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(54) **Device for panoramic viewing, especially of extensive public areas**

Vorrichtung zur panoramischen Ansicht, insbesondere von öffentlichen Lokalen

Dispositif pour visualisation panoramique, notamment des lieux publics

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(56) References cited:  
**WO-A-99/16233** **DE-A- 19 621 612**  
**US-A- 5 448 320**

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## Description

**[0001]** This invention refers to a device for panoramic viewing, especially of extensive public areas.

**[0002]** A device for panoramic viewing of this type is highly useful for parks, gardens and extensive and/or isolated areas in general, where the security of any users is to be safeguarded.

**[0003]** It is known that the traditional devices for panoramic viewing comprise a box-type structure on a pole at man height, which houses a telecamera capable of being rotated by a motor in a 360° range.

**[0004]** A user in distress or danger is sighted by the telecamera on the pole, which transmits the images to a control center where some operators are capable of organizing and/or coordinating a rescue. For example, WO 99/16233 discloses a device for panoramic viewing of extensive public areas according to the preamble of claim 1.

**[0005]** However, the traditional devices are notoriously exposed to the attack of vandals and ill-intentioned persons, as they are stationary, easily accessed and reachable. Moreover, such devices are equipped with a single telecamera mounted at a moderate height, which heavily restricts the visual angle to be controlled, and therefore limits the surveillance available from the pole.

**[0006]** The purpose of this invention is to eliminate the mentioned technical drawbacks, by producing a device for panoramic viewing, especially of extensive public areas, capable of inspecting and/or monitoring extensive areas.

**[0007]** A further purpose of the invention is to produce a device capable of operating from positions not easily accessible and reachable, so that any attempts at damaging them are impeded by their poor accessibility.

**[0008]** A further scope of the invention is to produce a device of a robust type, capable of withstanding the mishandling and/or the blows of ill-intentioned persons.

**[0009]** Not the last purpose of the invention is to produce a device for panoramic viewing, especially of extensive public areas, of an essentially simple, safe and reliable kind.

**[0010]** These and other purposes, according to this invention, are achieved by producing a device for panoramic viewing, especially of extensive public areas, according to claim 1.

**[0011]** Additional characteristics of this invention are further defined in the subordinate claims.

**[0012]** In an advantageous manner, the device according to this invention exercises a deterrent action on ill-intentioned persons, because it can be operated at any moment from the control center. The operators of the control center are therefore able to use the telecameras to view the events occurring in the vicinity of the device, to organize and/or to coordinate help and rescue actions and to eventually alert the public security forces.

**[0013]** Moreover, the entire device is fitted with some vibration and proximity sensors, which will in case of at-

tack automatically alert the operating center and public security forces.

**[0014]** It should also be added that the device is installed without providing any fixed electrical and/or telephonic connection, and that its maintenance, in particular for replacing the batteries, may be effected by a simple operation requiring only a few minutes, based on the signal received from the device itself.

**[0015]** Further characteristics and advantages of a device for panoramic viewing, especially of extensive public areas according to this invention, will become more clearly evident from the following description, referred to the simplified enclosed drawings, in which:

Figure 1 shows a prospective view of the device according to the invention,

Figure 2 shows a sectionalized prospective view of the device shown in Figure 1,

Figure 3 shows a plan view of a detail of the device according to the invention,

Figure 4 shows a detail of the circuits controlling the operation of the device, housed inside the bottom space shown in Figure 3,

Figure 5 shows a simplified view of the field of view of the device according to the invention, properly mounted at a height of about 3 meters.

**[0016]** The reference to the mentioned figures shows a device for panoramic viewing, in particular of extensive public areas, designated in its overall form by the number 11.

**[0017]** The device 11 comprises a box-type body of a circular bottom outline, made of a cup-type bottom 12 closed by a circular plate 13. The free edge of the bottom 12 is fastened to a cylindrical element 14 made of a transparent material, and closed by a lid 15 firmly attached to a hollow hood 16.

**[0018]** The body produced in this manner forms three different chambers: a first chamber 17 inside the bottom 12, a second chamber 18 inside the cylindrical element 14 and a third chamber 19 inside the hood 16.

