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(54) Machines for amusement and playing games.

(57) A fruit machine (M) or other games machine has a die (1 ; 54 ; 103 ; 132) which is mounted for rotation about one axis(2 ; 42 ; 109) which is itself rotatable about a second axis (24 ; 43 ; 106). The die may be held in a cup-shaped mask (102) which hides the drive mechanism of the die. There may be a front mask assembly (105) which also assist in hiding the operating mechanism from the viewer. Thus the viewer sees the die tumbling unsupported.

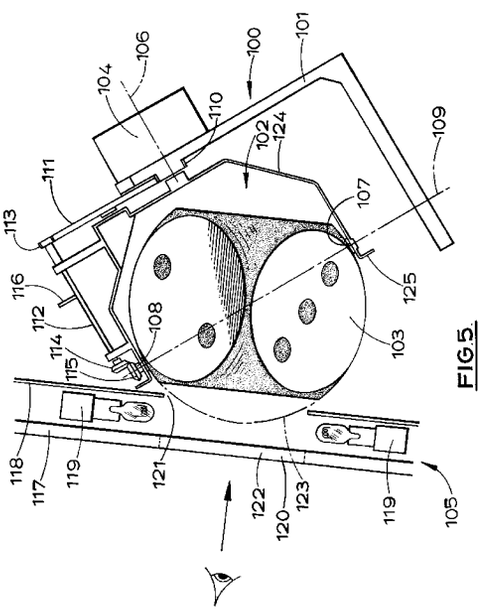

FIG.5.

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This invention relates to devices incorporating symbol carrying bodies and is applicable particularly but not exclusively to machines for amusement or for playing games.

In the art of gaming or amusement machines, it is well known to display symbols, such as representations of fruits, playing cards and so on, within amusement machines using mechanically-rotating reel mechanisms with the symbols arranged around the periphery of a rotating drum assembly, as in the so-called "fruit machine". It is also known to display as part of such machines other symbols, in particular dice, which have associations with other forms of gaming, in order to represent such other games within the framework of a fruit machine game.

However, there is a considerable difference between the appearance of a three-dimensional die and its representation on a two-dimensional surface of a reel strip, and such representations are not as popular with the players of such games as perhaps they would be were the representation more realistic.

We have already proposed improvements in the symbols used in fruit machines, for example in our patent application GB 8918448.5 in which the symbols have a three dimensional profile. A representation of a die can be made three dimensional in this way, but it only has one face visible to the user.

According to the invention apparatus for playing games or amusement in which symbols are presented at a viewing station, or position, comprises a die or other symbol-carrying body, and drive means adapted to move the die between different presentation positions in which different portions of the body are presented to the viewing station.

Control means is preferably provided which controls the drive means so that the symbol presented to a viewing station is controlled by the control means.

Preferably the control means knows what symbol is presented to the viewing station. It may do this by having a predetermined sequence of symbols to be presented and knowing where it is in that sequence, or by the provision of sensor means. The sensor means may be adapted to detect the orientation of the die with respect to the viewing station, or may be adapted to produce signals indicative of the symbol presented to the viewing station by the die, or both. A position sensor may be provided even when the sequence of symbols to be presented is controlled by the control means.

In the preceding paragraph references to a or the die include references to symbol-carrying bodies generally.

Preferably the body is non-cylindrical. Preferably the body is non-conical.

We believe that dice-throwing devices per-se are known in which a real die is contained within a transparent box and is impelled into the air by the action of a sharp blow or impact upon its base, usually derived from a solenoid. Detecting means within the box can determine which face of the die is uppermost. This idea can be extended to a collection of several dice to form a complete game in its own right. The "throwing" of the die is to all intents and purposes a random event. Often within a gaming or amusement machine it is desired to pre-determine the outcome of a game, or at least to influence it so that it is pseudo-random in a controllable manner. This is not possible with known dice-throwing machines and so they are not suitable for use in fruit machines and are not considered to be of any importance in the field of fruit machines.

It is also known from GB 2 147 510 to have a die which rotates about an axis joining two of its diametrally opposed corners, and to illuminate an upper or lower face of a pair of faces presented to a viewing station so that the user can identify which of the pair of faces is selected to be in play.

German Patent Application No. DE 4035757A discloses a dice mechanism for a coin operated machine. The dice mechanism has two axes about which the die can be moved, a sensor, and a motor. There is also a viewing station at which the dice mechanism can be viewed. An axle is mounted for rotational movement at one end and supports the die at the other end. The die-mounting axle is inclined at an angle of 126° to the axis about which it rotates.

Preferably the die or body of the present invention is movable about more than one axis. Most preferably the die or body is movable about two axes.

Preferably the die or body is movable about the two axes by a single motor or drive means.

Most preferably the two axes are substantially perpendicular.

The body may not be a closed body. It may in fact be an open shell in which the exterior or interior surface is visible or accessible. It may be a half sphere or spheroid or even a segment of a spheroid body having one surface which is part spherical and another surface which is planar or multi-faceted.

Preferably the drive means includes an input motive means which causes movement about the two axes. The input motive means is preferably a shaft which rotates. The shaft may be parallel with, or coaxial with, one of the axes. A die-carrying member may be moved around the one axis, with coupling means transferring motive force to a second axis drive mechanism mounted on the die-carrying member. The coupling means may comprise a gear system, such as an epicyclic, ring, or sun and planet gear system. There may be an intermediate gear between the sun and planet gear.

A die may rotate about the first and second axes at a fixed ratio, which is preferably an integral number. The ratio is most preferably related to the number of faces or symbol areas that are provided on the die or other body, preferably in such a way that all of the

faces of the die which can be presented to the viewing station are presented in a predetermined sequence. The faces or symbols are preferably presented in turn. The ratio may be 1:½(n), where n is the number of faces or symbol-presenting areas of the die.

There is preferably only a single position sensor provided to sense the position or orientation of the die, but more may be provided if desired.

Preferably the die or body is a multi-faceted body.

The body may be angularly movable about a first axis so as to present in turn a number of its facets (or symbol-presenting areas) to the viewing station. It is preferably movable to a changed axis-orientation state in which the orientation of the first axis relative to the viewing station is changed so that angular movement of the die about the first axis presents one or more different facets to the viewing station which cannot be seen readily with the first axis in its original orientation.

