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(54) Amusement machine.

(57) An amusement machine is provided which comprises an at least partially translucent tube (2) disposed in an upright position, a die (1) located internally of the tube and means to direct air upwardly from a lower region of the tube and thus to provide an airstream suspending said die in the tube. Said die and the bottom of the tube carry means (7) to sense the value shown by the die after it comes to rest upon cessation of the suspending airstream and further means (4) are provided to enable a player to predict such a value. The machine may be combined with other similar machine to form a complex of such machine.

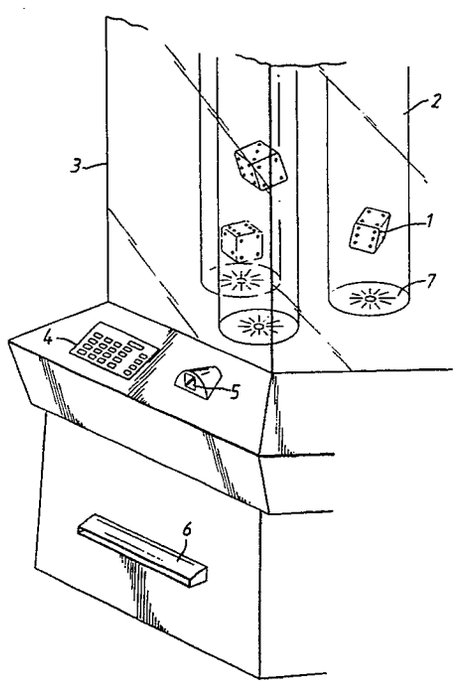


Fig.1.

EP 0 426 301 A1

AMUSEMENT MACHINE

This invention relates to amusement machines and, in particular, to machines that players may use to stake at least one bet on the result of randomly generated numbers.

According to the invention, there is provided an amusement machine comprising a tube which is at least partially translucent disposed in an upright position, a die located internally of the tube, means to direct air upwardly from a lower region of the tube and thus to provide an airstream suspending said die in the tube, means carried by said die and at the lower end of the tube to sense the value shown by the die after coming to rest upon cessation of the suspending airstream, and means to enable a player to predict such value.

The invention will be described hereinafter with reference to using coins to 'credit' the machine and the use of such coins as prizes, although it is understood that it is by no means limited to the use of coins. Indeed, tokens or notes may also be used to credit the machine and prizes may be tokens, 'credits' on the machine or any other type of prize.

For a better understanding of the invention, and to show how the same may be carried into effect, reference will now be made, by way of example only, to the accompanying drawings, in which:

Figure 1 is a somewhat diagrammatic perspective view of parts of an amusement machine in accordance with the invention showing generally the areas for use by one of the players; and

Figure 2 is a block diagram of die value sensing apparatus in accordance with the invention.

Referring to Figure 1, the section of the amusement machine that is somewhat diagrammatically illustrated therein is illustrated as being for use by a single player but, naturally, many more players than one may use a number of basically similar sections incorporated into the same machine. The operation of the amusement machine allows a player to stake a bet upon the result or value that is given by randomly generating a plurality of, in this case three, numbers. In the case of the machine that is illustrated in the drawing, three separate, relatively lightweight dice 1 are employed, although there could be merely a single die 1 , two dice or a plurality thereof in excess of three. In any case, the or each die 1 is accommodated internally of a corresponding transparent or at least partially translucent synthetic plastics or glass tube 2. It will be seen from the drawing that the dimensions of each die 1 relative to those of the corresponding tube 2 are such that said die 1 can move freely, and particularly spin, in the tube 2 without being restricted in such movements by the wall of the corresponding tube 2 itself. Each tube 2 is disposed in an upright and preferably vertical or substantially vertical position and is contained internally of a glass or other transparent cabinet 3 which allows close visual inspection of the tubes 2 and their contents but prevents physical access to them. The opaque front of the machine, beneath the transparent cabinet 3, exhibits means to enable a player to predict the values shown by the dice 1, such means being in the form of a player control panel 4. A coin entry slot 5 is provided closely alongside the panel 4 and, beneath them both near the foot of the machine, is a pay cup 6 into which the machine will automatically dispense wins won by a player. As mentioned, the machine may automatically credit wins to the players credit display, from where such credits may be used for further bets or may be exchanged for an equivalent cash prize.