**[0019]** The first chamber 17 houses six lateral telecameras 20, serving as image-acquiring fixtures and mounted along the cup-type bottom 12 of the body at an even distance from each other. The objective of each telecamera 20 faces a through hole 21 provided in the lateral wall of the cup-type bottom 12, so as to make it possible to capture a view of the environment outside the device 11.

**[0020]** These lateral telecameras 20 are placed in a way to enable a 360° view of the environment surrounding the device 11. In fact, because each telecamera 20 has a visual angle of 72° on a horizontal plane, the 360° coverage is ensured with a slight overlap (12°) of the horizontal field between the two adjacent telecameras 20 ( $62^\circ \times 6 = 432^\circ > 360^\circ$ ).

**[0021]** Moreover, the telecameras 20 are mounted with their axes turned downward (when the device is

properly positioned with its bottom 12 turned downward, and its lid 16 turned upward by about 20°, so as to also make it possible to visualize the environment set below and in the vicinity of the device 11.

**[0022]** The chamber 17 also houses a bottom telecamera 22 as a further image acquiring fixture, which faces downward (at a properly positioned device 11) and keeps its objective facing an additional through hole 23, also downward turned. The telecamera 22 and of course the hole 23 have axes offset with respect to one of the symmetry axes of the body's bottom 12.

**[0023]** The telecamera 22 allows viewing an area set below the device 11 and commands a visual range which is slightly overlapping with respect to that of the lateral cameras 20, so as to ensure a total possibility of viewing of the environment surrounding the device 11, without leaving any areas in the dark.

**[0024]** The chamber 17 also contains the electronic circuits controlling the operation of the device 11. In particular, these circuits comprise a control circuit based on a video multiplexer 24, which controls the operation of the seven telecameras 20 and 22, the electronic circuit feeder 25, the lamp 26, and the coupling circuit 27 to the antenna 28.

**[0025]** The chamber 17 further contains an vibration sensor 29 and a proximity sensor 30. The sensors 29, 30 are electrically connected to the feeder 25 and the circuit 27, so as to alert the operating center whenever the device 11 is attacked by vandals or ill-intentioned persons.

**[0026]** The second chamber 18 contains a lamp 26 as a signaling device, which is electrically connected to the feeder 25. The lamp 26 is mounted on a lamp holder housed in a seat crossing the plate 13; the lamp holder is electrically connected to the feeder 25 by some electric cables, not shown here for simplicity. This lamp 26 is preferably of a gas discharge type and used as a blinking light, to allow the alarm signaling device 11 to be easily and quickly identified.

**[0027]** The third chamber 19 contains the antenna 28 of a GSM radio type, which is electrically connected to the coupling circuit 27. The antenna 28 is fixed in a hole crossing the lid 15 and electrically connected to the coupling circuit 27 by a cable, not shown here for simplicity.

**[0028]** The device 11 is particularly suitable for being operated on a support at a high elevation above the ground, for example on a pole at a height of about 3 meters.

**[0029]** The operation of a device for panoramic viewing, in particular of extensive public areas according to the invention, is as follows.

**[0030]** While running, the device 11 transmits the images taken by its telecameras 20, 22 to an operating center where the operators can organize the rescue and/or alert the public security forces.

**[0031]** In particular, the device 11 allows taking photos of the targeted scenes in a 360° range.

**[0032]** These photos are taken in sequence, so as to

memorize in a time lapse of about 1 second 7 images framed by the 6 lateral cameras 20 and the downward turned camera 22. This makes it possible to scan the entire panorama in a 360° range at practically the same instant (1 second). The images therefore acquire a well defined and fixed temporal relationship among them, so as to maintain a congruence between them, even if transmitted to the operating center in a delayed time mode, which allows a better analysis of the pictured events.

**[0033]** The device 11 is particularly suited for a remote surveillance from an operating center. In this case the images taken by the seven telecameras 20, 22 of the device 11 are sequentially transmitted each of them every 5/10 seconds, thus providing a completely refreshed panorama about every 40/70 seconds.

