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(54) **DRIVE ASSEMBLIES**

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Description

The present invention relates to drive assemblies and is especially, but not exclusively, concerned with drive assemblies for use with gaming machines, sometimes referred to as fruit machines or amusement machines.

It is known from GB-A-2253154, to which the reader is invited to refer, for a gaming machine to include a tumbling multi-symbol-carrying body, such as a die.

Drive means is provided to move the body about different axes between different presentation positions in which different symbols are presented to a viewing station. Sensor means detects the orientation of the body and produces signals indicative of the symbol presented to the viewing station. Control means receives the signals from the sensor means and controls the drive means so that the symbol presented to the viewing station is itself both known and controlled.

An object of the present invention is to modify GB-A-2253154 to provide drive assemblies which could be simpler and could be used in applications other than gaming machines.

A drive assembly, in accordance with the present invention, comprises indicator means for presenting a plurality of different symbols and drive means for moving the symbols about different axes between different presentation positions, characterised in that the indicator means is supported by and at least partly surrounded by a drive track which forms part of the drive means and remains stationary.

It will be appreciated that the present invention can be simpler than GB-A-2253154 primarily by omitting the sensor means and the control means. These might not be required in applications where it was unnecessary for the indicator means to be moved by the drive means in a manner such that a predetermined symbol is displayed at a predetermined presentation position. There would then be a truly random drive assembly.

Preferably, the indicator means is in the form of a multi-faceted, curved or even spherical body of plastics or other suitable material presenting any symbols such as conventional dice dots, playing cards, representations of fruit or even blocks of colour.

If the material of the body is translucent, particularly between the symbols but alternatively or additionally at the symbols, the body may present a pleasing appearance as if lit from within when in fact lit from behind.

Preferably, the drive means is in the form of a single electric motor with a rotatable shaft, but could be entirely mechanical to include a rotatable shaft which is spring driven or friction driven.

The drive means may simultaneously rotate the indicator means about two axes, preferably substantially perpendicular, in such a way that all of the facets/symbols are presented in turn in a predetermined sequence to a viewing station, the indicator means being simultaneously rotated about the two axes at a fixed ratio, such

as 1: $\frac{1}{n}$ where n is the number of the facets/symbols.

Preferably, the rotatable shaft is co-axial with a first of the axes, and transfers power to a support which may be of a skeletal or continuous generally hemispherical shape. A pair of stub shafts are co-axial with the second of the axes, and are arranged to extend through and be rotatable with respect to the support. Inner ends of the stub shafts are secured to opposed parts of the symbol presenting body, whereas outer ends of the stub shafts engage or at least abut the stationary drive track, which is preferably annular. Thus, when the support is driven by the rotatable shaft, the stub shafts are not only rotated about the first axis in unison with the support, but are also caused to rotate about the second axis by effectively rolling along the annular track.

The result is that the drive means imparts simultaneous rotation about the first and second axes to the indicator means.

It will be appreciated that the present invention is not restricted to the preferred embodiment - in other embodiments, the track need not be annular and the pair of stub shafts could be replaced by a single axle extending just to one side of the symbol presenting body.

More generally, it should be appreciated that the present invention may embody one or more of the following preferred features:-

- the drive track is formed with gear teeth, and is formed on a case which houses part of the indicator means and hides part of the drive means;
- the symbols are at least partly rotatable about each of two of said different axes which are substantially perpendicular;
- the symbols are fully rotatable about both of said substantially perpendicular axes;
- the indicator means is supported at each of two different sides or portions thereof by a pair of stub shafts extending outwardly thereof;
- the indicator means is positively driven at both of said sides or portions thereof by rolling contact of said pair of stub shafts along said stationary drive track;
- the indicator means is at least partially located in and supported by a cup; and
- at least one side or portion of the indicator means is provided with an axle which is at least partly rotatable about a first of said different axes with respect to a support which is at least partly rotatable about a second of said different axes under the control of the drive means with the axle rolling along the stationary drive track when the support is driven by the drive means.

The attention of the reader is also drawn to GB-A-2268415 which was officially published on 12 January 1994.

A drive assembly, in accordance with the present invention, will now be described in greater detail, by way

of example only, with reference to the accompanying drawings, in which:-

Figure 1 is a partially fragmented schematic perspective view of the drive assembly; and
Figure 2 is a partially sectioned schematic front view of the drive assembly.

