to Claim 1 or Claim 2, wherein said entrainment element consists of a wire bent in the form of a helical curve.

4. The device according to any one of Claims 1 to 3, wherein a ring is fastened to the side of said rotating disc facing towards said membrane for frictional engagement with the free end of said entrainment element.

5. The device according to any one of Claims 1 to 4, wherein said entrainment element is affixed to said membrane with adhesive.

6. The device according to Claim 5, wherein said adhesive is an epoxy resin adhesive.

7. The device according to any one of Claims 1 to 6, wherein said free end of said entrainment which is in contact with said rotating disc is provided with a cap of sound-deadening material.

8. The device according to Claim 7, wherein said cap is made from rubber or the like material.

9. The device according to any one of Claims 1 to 8, wherein said entrainment element consists of a bundle of fibres, disposed at an angle to the axis of said loudspeaker membrane.

10. The device according to Claim 9, wherein said fibres are carbon fibres.

11. The device according to Claim 9 or Claim 10, wherein said bundle of fibres is affixed to said rotating disc and its free end engages with an outer ring on said loudspeaker membrane.

12. The device according to any one of Claims 1 to 11, wherein said light source is located within said cavity of said membrane of said loudspeaker.

13. The device according to Claim 12, wherein said membrane is provided with a light-reflecting coating.

14. The device according to any one of Claims 1 to 12, wherein that surface of said disc facing towards the observer is illuminated by a light source, the other rotating disc being provided with a light-reflecting coating on its surface facing towards the observer.

15. The device according to any one of Claims 1 to 14, wherein said rotating disc has a bent-over perimeter with perforations or cut-out portions towards which light is directed from at least one light source.

16. A device for producing light effects, substantially as herein described with reference to the accompanying drawings.

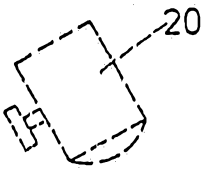
DATED this 28th day of February 1991.

ERICH STASTNY

By their Patent Attorneys:

CALLINAN LAWRIE

Fig. 1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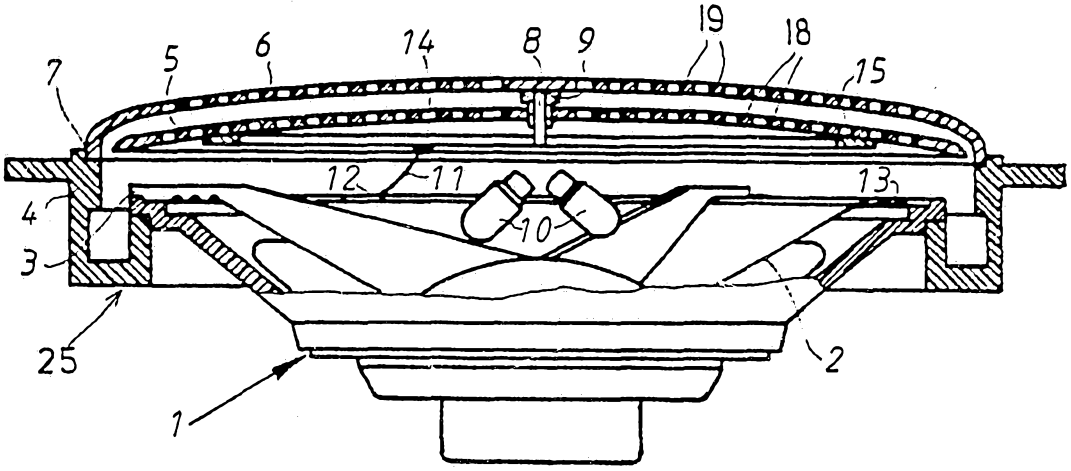
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FIG. 4