**[0034]** The visual range of the telecameras 20, 22 of the device 11 covers a broad area around the same device 11, when the latter is properly mounted, preferably on a pole at a height of about 3 meters. The lateral cameras 20 in fact enjoy a visual range of at least 54° on a vertical plane, and manage to see as far as the visual range of the downward turned telecamera 22 permits. The axis of each lateral telecamera 20 is tilted 20° downward, and encounters the ground, on a horizontal plane, at a ground distance from the device 11 of about 41 meters, which means that the telecameras 20 are pointed toward objects or persons set at a ground distance of about 41 meters from the device 11, when the latter is mounted at a height of 3 meters. This makes it therefore possible to see objects set at a ground height of 10 meters and at a distance of about 57 meters from the device 11. The telecamera 22 has a visual range of about 93°, so as to cover the lower area of the device at a slight overlap with the visual range of the lateral cameras.

**[0035]** The device 11 according to the invention allows viewing every object or person in the half space extending from 360° around the device 11 and downward, with an upward limitation of 7° beyond the horizon of the device.

**[0036]** It has in practice been found that a device for the panoramic viewing of extensive public areas according to the invention is particularly advantageous, as it allows a remote surveillance of vast public areas without requiring cables, which would be its weak point and increase the cost, for either its electrical feeding system or its communications with the operating center. The device may moreover be spotted quickly and easily by persons in distress, and is any rate hard to damage by vandals and/or ill-intentioned persons.

### Claims

1. A device (11) for panoramic viewing of extensive public areas, comprising a box-type body (12-16), having a circular ground plan and whose interior houses a multiple number of fixtures (20, 22) for ac-

quiring images, which are facing towards through holes (21, 23) provided along a perimeter of said body (12-16) to see outside said body (12-16), where said fixtures (20, 22) are associated with a control circuit (24), a feeder (25) and a coupling circuit (27) to an antenna (28), so that the images taken by each of these fixtures (20, 22) can be transmitted to a control center, said device (11) also comprising a signaling unit (26), capable of identifying said device (11) in a quick and simple manner, **characterised in that** said body (12-16) forms at least three chambers (17-19), where a first chamber (17) contains at least said fixtures for acquiring the images (20, 22) by said control circuits (24), where said feeder (25), said coupling circuit (27) and at least said signaling unit (26) are housed in a second chamber (18), and where at least said antenna (28) is housed in a third chamber (19).

2. A device (11) according to claim 1, **characterized in that** it comprises at least one vibration sensor (29) capable of alerting said control center whenever a dangerous situation is noticed for said device (11).
3. A device (11) according to claim 1, **characterized in that** it comprises at least one proximity sensor (30) capable of alerting said control center whenever a dangerous situation is noticed for said device (11).
4. A device (11) according to claim 1, **characterized in that** a plurality of lateral units (20) of said fixtures (20, 22) for acquiring images are housed along a perimeter of said body (12-16) at essentially even distances from each other.
5. A device (11) according to claim 4, **characterized in that** said lateral fixtures (20) are mounted having an axis turned downward by about 20°, whenever said device is properly positioned with one bottom (12) turned downward and one hood (16) turned upward, so as to also enable viewing the environment below and in the vicinity of said device (11).
6. A device (11) according to claim 1, **characterized in that** at least one bottom unit (22) of said fixtures (20, 22) for acquiring images faces one bottom (12) of said body (12-16) destined to be turned downward when said device (11) is mounted in a correct position.
7. A device (11) according to claim 6, **characterized in that** said at least one bottom unit (22) is offset with respect to an axis of symmetry of said bottom (12) of said body (12-16).
8. A device (11) according to claim 1, **characterized**

**in that** said signaling unit (28) comprises at least one lamp.

9. A device (11) according to claim 1, **characterized in that** said fixtures (20, 22) for acquiring the images are constituted by telecameras.
10. A device (11) according to claim 1, **characterized in that** it is suitable for being operated on a support at a high level above the ground.