The movement of the first axis from its first orientation relative to the viewing station to its changed orientation may comprise an angular movement of the first axis relative to the viewing station.

The first axis may pass through opposed vertices of the die or body.

The movement of the first axis to the changed axis-orientation state may comprise rotation of the first axis through at least substantially 90 degrees about a second axis substantially perpendicular to the first axis. Such a movement may comprise angular movement of substantially 90 degrees. Of course, the die or body could rotate, or tumble over, several or many times before stopping. It may tumble or spin at a speed such that the viewer cannot easily see or recognise the symbols as they pass the viewing station. Alternatively the body may move sufficiently slowly for the user to recognise symbols. The body may move slowly at one time in a "roll" and more quickly at another time (earlier or later).

The die or body may be internally illuminated.

According to a second aspect of the invention we provide a die or other symbol-presenting body mechanism adapted for incorporation in a machine for playing a game or for amusement, the mechanism comprising a body, drive means adapted to move the body between different presentation positions in which the body has different orientations, and control means which controls the drive means so that the facet or symbol presented by the body to a viewing station is controlled by the control means.

Preferably sensor means is provided adapted to detect the orientation of the body and adapted to produce signals indicative of the orientation of the body.

The invention is also applicable to machines other than amusement or gaming machines. For example there may be times when no feed-back of the orientation of the body is required, perhaps because the user will view the body and note the orientation himself. In any case the machine may not use that information.

According to a third aspect of the invention we provide a device for controlling the orientation of symbols, or other information, comprising a symbol-carrying body, a viewing region at which the symbols are capable of being viewed, drive means adapted to move the body between different presentation positions in which different symbols are visible in the viewing region, and control means adapted to control the movement of the body.

The body may be movable to stopped positions where the symbol is squarely presented to the viewing region, that is in a face-on orientation, and preferably occupies a substantial part of the viewing region, or substantially all of the viewing region. Preferably no other symbol can be seen easily, and no other symbol face-on. The body is also preferably movable to a stopped position in which no symbol is fully presented, or presented face-on to the viewing region. More than one symbol may be visible in the viewing region. One or more than one symbol may be obliquely presented to the viewing region.

The control means may move the body between different positions which are randomly selected, or pseudo randomly selected, by the control means. However, in the foregoing aspects of the invention, the drive means may move the body between different presentation positions which are not predetermined or even determined by the device once the body is in a presentation positions. If there is to be a determination of presentation position (and symbol or symbols displayed) it may only in fact, be done by the eye of an observer.

The device may move the body about two axes, and may have a single motor or drive means.

The body may be supported at both ends of an axis about which it is angularly moveable.

In one embodiment of the invention the body is moved by the drive means into positions in which symbols are not necessarily presented face-on to the viewing station or viewing region. Intermediate portions of the body, for example portions of the body lying between adjacent symbols may be presented instead.

Presentation of intermediate portions may be presentation of portions of the body other than specific "half-way" orientations in which a portion exactly between two or more symbols is presented. The drive means may move the body to an orientation in which any allowable, presentable, portion of the body may be presented (whether or not it carries a symbol). Alternatively symbols presented only in face-on and "half-way" orientations may be preferred. The device may be provided with a mechanical, electrical or electro-mechanical system which prevents the body from adopting any orientation, restricting it to being one of a discrete number of presentation orientations. A

ratchet arrangement may be provided in which only particular orientations such as face-on and "half-way" are permissible.

In such an embodiment having presentation of intermediate portions of the body a player of the device may be provided with a nudge facility to choose between the symbols of the body partially in view. There may be two, or three, or more symbols in view to which a user may "nudge". Appropriate nudge controls would then be provided. These would normally be manually operated, for example buttons. Alternatively the choice between symbols may be provided during a gamble feature in which the player lets the device determine randomly or pseudo-randomly the chosen symbols. Alternatively or additionally a skill stop feature may be provided. For example the symbols partially in view are illuminated in sequence and the player attempts to stop the sequential illumination while one of the symbols in particular is illuminated. However such a skill stop feature may also be randomly or pseudo-randomly determined rather than determined by the skill of the player. The skill stop feature may also move the die or body through positions other than just presenting, alternatively, adjacent symbols. In other words a gamble feature may alternate between any two orientations such orientations displaying symbols which may not be adjacent. The user may, in fact, gamble between more than two orientations. For example the body may present a sequence of symbols, which may be each symbol in turn so that the user can anticipate what symbol will be presented next.

According to a further aspect of the invention we provide a machine for amusement or playing a game having a viewing station, a symbol carrying body movable so as to show a symbol to a viewer at the viewing station, and a mask means.

Preferably the mask means have an aperture or window, the body being visible through the aperture. Preferably only a part of the body is visible through the mask means.

Preferably part of the body extends at least up to the mask aperture, or can extend at least up to the aperture, at at least one position in the movement of the body. Most preferably a part of the body projects through the aperture in the mask means, or can project at at least one position in its movement through the aperture in the mask means. Preferably the body has a first position in its movement in which part of the body extends through the aperture, and a second position in its movement in which no part of the body extends through the aperture.

The mask means may comprise a first mask member and a second mask member.

The first mask member may be in front of the body and the second mask member behind the body.

There may be illumination means between the first and second mask members.

The body may be movable about an axis which itself is movable, and the mask means may be provided inclined to the plane of the moving axis. Alternatively, the mask means may be parallel, or generally parallel, to the plane of the moving axis.

The aperture of the mask member is preferably provided in a plane such that the body of revolution traced out by the symbol-carrying body is divided into minor and major segments by the aperture.

The mask means is preferably adapted to hide fully or partially from the viewer the drive or coupling means adapted to move the body.

The mask means may comprise a rear mask. Alternatively it may comprise a front mask. There may be a rear and front mask member.

The mask means may be movable relative to the viewing station. The mask means may have a recess and may comprise a cup or a shell, for example when it is a rear mask member.

The mask means may mount the movable axis of the body.

The mask member may comprise a generally planar member, such as a panel.

The symbol-presenting body may extend into the recess provided in the mask member. There may be both a generally planar mask member and a recessed mask member.

A sensor is preferably provided to detect the position of the body. The sensor (or component detected by the sensor) may be provided on, or be carried by, the mask means.