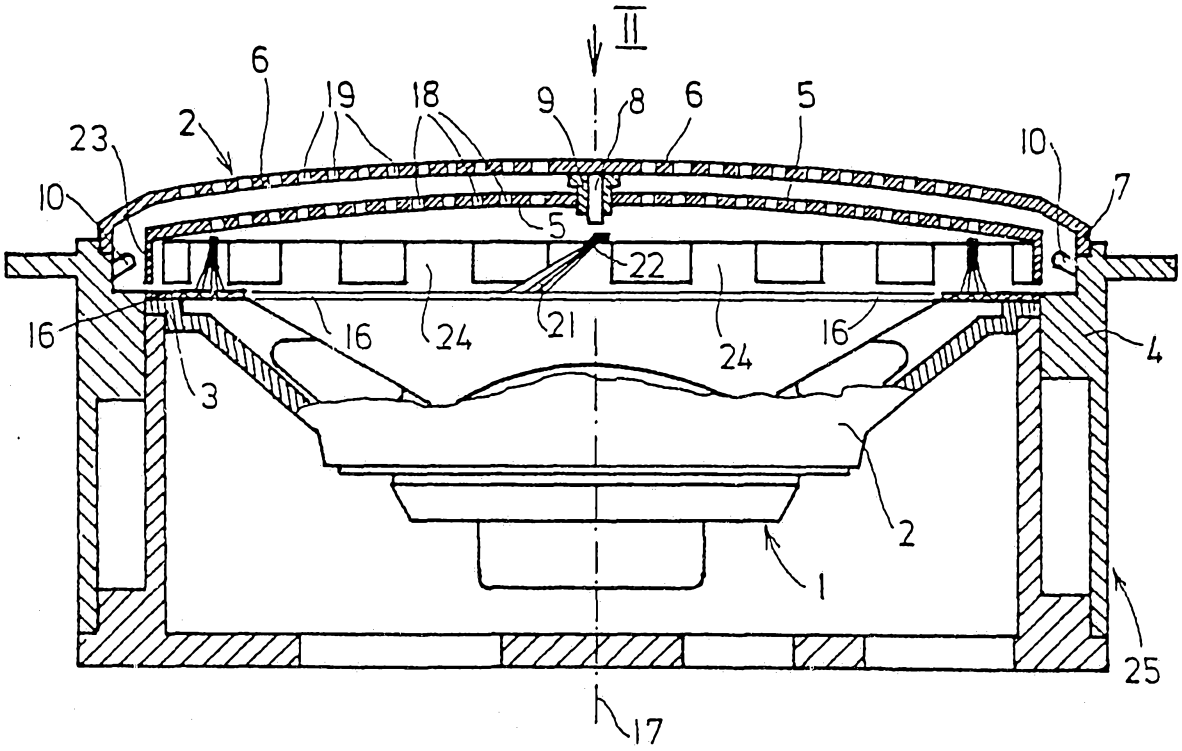
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Fig. 2

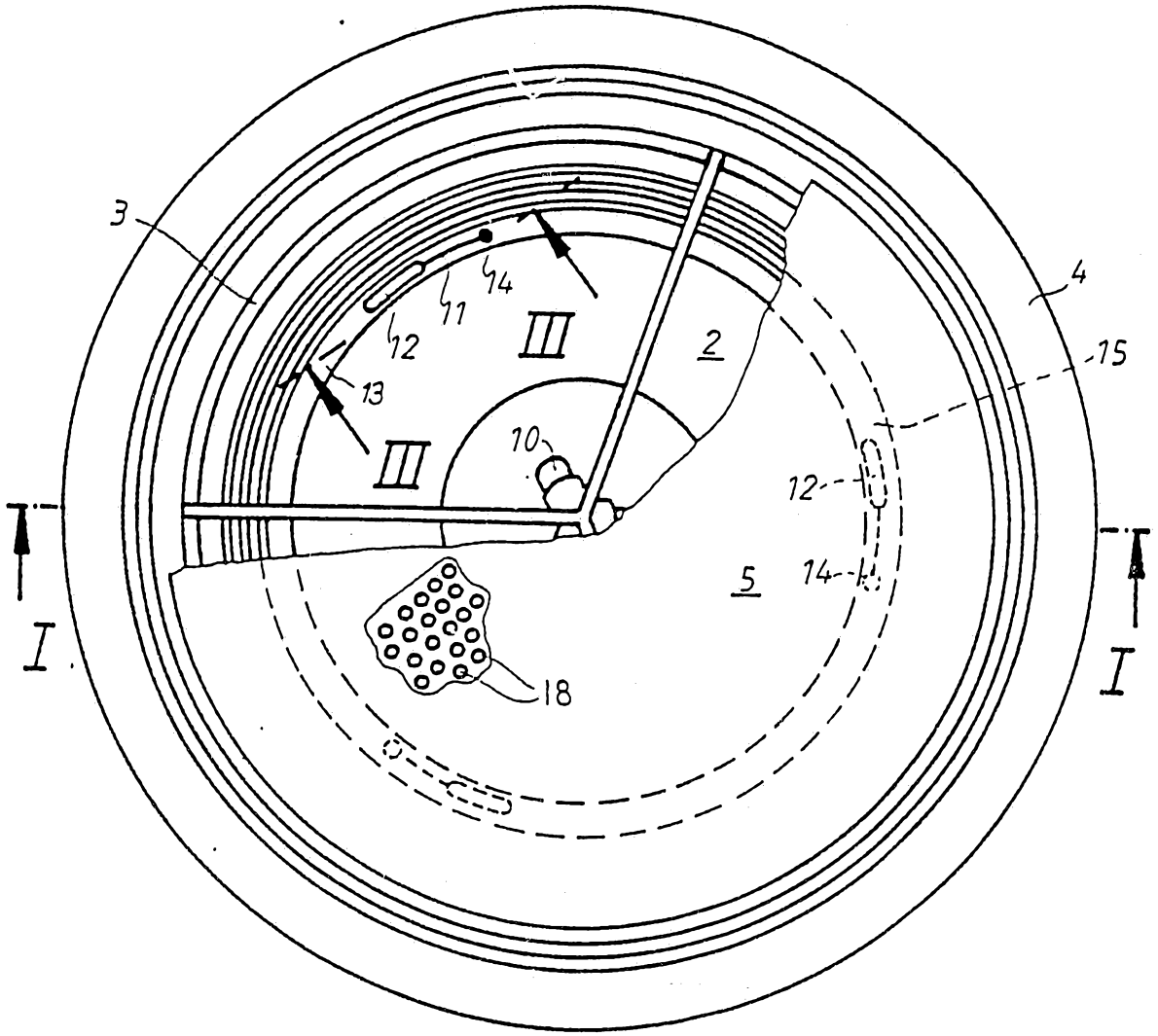
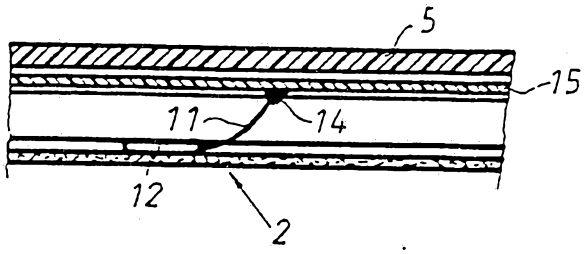