#### Patentansprüche

1. Gerät (11) für die panoramische Betrachtung von ausgedehnten öffentlichen Bereichen, umfassend einen kastenartigen Körper (12-16), der einen kreisförmigen Grundriss aufweist und in dessen Inneren eine Mehrzahl von Vorrichtungen (20, 22) zur Gewinnung von Bildern untergebracht sind, welche Durchgangsöffnungen (21, 23), die entlang einem Umfang des Körpers (12-16) angeordnet sind, zugewandt sind, um aus dem Körper (12-16) zu sehen, wobei die Vorrichtungen (20, 22) mit einer Steuerschaltung (24), einem Speiser (25) und einer Kopplungsschaltung (27) zu einer Antenne (28) verbunden sind, so dass die von jeder dieser Vorrichtungen (20, 22) aufgenommenen Bilder zu einem Kontrollzentrum übertragen werden können, wobei das Gerät (11) ferner eine Signalgabeeinheit (26) umfasst, welche das Gerät (11) auf schnelle und einfache Weise zu identifizieren vermag, **dadurch gekennzeichnet, dass** der Körper (12-16) mindestens drei Kammern (17-19) bildet, wobei eine erste Kammer (17) wenigstens die Vorrichtungen (20, 22) zur Gewinnung der Bilder über die Steuerschaltungen (24) enthält, wobei der Speiser (25), die Kopplungsschaltung (27) und wenigstens die Signalgabeeinheit (26) in einer zweiten Kammer (18) angeordnet sind, und wobei wenigstens die Antenne (28) in einer dritten Kammer (19) angeordnet ist.
2. Gerät (11) nach Anspruch 1, **dadurch gekennzeichnet, dass** es mindestens einen Vibrations-sensor (29) umfasst, welcher das Kontrollzentrum zu warnen vermag, wenn eine gefährliche Situation für das Gerät (11) bemerkt wird.
3. Gerät (11) nach Anspruch 1, **dadurch gekennzeichnet, dass** es mindestens einen Näherungs-sensor (30) umfasst, welcher das Kontrollzentrum zu warnen vermag, wenn eine gefährliche Situation für das Gerät (11) bemerkt wird.
4. Gerät (11) nach Anspruch 1, **dadurch gekennzeichnet, dass** eine Mehrzahl von seitlichen Einheiten (20) der Vorrichtungen (20, 22) zur Gewinn-

nung von Bildern entlang einem Umfang des Körpers (12-16) in im Wesentlichen gleichen Abständen voneinander angeordnet sind.

5. Gerät (11) nach Anspruch 4, **dadurch gekennzeichnet, dass** die seitlichen Vorrichtungen (20) mit einer um ca. 20° nach unten geneigten Achse angeordnet sind, wenn das Gerät richtig, mit einem Boden (12) nach unten und einer Haube (16) nach oben weisend, positioniert ist, um so auch die Umgebung unterhalb und in der Nähe des Gerätes (11) betrachten zu können. 5
6. Gerät (11) nach Anspruch 1, **dadurch gekennzeichnet, dass** wenigstens eine untere Einheit (22) der Vorrichtungen (20, 22) zur Gewinnung von Bildern einem Boden (12) des Körpers (12-16) zugewandt ist, der dazu bestimmt ist, nach unten zu weisen, wenn das Gerät (11) in korrekter Position montiert ist. 10
7. Gerät (11) nach Anspruch 6, **dadurch gekennzeichnet, dass** die wenigstens eine untere Einheit (22) bezüglich einer Symmetrieachse des Bodens (12) des Körpers (12-16) versetzt ist. 15
8. Gerät (11) nach Anspruch 1, **dadurch gekennzeichnet, dass** die Signalabeeinheit (28) mindestens eine Lampe umfasst. 20
9. Gerät (11) nach Anspruch 1, **dadurch gekennzeichnet, dass** die Vorrichtungen (20, 22) zur Gewinnung der Bilder von Telekameras gebildet sind. 25
10. Gerät (11) nach Anspruch 1, **dadurch gekennzeichnet, dass** es geeignet ist, an einem Träger in großer Höhe über dem Erdboden betrieben zu werden. 30