Transmission means, or coupling means may be provided to drive the body about the movable axis. The transmission or coupling means may comprise gear means, or may comprise a friction drive, or any suitable drive. The transmission means may be provided on, or be carried by, the mask means.

When there is a rear and/or front mask means either, or both, may assist in hiding transmission or coupling means from the viewer.

The mask means may be driven directly by the motor, for example when it mounts the movable axis.

The transmission means driving the movable axis may comprise a ring gear, and may be provided in fixed relationship relative to the viewing station.

According to a further aspect of the invention we provide a machine for amusement or playing a game comprising a viewing station, a symbol presenting body adapted to reveal a symbol to a viewer at the viewing station, in which the body is movable about a first, movable, axis that is itself movable about a second axis.

The body is preferably supported on an axle (or axles) supported at each side of the body. There may be a single axle passing through the body, or two stub axles extending to the body.

There may be a single motor adapted to move the body about the first and second axis, appropriate

transmission or coupling means being provided to convert movement of the movable axis about the second axis into movement of the body about the movable axis. The second axis may also be movable, or it may be fixed relative to the viewing station.

The body may be mounted on the movable axis by an axle. The axle may be electrically conducting. The body may be mounted on the first axis by two axles, each of which may be electrically conducting.

Embodiments of the invention will now be described by way of example only with reference to the accompanying drawings of which:-

Figure 1 shows a fruit machine incorporating the invention;

Figure 2 illustrates the die mechanism of the fruit machine of Figure 1 in schematic detail;

Figure 3 shows an alternative die mechanism;

Figure 4 shows another die mechanism;

Figure 5 shows details of a further die mechanism fitted to a fruit machine;

Figure 6 shows a schematic side view of a still further die mechanism; and

Figure 7 shows a top view of the arrangement of Figure 6, but with a masking flange not shown for clarity.

A fruit machine M has a coin input slot, a payout tray, a reel display R comprising three reels, a feature display F indicating game features such as "trail" features and/or "skill-shot" features (terms known in the art and discussed in some of our earlier patent applications), and a die display, or viewing station, D.

In an alternative arrangement the display R comprises a plurality of dice. For example three dice, one for each "reel", or nine dice, three for each "reel" (one for each symbol region visible at the display).

The die display D comprises a cube 1 representing the die rotationally mounted at two diagonally opposed vertices by a rod 2 held by bearings 14 and 15 in a frame arrangement 3 supported by suitable idler pulleys 4 and a drive pulley 5. Drive means are provided for the rod 2 by a motor 6, and for the pulley 5 by a motor 7. The cube 1 can be rotated through 360 degrees by the motor 6 and rod 2, and the frame 3 can be rotated by at least 90 degrees by the motor 7 and pulley 5. Photoelectric sensors 8 and 9 pick up position-identifying information from suitable sensor components 10 and 11 affixed to the cube drive rod 2 and frame 3 respectively, so that the absolute orientation of the cube 1 can be determined by control means 12, which also controls the motors 6 and 7. Appropriate drive signals are generated by the control means 12 and fed to motors 6 and 7 and in conjunction with the positional feedback information from sensor components 10 and 11 the control means 12 can arrange for any of the six faces of the cube to be presented to the player of the machine at the viewing station, the player viewing the cube from a viewing position along the line 13. In use the cube would rest in any of six "index" positions, in which one of its faces is presented perpendicularly, that is in a face-on orientation, to the player along viewing line 13. Motion may be imparted to the die in order to alter the displayed face during a game by use of the motors 6 and 7.

The cube may be illuminated from within, power for this purpose being advantageously passed down opposing projecting sides of the cube supporting rods 2, this being split inside the cube into two parts made of a suitable conducting medium. The electrical connections then being made by means of wires attached to the supporting bearings 14 and 15 on the outer frame, and the outer frame 3 being suitably insulated at least two parts of its circumference. Alternatively, electrical connections 18 and 19 could be made to suitable points on the frame 3 as shown in Figure 2, again with insulating parts 16 and 17 of the frame being provided. The motor 6 moves around with the frame 3, or a coupling capable of accommodating the motion is provided.

Various alternative embodiments are possible within the framework of this invention. For instance, the symbols depicted do not necessarily need to represent a die and could be any other desired symbols such as fruits, playing cards or indeed just blocks of different colour. The surface of such symbols could be formed in relief in a manner outlined in our British patent application GB 89184448.5.

The supported body which in the example is cubic could be any desired geometrical polygon with an appropriate adjustment being made to the control means to provide the requisite index positions in order to be able to present each symbol to the player's view. The body could have curved surfaces and could even be a sphere, a spheroid or any smoothed surface body such as an ovoid. Alternatively the body could be a sheet representing, for example, a playing card.

The positional feedback could be by optical, magnetic or other suitable means. The rotational drive for the supported body could be by means of an integral electric motor of the stepper (or other) kind supported on the outer frame and directly driving the rod as described, or by means of a friction drive onto an extension of the support rod.

An alternative support frame for the dice is shown in Figure 3 and comprises a skeletal frame of two wires 20 and 21 (of suitable strength) as shown in Figure 3, attached to bearing points 14' and 15' of rod 2', and formed so that they come together at a suitable drive point 22 such that an equivalent rotation in the same plane as that described for frame 3 would be achieved by means of a direct drive motor 23 instead of an intermediate pulley. The wires 20 and 21 sweep out a cone at the vertex 22 of which the motor 23 is situated and the axis 24 of the cone is perpendicular to a plane 25 equivalent to frame 3 already described.

Internal illumination means of the body 1' could

be provided in a similar manner to that of the first embodiment by providing insulating sections of the wires 20 and 21.

The use of the terms "wires" and "frames" in the above descriptions could be interchanged and the required physical spatial arrangements could of course be made by means of plastic or metal mouldings, wires, or other fabrications as may be convenient as long as the required insulating or conducting properties, as appropriate, were preserved.

In either embodiment, drive about an axis could be provided by a motor, and drive about a second axis by gears which convert motion produced by the single motor to motion about a second axis. This may be achieved by the motor driving a die-carrying frame, movement of which moves gears or other transmission means to drive the dice about an axis.

Figure 4 illustrates another arrangement of a die display system 40 in which there is only one drive motor (not shown) and the drive for a first axis of rotation, axis 41, is mechanically linked to the drive shaft 42 of a second axis of rotation, axis 43. Only one motor (not shown) is used, and this drives the shaft 42.