Means, such as an electrically operated fan (not shown), directs air, during the operation of the machine, upwardly from a lower region of each tube 2, which is conveniently the bottom of that tube 2, in such a way that each die 1 is suspended in the airstream so produced and can spin and turn in an entirely random manner. Each airstream can escape from the upper end of the corresponding tube 2 through removable mesh or the like in which the holes are too small to pass any die 1. The dice 1 are of such a construction that, when a specific electric field is generated around them, they create a measurable reaction which will determine the current attitude of each die and therefore, in particular, the visually observable value which it shows. The means to effect this is described hereinafter with reference to Figure 2 which shows a block diagram of the means to detect the value of a single die only, and which may be multiplicated acording to the preferred number of dice. Said means preferably comprises three component parts; the dice themselves, the sensor or field coils and the drive and sensor electronics assembly. The operation of the sensor system is as follows:

A controlling microprocessor system (C.P.U.) generates a voltage ramp via a digital to analogue converter (D.A.C.). This voltage ramp is applied to three voltage controlled oscillators (V.C.O.) in the sensor electronics. The V.C.O.'s preferably produce a. sine wave output in the range 2-10 MHz. The low level signal output from the V.C.O.'s is coupled into three single turn field coils mounted below the dice tubes. A concentric inner field coil consisting of two turns, a tuning capacitor and switching diode couples the output of the V.C.O.'s into three synchronous detectors (sensing means).

These detectors synchronously monitor the presence of the V.C.O. signal coupled from the outer field coil to the inner field coil as the V.C.O.'s are scanned by the controlling microprocessor. In the absence of a die within range of the field coil, the full scan range of the V.C.O.'s is achieved without a transition at the output of the detectors. This state is used to ensure that the dice have risen in the tubes, i.e. no dice are detected within the sense range of the field coils.

The faces of the dice carry printed circuit foils forming tuned circuits. The resonant frequencies of the six tuned circuits attached to each die are designed such that each is unique and lies within the scan range of the V.C.O.'s described above. When the dice are introduced close to the field coils, the tuned circuits attached to the lower faces of the die resonate, absorbing energy from the field coils as the V.C.O.'s scan across the resonant frequencies. The absorption of energy from the field coils is detected by the synchronous detectors in the sensor electronics and result in outputs to the controlling microprocessor. These output signals, once validated, cause the microprocessor to stop scanning the V.C.O's, the data values written to the D.A.C. being a direct indication of the die orientation in each tube. The signal output level of the V.C.O.'s is set such that only the lower face of the die produces a significant response in the field coils. The top and vertical face responses are below the threshold level of the sensor, as are responses from a die not sitting square in the tube, i.e. a 'cocked' die.

In order to ensure the reliability of the system under extremes of operating environment, a self calibration ability is preferably built into the system. Each field coil has a diode switch and resonating capacitor mounted on the inner of the two coils. Under control of the microprocessor, the inner coil can be switched to resonate with its capacitor, producing a known, repeatable sensor output that is periodically used to check the calibration of the system.

The calibration values and data for the die face resonant frequencies are used by the microprocessor to deduce the orientation of the dice in the tubes when they settle above the field coils, an initial calibration and set-up procedure, along with 'windowing' of data in the microprocessor software ensures the reliability of the system with different dice and environmental changes.