#### Revendications

1. Dispositif (11) pour une visualisation panoramique de zones publiques étendues comprenant un corps, en forme de caisson, (12-16) présentant un plan au sol circulaire et dont l'intérieur abrite une multiplicité d'appareils (20, 22) d'acquisition d'images, lesquels sont placés en face de trous d'observation (21, 23) prévus sur le périmètre dudit corps (12-16) pour voir à l'extérieur dudit corps (12-16), dans lequel lesdits appareils (20, 22) sont associés avec un circuit de commande (24), une source d'alimentation (25) et un circuit de couplage (27) à une antenne (28), de façon que les images prises par chacun de ces appareils (20, 22) puissent être transmises à un centre de contrôle, ledit dispositif (11) comprenant également une unité de signalisation (26) capable d'identifier ledit dispositif (11) de façon simple et rapide, 45

**caractérisé en ce que** ledit corps (12-16) forme au moins trois chambres (17-19), dans lequel une première chambre (17) contient au moins lesdits appareils servant à acquérir des images (20, 22) par lesdits circuits de commande (24), dans lequel ladite source d'alimentation (25), ledit circuit de couplage (27) et ladite au moins une unité de signalisation (26) sont logés dans une seconde chambre (18), et où ladite antenne au moins (28) est logée dans une troisième chambre (19).

2. Dispositif (11) selon la revendication 1, **caractérisé en ce qu'il** comprend au moins un détecteur de vibration (29) capable d'alerter ledit centre de contrôle chaque fois qu'une situation dangereuse est signalée audit dispositif (11). 50
3. Dispositif (11) selon la revendication 1, **caractérisé en ce qu'il** comporte au moins un détecteur de proximité (30) capable d'alerter ledit centre de contrôle chaque fois qu'une situation dangereuse est signalée audit dispositif(11). 55
4. Dispositif (11) selon la revendication 1, **caractérisé en ce qu'**une pluralité d'unités latérales (20) desdits appareils (20, 22) servant à acquérir des images sont logées le long du périmètre dudit corps (12-16) à distance essentiellement égale l'une de l'autre.
5. Dispositif (11) selon la revendication 4, **caractérisé en ce que** lesdits appareils latéraux (20) sont montés en présentant un axe tourné vers le bas d'environ 20°, chaque fois que ledit dispositif est correctement positionné avec un fond (12) tourné vers le bas et un capot (16) tourné vers le haut, de façon à permettre également la visualisation de l'environnement situé au-dessous et au voisinage dudit dispositif (11).
6. Dispositif (11) selon la revendication 1, **caractérisé en ce qu'**au moins une unité inférieure (22) desdits dispositifs (20, 22) servant à acquérir des images est placée en face du fond (12) dudit corps (12-16) destiné à être tourné vers le bas lorsque ledit dispositif (11) est fixé en position correcte.
7. Dispositif (11) selon la revendication 6, **caractérisé en ce que** ladite unité inférieure (22) est décalée par rapport à un axe de symétrie dudit fond (12) dudit corps (12-16).
8. Dispositif (11) selon la revendication 1, **caractérisé en ce que** ladite unité de signalisation (28) comporte au moins une lampe.
9. Dispositif (11) selon la revendication 1, **caractérisé en ce que** lesdits appareils (20, 22) d'acquisition d'images sont constitués de caméras de télévision.

10. Dispositif (11) selon la revendication 1, **caractérisé en ce qu'il** est disposé de façon appropriée pour fonctionner sur un support placé à un niveau élevé au-dessus du sol.