The shaft 42 is connected to a yoke 44, or other die-carrying means which rotates with the shaft 42. An epicyclic gear train 45 is provided and comprises a sun gear 46 which is keyed in a fixed position relative to a support and keying bracket 47, an idler, or intermediate, gear 48 rotatably mounted on the yoke 44, a planetary gear 49 rotatably mounted on the yoke 44 and driving a motive force transfer shaft 50 which has a bevel drive gear 51 co-operating with another bevel drive gear 52 which is fixed to a shaft 53 on which is mounted a die 54 and which defines the first axis 41.

The yoke 44 has an upper arm 55 joined to a lower arm 56 by a mounting limb 57. The sun gear 46 has flats 58 to hold it in fixed relationship relative to the bracket 47, and a central bore 59 through which the shaft 42 extends. The idler gear 45 is rotatably mounted on a stub axle 60 provided on the limb 57.

The motive force transfer shaft 50 is journalled to rotation in two blocks 61 and 62 provided on the arm 55 and carries a sensor paddle 63. An optical sensor (not shown) is provided at a position such that it senses the paddle once for each complete cycle of presentation of the faces of the die to a viewing station. Alternatively the sensor arrangement could detect each presentation of a symbol to the viewing station and distinguish between them, or it may even be able to detect and distinguish not only face-on presentation orientations but also intermediate orientations at which no single face is fully presented for viewing (the dice body preferably being able to stop in such "half-way" or random non-face-on orientations).

The rates of rotation of the die about axis 41, and the yoke (and die) about axis 42 are fixed relative to each other and the faces of the die are presented to the viewing station of the fruit machine in turn in a predetermined sequence. In the arrangement of Figure 4 the gearing ratio between the two axes is 11:3. The die runs through its complete range of face presentations in sequence every three complete revolutions of the directly driven shaft 42. Each successive face of the die is presented in turn to the viewing station every half-turn of the shaft 42. The sensor system is also simplified in that only one sensor is needed and this outputs a signal once every three complete revolutions of the directly driven axis. This provides a reference point which can be interpreted by the control means of the system which controls the die appropriately. Thus the control means can always determine the exact position of the die from the number of motor control impulses fed to a stepper motor controlling the rotation of the shaft 42.

As the shaft 42 is rotated the yoke 44 rotates with it and the idler gear 45 rotates around the sun gear 46. The idler gear drives the planetary gear 49 which drives the shaft 50, which in turn rotates the shaft 53 via the bevelled gears 51 and 52. The sensor paddle 63 executes a compound curve consisting of elements of rotation of the yoke about the main driven axis of rotation 43 and rotation of the paddle about the axis of the shaft 50. The paddle intercepts an optical sensor once every third revolution of the shaft 42.

The arrangement of Figure 4 has the advantage of needing only a single drive motor, a single sensor, and associated savings in circuitry. It is therefore cheaper.

It will be appreciated that our symbol-carrying body is quite stable. It has a relatively low tendency to wobble during rotation. This gives it a better appearance when the dice is spinning fast and makes the machine more attractive to the user. The die is supported at both ends of an axis for rotation about the axis. Embodiments which have an axle (or axles) on which the die rotates either side of the die have the advantage that we can control the movement of the die more closely. The movable die body itself can be made out of relatively heavier materials, should this be required, than is desirable if the support of the die is at one end only. Having a relatively heavy die may well be desirable if, for example, the die is to be internally illuminated. The body of the die may be illuminated by passing power down the axis about which it rotates, two independent conducting supports will usually be provided. Supporting the axle of the die at each side of the die, rather than supporting only one end of the axle allowing the other end to wave freely, reduces the deviation of the die for a true rotation i.e. reduces wobble, and improves the control of the die. This improves its appearance, and also allows us to have components of the machine closer to the body of rotation of the die - if the die had more wobble we would have to have structures, for example masks, further from the body of rotation to allow for devia-

tions. Furthermore, in many cases our support structure is symmetrical about the symbol-presenting body's centre of mass. This too assists in reducing wobble.

We may prefer to provide a die-moving mechanism as a unit which can be supplied for incorporation in amusement machines, or machines for playing games. Figure 5 shows a unit for incorporation into a "fruit machine" (or indeed any other machine) and shows another mechanism for moving the die. It also shows two masking arrangements which can be used in combination, or separately.

A unit 100 is shown in Figure 5 and comprises a mounting member 101, a rear mask member 102, a die 103, motor 104, and a front mask assembly 105.

The mounting member 101 is mounted upon the carcass of a fruit machine, or upon a support structure inside the carcass, by any suitable means.

The rear mask member 102 comprises a cup 103 mounted relative to the mounting member 101 for rotation about an axis 106. The die 103 is mounted on the cup 103 by two axles 107 and 108 for rotation about a movable axis 109. A stationery gear 110 is provided on the mounting member, and an orbiting gear 111 is mounted on the rear mask member 102. A transmission drive rod 112 is also rotatably mounted on the rear mask by support arms, and has a gear 113 which is driven by the gear 111. The transmission member 112 has another gear 114 at its other end which drives a further gear 115 fixed to the axle 108. A position sensor 116, or a component that is sensed by a position sensor is provided on the transmission member 112 and rotates with it.

The front mask assembly 105 comprises a front mask panel 117, a back mask panel 118, and lights 119 in the space between them. The front and back mask panels have apertures 120 and 121. The aperture 120 comprises a transparent window 122 in the opaque or translucent front mask panel 117. The aperture 121 is a circular hole in the mask panel 118.

As will be seen from Figure 5, the die 103 can be rotated about axis 109, and that axis can be rotated about axis 106. The die sweeps out a volume of revolution, part of which is shown in chain dotted line 123 and which extends through the aperture 121.

The die is received in a cup portion 124 of the rear mask member 102. The rear mask member hides the motor and transmission means from the viewer. The cup 124 has an outer peripheral flange 125. This assists in masking from the viewer the gears 114 and 115, and also the stub axles 108 and 107.

The front mask assembly 105 also restricts what the viewer can see. The viewer cannot see the mechanism used to drive the die. The die appears to be floating to the viewer and tends to be spinning freely without visible means of support.