The accompanying drawings show a drive assembly 10 according to the present invention comprising indicator means 12 for presenting a plurality of different symbols and drive means 14 for moving the symbols about different axes between different presentation positions.

The indicator means 12 is of cube-like shape having six orthogonal faces 16 joined by curved surfaces, the orthogonal faces 16 presenting respective conventional dice dots (to form a die) or other symbols in a manner which need not be illustrated.

A pair of opposed stub shafts 18 are fixed to and extend outwardly from what may be regarded as a diametrically opposed pair of the corners of the die. The stub shafts 18 extend through, and are rotatable in, respective apertures near the mouth of a hollow generally hemispherical cup or support 20. A central part of the support 20 is secured in any suitable manner, such as by a splined connection 22, to a rotatable shaft 24 driven by an electric stepper motor 26. The motor 26 is secured by screws 28 to a central part of a case 30 whose mouth is formed with an annular track 32.

In the illustrated embodiment, the annular track 32 is formed as a ring gear with teeth which engage with complementary teeth formed on pinions 34 formed at outer ends of the stub shafts 18.

When the shaft 24 is rotated by the motor 26, the support 20 is rotated and the stub shafts 18 are caused to roll along the annular track 32, with the result that the indicator means 12 is simultaneously rotated in a tumbling action about the axis defined by the shaft 24, as well as the axis defined by the stub shafts 18.

The die may be formed of plastics material which may be translucent, for example at the faces 16, with the corners acting as internal reflectors for light entering the die.

The annular track may be formed of, or be faced with, a material which gives a frictional drive to the outer ends of the stub shafts, which need not be formed as enlarged pinions.

It will be appreciated that the sensor means and the control means of GB-A-2253154 can be incorporated if the indicator means is to be moved by the drive means in a controlled and therefore merely pseudo-random manner.

Claims

1. A drive assembly (10) comprising indicator means

(12) for presenting a plurality of different symbols and drive means (14) for moving the symbols about different axes between different presentation positions, characterised in that the indicator means (12) is supported by and at least partly surrounded by a drive track (32) which forms part of the drive means (14) and remains stationary.

2. A drive assembly according to claim 1, characterised in that the drive track (32) is annular.
3. A drive assembly according to claim 1 or claim 2, characterised in that the drive track (32) is formed with gear teeth.
4. A drive assembly according to any preceding claim, characterised in that the drive track (32) is formed on a case (30) which houses part of the indicator means (12) and hides part of the drive means (14).
5. A drive assembly according to any preceding claim, characterised in that the symbols are at least partly rotatable about each of two of said different axes which are substantially perpendicular.
6. A drive assembly according to claim 5, characterised in that the symbols are fully rotatable about both of said substantially perpendicular axes.
7. A drive assembly according to any preceding claim, characterised in that the indicator means (12) is supported at each of two different sides or portions thereof by a pair of stub shafts (18) extending outwardly thereof.
8. A drive assembly according to claim 7, characterised in that the indicator means (12) is positively driven at both of said sides or portions thereof by rolling contact of said pair of stub shafts (18) along said stationary drive track (32).
9. A drive assembly according to any preceding claim, characterised in that the indicator means (12) is at least partially located in and supported by a cup (20).
10. A drive assembly according to any preceding claim, characterised in that at least one side or portion of the indicator means (12) is provided with an axle (18) which is at least partly rotatable about a first of said different axes with respect to a support (20) which is at least partly rotatable about a second of said different axes under the control of the drive means (14) with the axle (18) rolling along the stationary drive track (32) when the support (20) is driven by the drive means (14).

Patentansprüche

1. Antriebsbaugruppe (10) mit einem Anzeigemittel (12) zum Präsentieren einer Anzahl verschiedener Symbole und mit einem Antriebsmittel (14) zum Be-
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caractérisé en ce que le moyen indicateur (12) est entraîné directement à l'endroit de ses deux côtés ou parties par le contact de roulement desdits deux tronçons d'arbre (18) le long de ladite piste d'entraînement stationnaire (32).

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9. Ensemble d'entraînement selon l'une quelconque des revendications précédentes, caractérisé en ce que le moyen indicateur (12) est au moins en partie logé dans une cuvette (20) et est soutenu par cette dernière.