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Fig.1

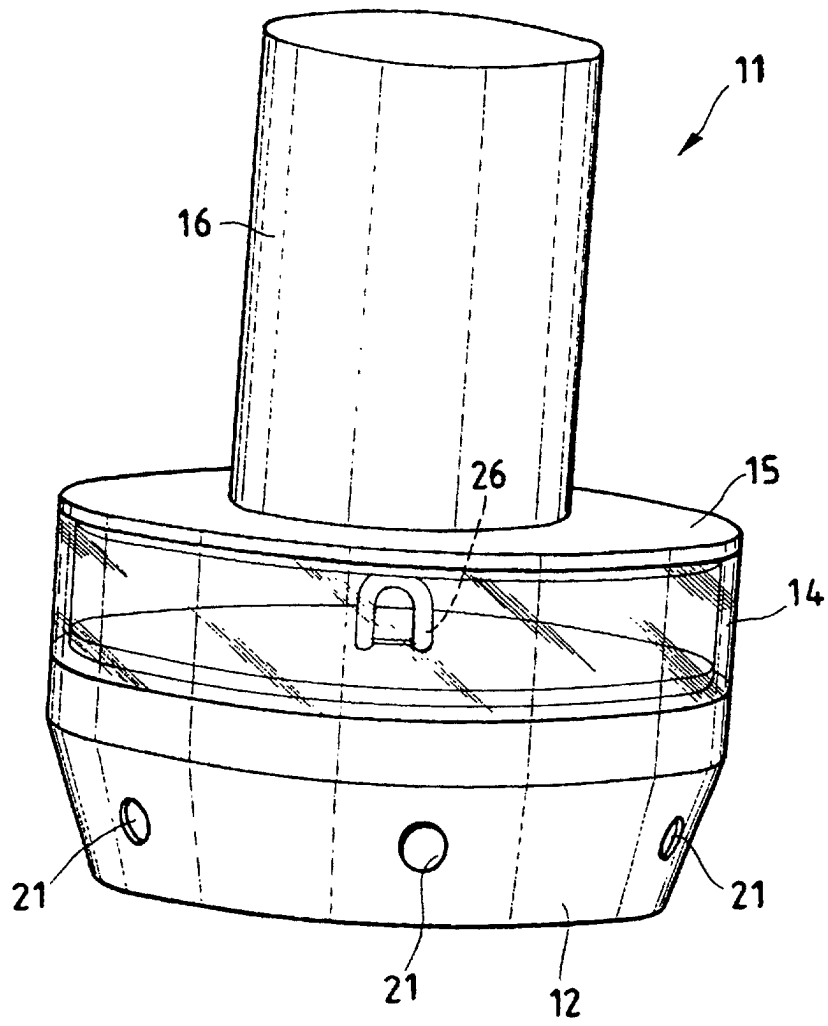


Fig.2

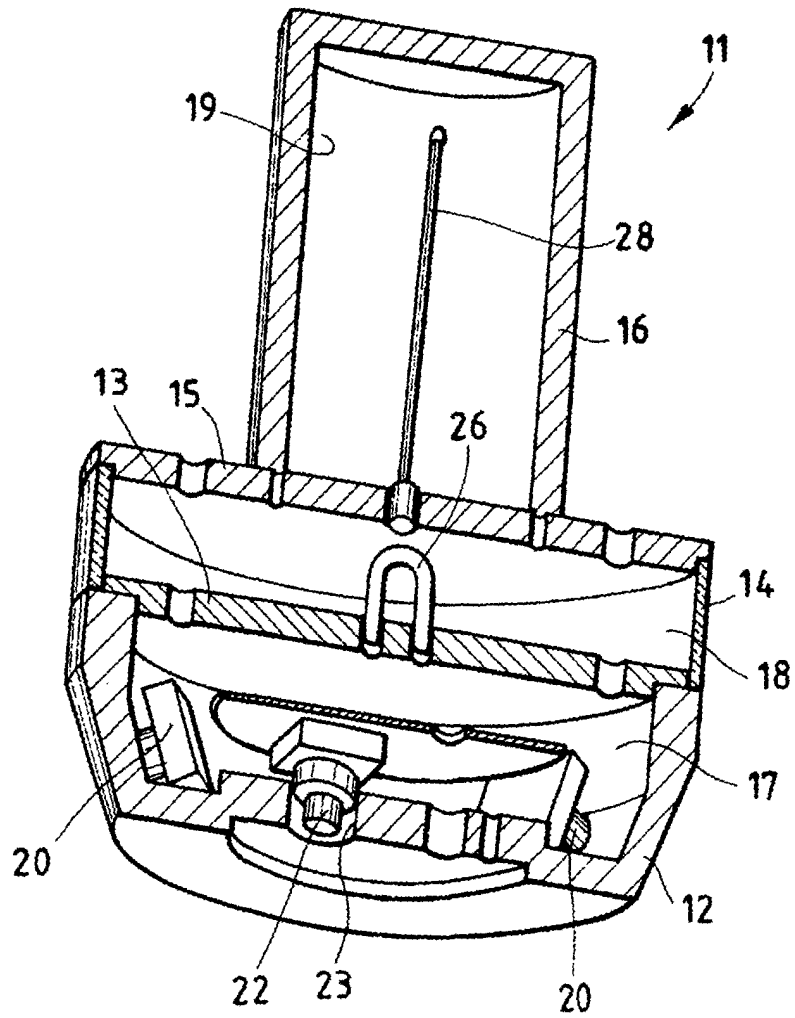