In use, a player will "credit" the amusement machine by entering coins into the slot 5 (or if notes are to be used by means of a suitable acceptor) the number of credits thus generated being displayed on the panel 4. The machine preferably, but not essentially, runs its game cycle continuously and, at the beginning of each such cycle, there is a time period during which an invitation for a player to place a bet appears on the control 4, such bet being a prediction of the value that will be shown by the dice 1 when they next come to rest upon the lower ends 7 of the tubes 2 upon cessation of the suspending airstream or division thereof away from said tubes 2. Upon entering at least one bet, this bet is shown on the control panel 4 and the number of available credits is reduced accordingly. The control panel 4 indicates the end of the period just mentioned and no more bets can then be placed until the next game cycle. The three, in this embodiment, dice 1 are blown upwardly in the tubes 2 by corresponding streams of air produced as, for example, previously mentioned and, after a short further time of randomly spinning and turning suspended in the airstreams, those airstreams cease, or are diverted, and the dice 1 come to rest at the lower ends 7 of the corresponding tubes 2. The aforementioned sensing means then "reads" the attitude of the three dice and the panel 4 displays the appropriate values. If the bet, or one of the bets, placed by the player has correctly predicted the values shown by the three dice, a winning payout is made in the cup 6 upon complying with instructions shown on the panel 4. As mentioned, such a payout may be coins, tokens or additional credits on the machine.

Although the dice 1 shown in the accompanying drawing are of conventional cuboid form having six sides carrying corresponding numbers of spots from one to six, this is not essential and the dice 1 may be of other geometrically regular shapes provided only that these shapes are such that, upon coming to rest, a surface of the die concerned will be upwardly directed. Obviously, the indication of numbers on the outer faces of each die 1 could be other than by way of dots, actual numbers being one alternative. A machine in accordance with the invention may stand as a "single entity" or be arranged alongside one or a plurality of similar machines to form a complex.

Claims

1. An amusement machine comprising a tube which is at least partially translucent tube disposed in an upright position, a die located internally of the tube, means to direct air upwardly from a lower region of the tube and thus to provide an airstream suspending said die in the tube, means carried by said die and at the lower end of said tube to sense the value shown by the die after coming to rest upon cessation of the suspending airstream, and means to enable a player to predict such a value.

2. An amusement machine as claimed in claim 1, wherein said means to direct air is a fan.

3. An amusement machine as claimed in claim 1 or 2, wherein the faces of the said die carry respective printed circuit foils forming respective tuned circuits having different respective resonant frequencies, and the said means to sense the value of said die comprises:
an oscillator having a frequency of oscillation that may be varied in accordance with a control signal applied thereto;
coil means disposed at the lower end of the said tube, having a first coil connected to the said oscillator, for energising the said tuned circuits, and a second coil arranged in close proximity to the said first coil, for detecting absorption of energy supplied by the said first coil to those tuned circuits when the machine is in use;
sensor means, connected to the said second coil, for measuring the amount of such energy absorption; and
control means, connected to the said oscillator and to the said sensor means, for generating the said control signal when the die has come to rest such that the said frequency of oscillation of the oscillator is set in turn to each of the said resonant frequencies, and for determining in dependence upon the said amount of energy absorption for each of those resonant frequencies whether or not the die face carrying the foil having that resonant frequency is closest to the coil means.

4. An amusement machine as claimed in claim 3, wherein the said oscillator is a voltage-controlled oscillator and the said control signal is a ramp voltage signal.

5. An amusement machine as claimed in any preceding claim, wherein said machine is combined with other similar machines to form a complex which is played by a plurality of players.