It is desirable, from a point of view of the providers of the machine incorporating the mechanism, that the dice themselves should appear to be freely rotating or "tumbling". We have therefore appreciated that it is advantageous to conceal as much of the working mechanism as possible from the sight of the player. The rotating mask cup 124 forms a continuous surface behind the die 103 preventing much of the mechanism from being seen. Of course the rear mask may have a hole in it, for example at its centre. Similarly, the back mask panel 118 through which the die can project shrouds the remainder of the mechanism. Thus as seen by the viewer the die body apparently floats just behind the front mask panel 117.

It will of course be appreciated that it may not be necessary to have both a front and a rear mask panel 117 and 118, and that we need not have illumination means in front of the die. For example, as previously described we could arrange for the die to be internally illuminated. It will also be appreciated that the light sources 119 are not directly visible to the user.

Different arrangements of the coupling or transmission of the drive from the motor to the die body can be envisaged. Instead of the sun/planet arrangement to transfer drive from the motor-driven cup to impart motion to the body (die) in the axis at right angles to the motor shaft, the motor could drive the cup only. The die, or other symbol-presenting body, being rotated about the movable axis by a fixed gear or friction drive.

Figures 6 and 7 show another arrangement for driving the die.

A motor 130 drives the cup mask member 131 which supports a die 132 by two stub axles, one at each side of the die. One of the stub axles has a gear 133, and the other is a bearing. There is a ring gear (or friction drive) 134 which is in a fixed relationship to mounting member 135 (and hence to the viewing station of the machine). The ring gear 134 is supported by a second cup (fixed), or support struts.

The motor 130 drives the cup 131 about a fixed axis, and the motion of the cup causes the gear 133 to rotate the die 132 about the movable axis. This has the advantage that there is no complicated transmission means between the motor 130 and the die 132. There are no intermediate gears (or friction drives) which move with the die, other than the gear 133 which is actually provided on the axle which mounts the die.

Figure 7 shows this arrangement from above.

The reels of the fruit machine may have a symbol the appearance of which in the win line, or in the reel display R, enables the player to play a die game with the die display D. Alternatively or additionally the achievement of a feature of a trail or skillshot of the feature display F may entitle the player to play a die game.

It will be appreciated that having the two axes of rotation of the body at substantially 90° has advantages. It may help to minimise the amount of movement

necessary to present a particular symbol. It also enables us to maximise the size of the rear mask. If the two axes were inclined, as in DE 4035757A then the rear mask could not be substantially a hemisphere - it would have to be smaller to allow for rotation of the inclined axis about the stationery axis. A symmetrical arrangement has advantages, especially when the die has 360° movement (or substantially 360° movement) about one or both axes.

It will also be appreciated a mechanism similar to that described above may have application beyond the field of a chance game element in a fruit machine. The embodiments shown in Figures 2 to 4 may be used in isolation from a fruit machine, that is simply as die mechanisms, or in other machines. For example the die mechanism could be used by itself as a simulated die. A stand-alone die mechanism could replace a die that is used in a board game. Furthermore the stand-alone die mechanism could replace conventional dice in a host of other uses. We may provide a kit comprising a game such as a board game and a die mechanism.

Claims

1. Apparatus (M;100) for playing a game or amusement in which symbols are presented at a viewing station, or position (d;122) in which there is a die or other symbol-carrying body (1; 54; 103; 132), and drive means (5, 6, 2, 3; 42, 45, 50, 51, 52; 104, 111, 112, 114, 115; 130, 131, 133) adapted to move the die between different presentation positions in which different portions of the body are presented to the viewing station.

2. Apparatus according to claim 1 in which the body is mounted for angular movement about a first, movable, axis (2; 41; 109) which is itself movable about a second axis (24; 43; 106).

3. Apparatus according to claim 2 in which the body is mounted for movement about the movable axis by first axle means (53; 107) to one side of the body and second axle means (53; 108) to the other side of the body.

4. Apparatus according to claim 2 or claim 3 in which the first and second axes are substantially at a right angle to each other.

5. Apparatus according to any preceding claim in which mask means (102, 105) is provided.

6. Apparatus according to claim 5 in which the mask means (105) is generally in front of the body.

7. Apparatus according to claim 5 in which the mask means (102) is generally behind the body.

8. Apparatus according to claim 6 or claim 7 in which the mask means (102 or 108) has a recess, or an aperture (121) into which the body extends at at least some point in its movement.

9. Apparatus according to any preceding claim in which there is both mask means (105) generally in front of the body and mask means (102) generally behind the body.

10. A coin, counter, or credit freed machine such as a fruit machine (M) or the like, characterised in that it has apparatus according to any preceding claim.

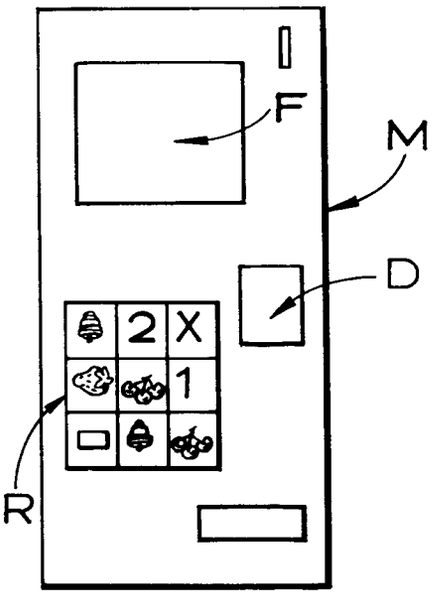

FIG.1.