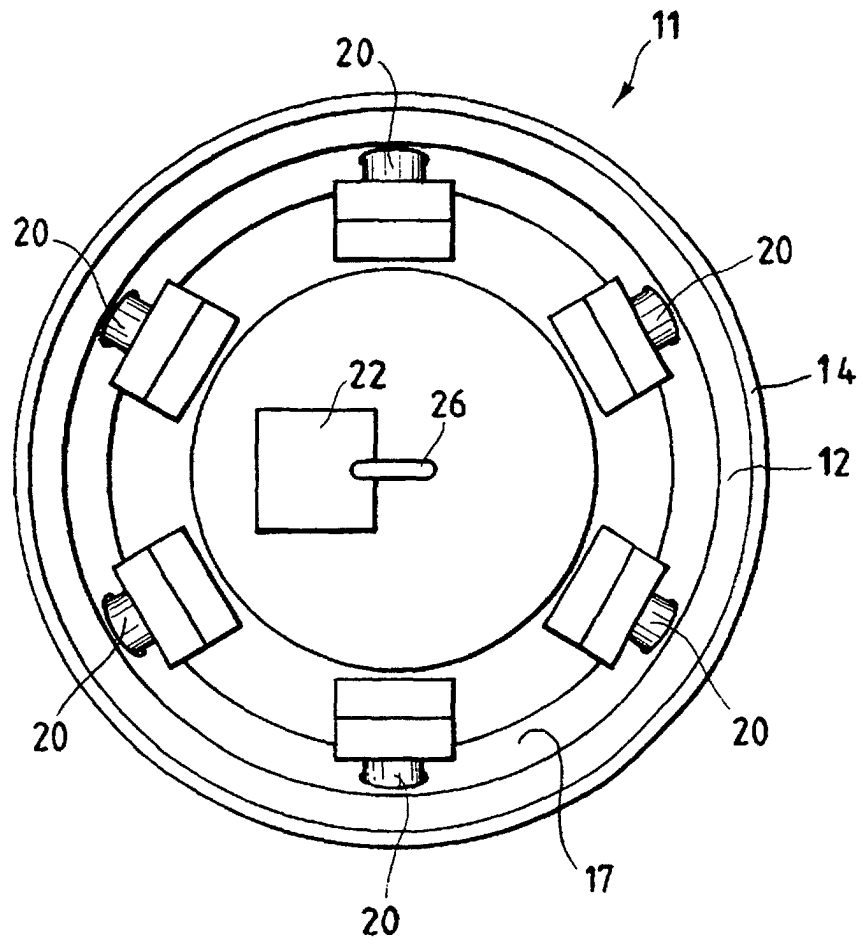




Fig. 3



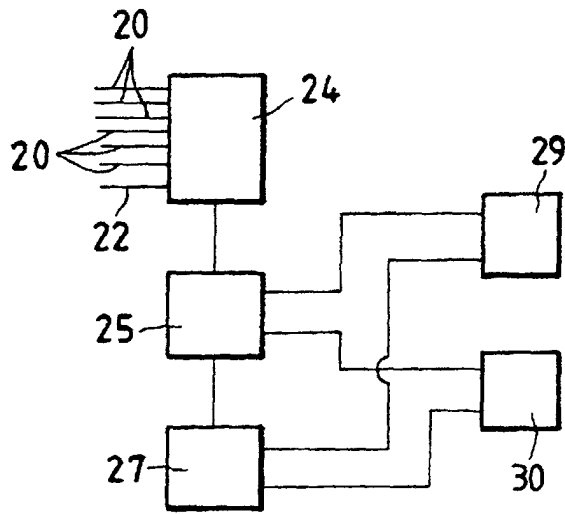


Fig.4

Fig.5