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10. Ensemble d'entraînement selon l'une quelconque des revendications précédentes, caractérisé en ce qu'au moins un côté ou partie du moyen indicateur (12) est doté d'un axe (18) qui peut tourner au moins en partie autour d'un premier desdits axes différents, par rapport à un support (20) qui peut tourner au moins en partie autour d'un deuxième desdits axes différents, sous la commande du moyen d'entraînement (14), l'axe (18) roulant sur la piste d'entraînement stationnaire (32) lorsque le support (20) est entraîné par le moyen d'entraînement (14).

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Fig.1.

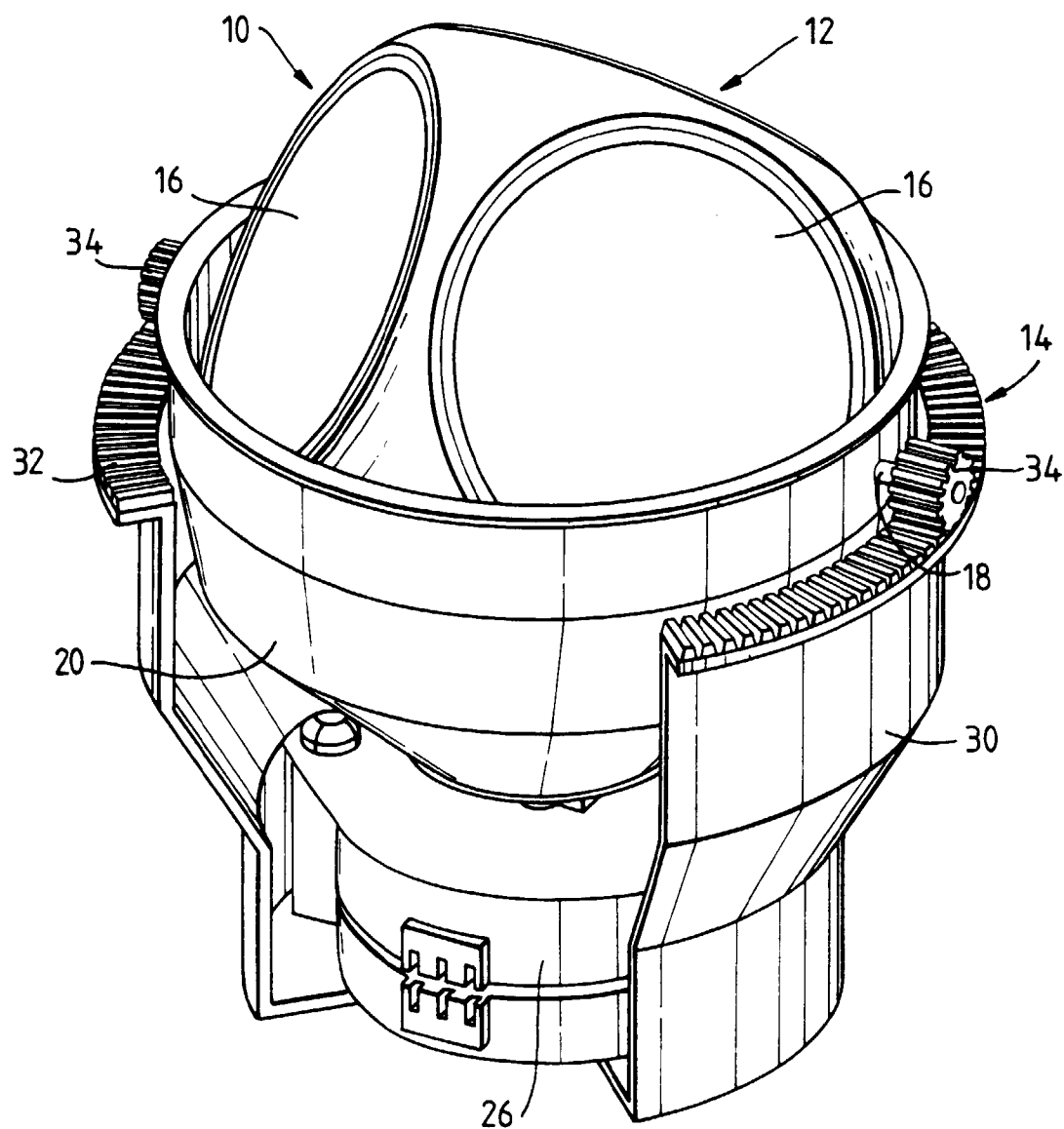


Fig. 2.