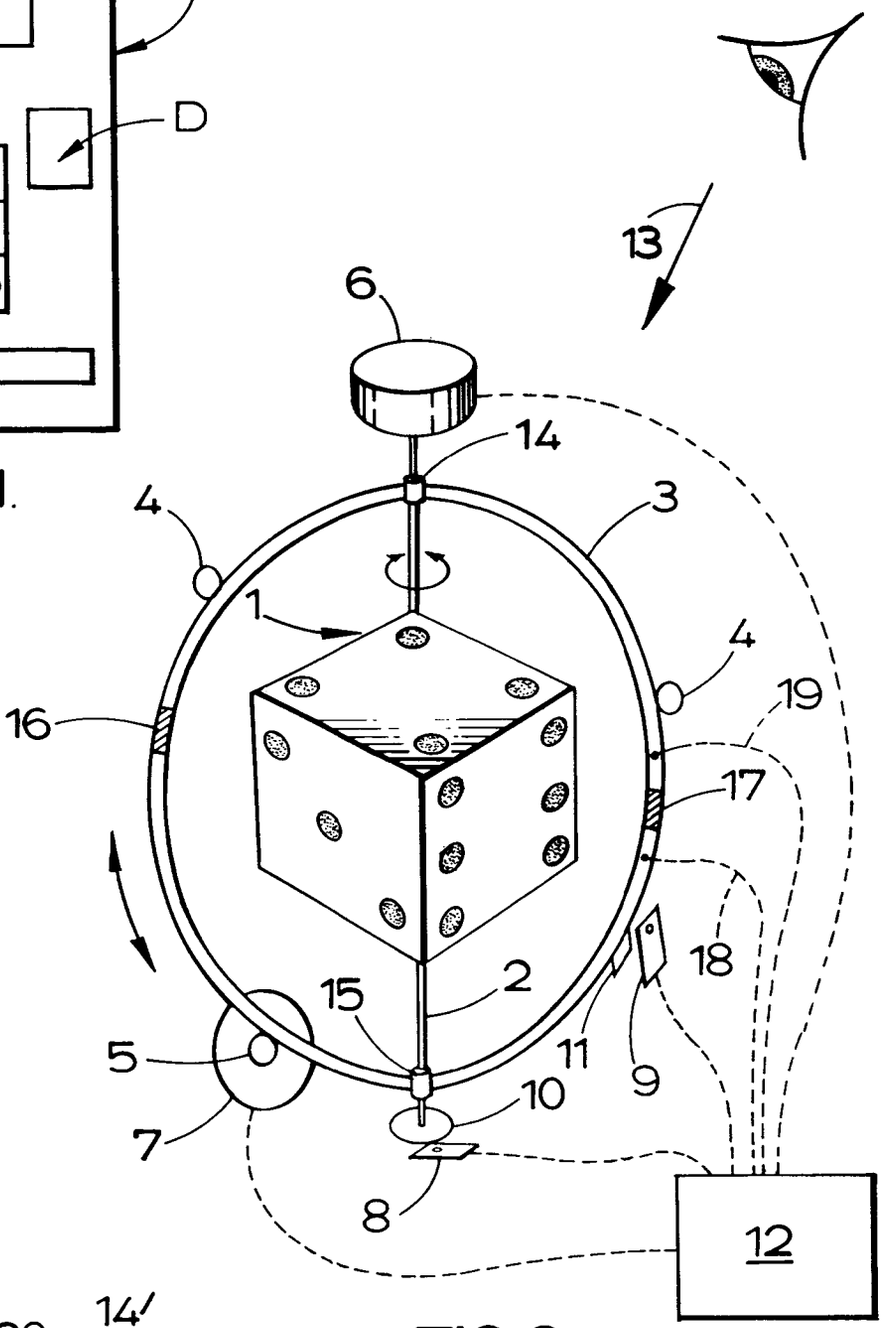

FIG.2.

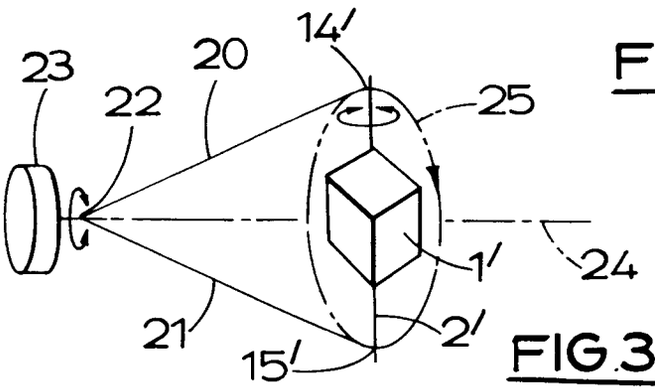

FIG.3.