Fig. 3



INTERNATIONAL SEARCH REPORT

International Application No PCT/AT87/00049

I. CLASSIFICATION OF SUBJECT MATTER (If several classification symbols apply, indicate all) [6]

According to International Patent Classification (IPC) or to both National Classification and IPC

Int.Cl[4]: A 63 J 17/00, F 21 P 5/02

II. FIELDS SEARCHED

Minimum Documentation Searched [7]

Classification System	Classification Symbols
Int.Cl[4]	A 63 J H 04 R F 21 P

Documentation Searched other than Minimum Documentation to the Extent that such Documents are included in the Fields Searched [8]

III. DOCUMENTS CONSIDERED TO BE RELEVANT [9]

Category *	Citation of Document, [11] with indication, where appropriate, of the relevant passages [12]	Relevant to Claim No. [13]
X	US,A,4232304(DURLEY III)04 November 1980, see figures 2,9,1-,30;column 5,lines 50-51;column 8,lines 33-36;column 12, lines 25-61	1,2
Y	--	10
A	--	7
Y	EP,A,0099932(MITSUBISHI DENKI K.K.) 08 February 1984,see abstract;page 5, lines 8-13	10
	--	
Y	US,A,3473429(TANDBERG)21 October 1969 see figures 1-4;column 1,lines 35-59	1,2
	--	
Y	US,A,4085932(HAMANO)25 April 1978 see abstract;figure 3	1,2
	--	
A	GB,A,1248821(PHILLIPS)06 October 1971 see figures 3,7,8,25	1
	--	
A	US,A,3603195(WILLIAMS)07 September 1971 see figures 3,4;column 2,lines 56-64	1,6,11
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* Special categories of cited documents: [10]

"A" document defining the general state of the art which is not considered to be of particular relevance

"E" earlier document but published on or after the international filing date

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"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step

"Y" document of particular relevance; the claimed inve. 'on cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.

"&" document member of the same patent family

IV. CERTIFICATION

Date of the Actual Completion of the International Search	Date of Mailing of this International Search Report
26 November 1987(26.11.87)	22 December 1987(22.12.87)
International Searching Authority	**Signature of Authorized Officer**
European Patent Office	

ANNEX TO THE INTERNATIONAL SEARCH REPORT
ON INTERNATIONAL PATENT APPLICATION NO. AT 8700049
SA 18427

This annex lists the patent family members relating to the patent documents cited in the above-mentioned international search report.
The members are as contained in the European Patent Office EDP file on 08/12/87
The European Patent Office is in no way liable for these particulars which are merely given for the purpose of information.

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US-A- 4232304	04-11-80	Keine	
EP-A- 0099932	08-02-84	WO-A- 8302707 AU-A- 1153483	04-08-83 12-08-83
US-A- 3473429	21-10-69	Keine	
US-A- 4085932	25-04-78	Keine	
GB-A- 1248821	06-10-71	Keine	
US-A- 3603195	07-09-71	Keine	