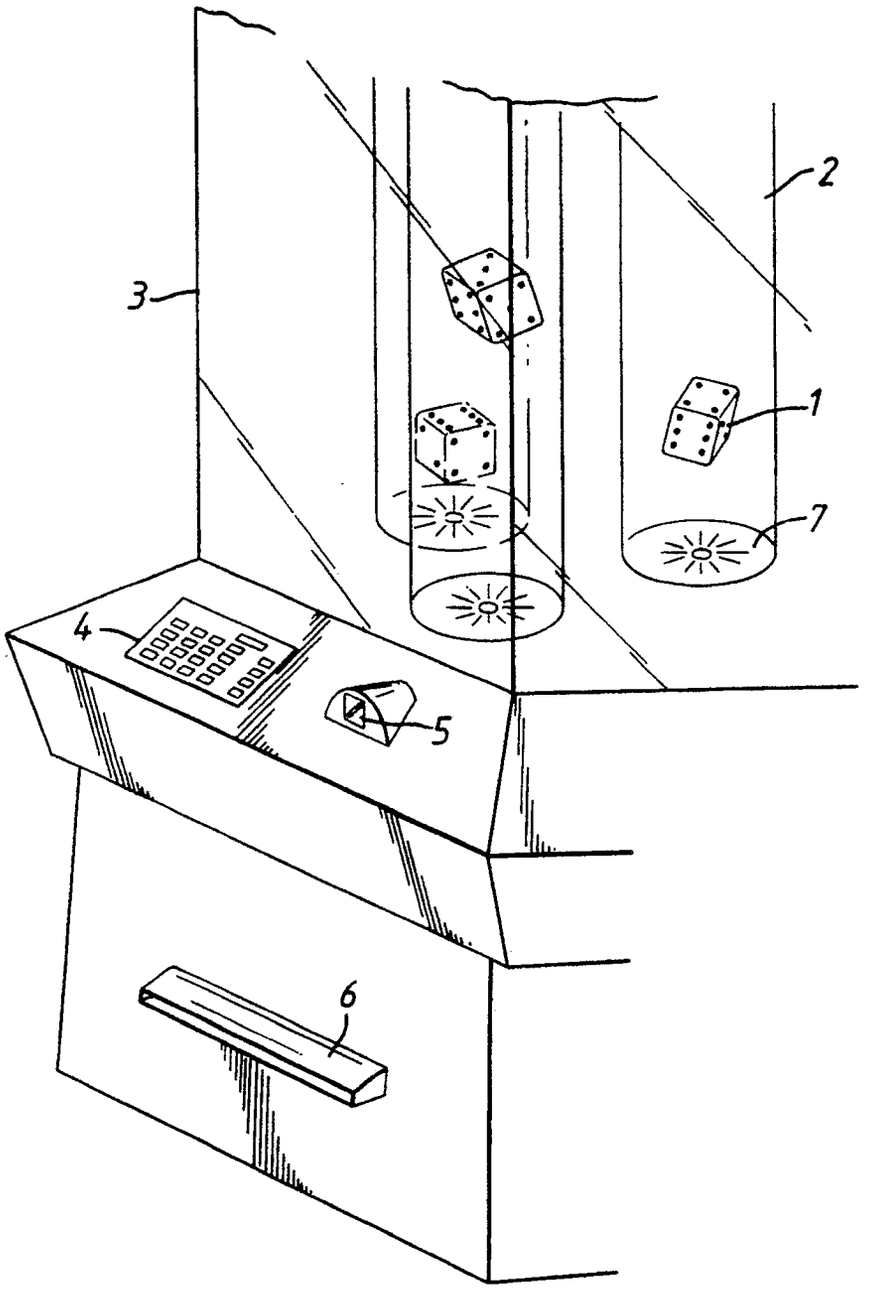


Fig.1.