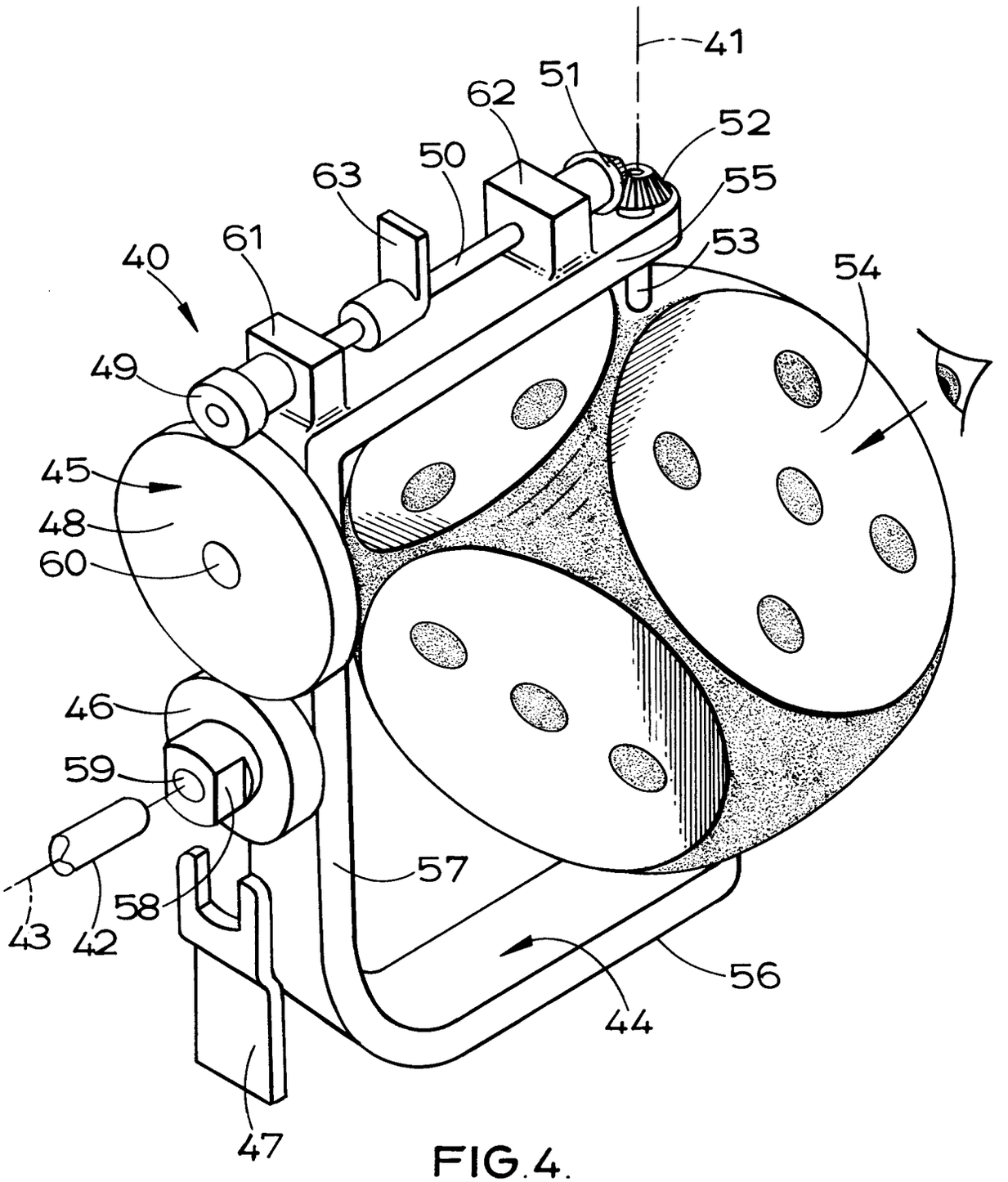

FIG.4.

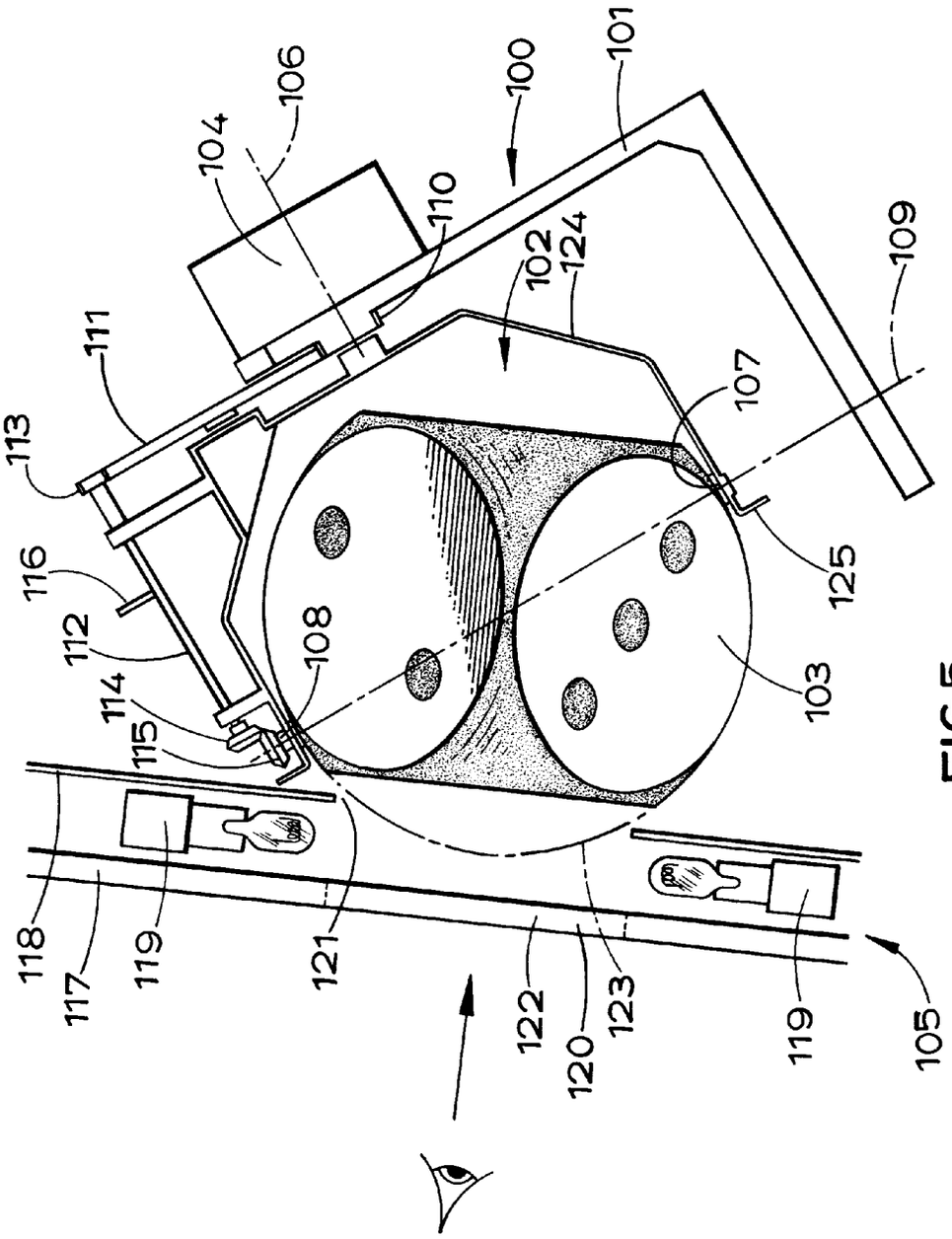
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FIG.5.

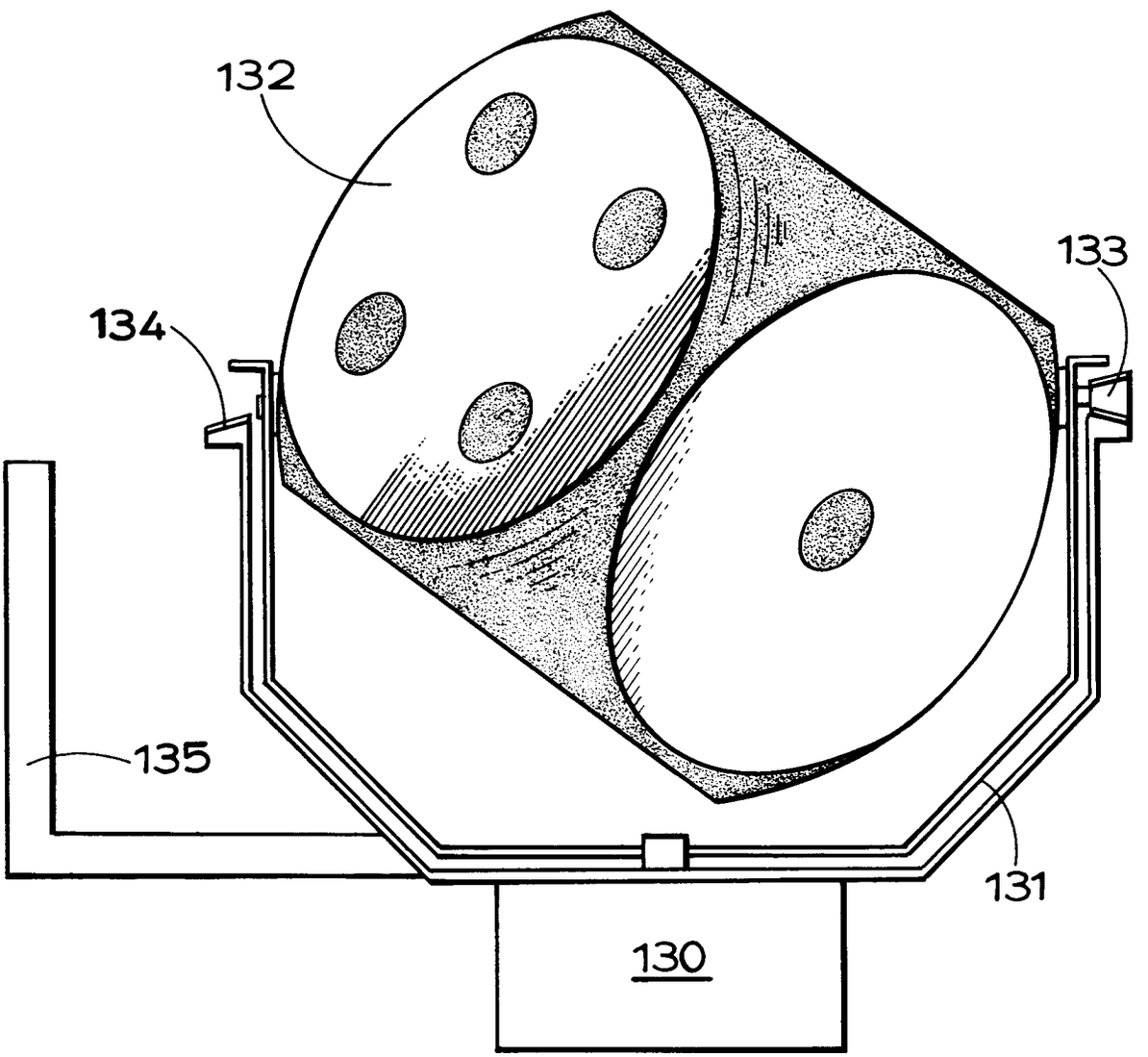

FIG.6.

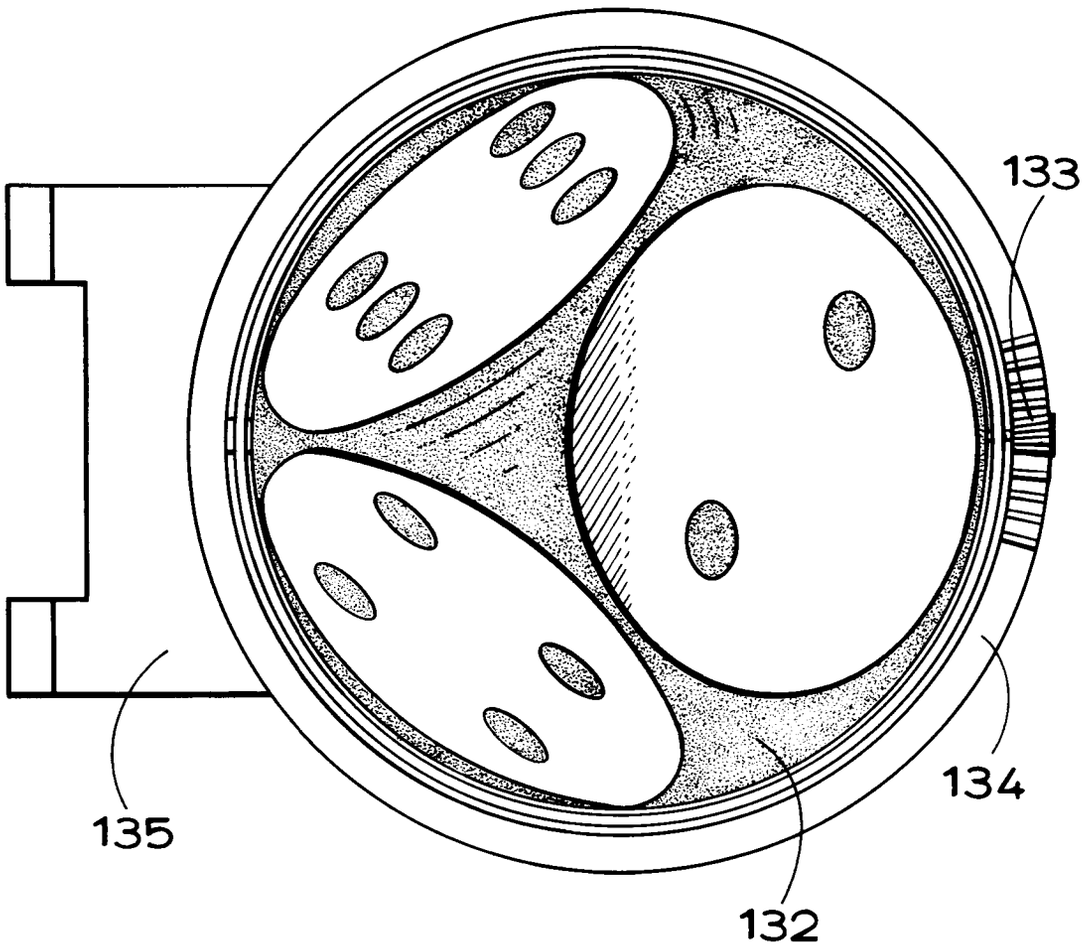

FIG.7