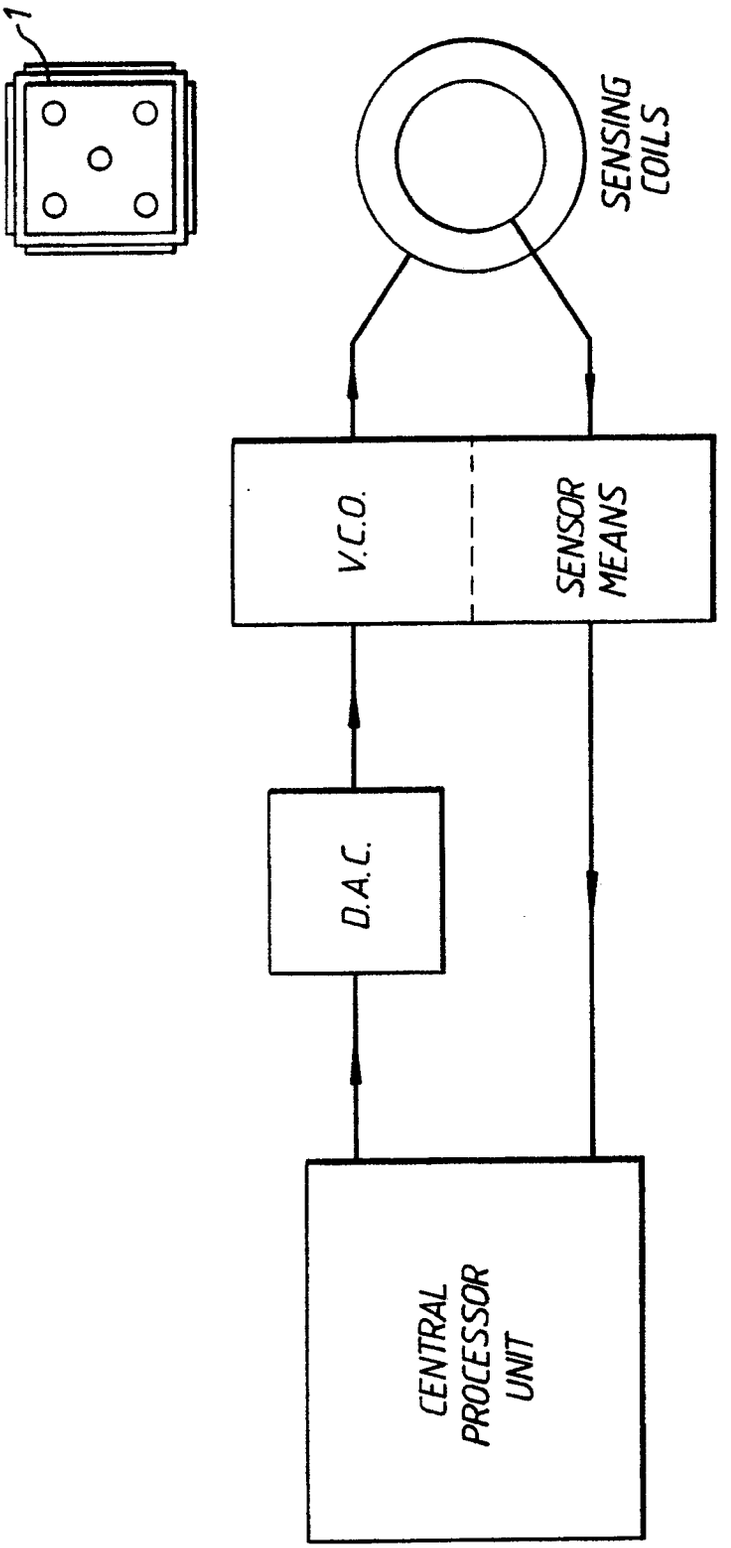

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SENSING COILS
V.C.O.
SENSOR MEANS
D.A.C.
CENTRAL PROCESSOR UNIT

Fig.2.

European Patent Office

EUROPEAN SEARCH REPORT

Application Number

EP 90 31 0691

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int. Cl.5)
Y	GB-A-1 180 560 (MAYFIELD ELECTRONICS LTD) * Page 1, lines 43-48,74-88; page 2, lines 10-20 *	1-5	A 63 F 9/04
Y	DE-C-1 871 7 (SCHOLZ) * Claim *	1-5	
A	US-A-4 861 032 (GAYLOR) * Column 2, lines 24-31; column 3, lines 5-8 *	1,2	
A	GB-A-2 103 943 (BLENKINSOP et al.) * Page 3, lines 57-62 *	3	
A	GB-A-2 147 510 (CLARASO)		

TECHNICAL FIELDS SEARCHED (Int. Cl.5)

A 63 F
G 07 C

The present search report has been drawn up for all claims

Place of search	Date of completion of search	Examiner
The Hague	04 January 91	GLAS J.

CATEGORY OF CITED DOCUMENTS

X: particularly relevant if taken alone
Y: particularly relevant if combined with another document of the same catagory
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