June 26, 1928. 1,675,209

E. O. BROWER

AMUSEMENT DEVICE

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FIG. 1.

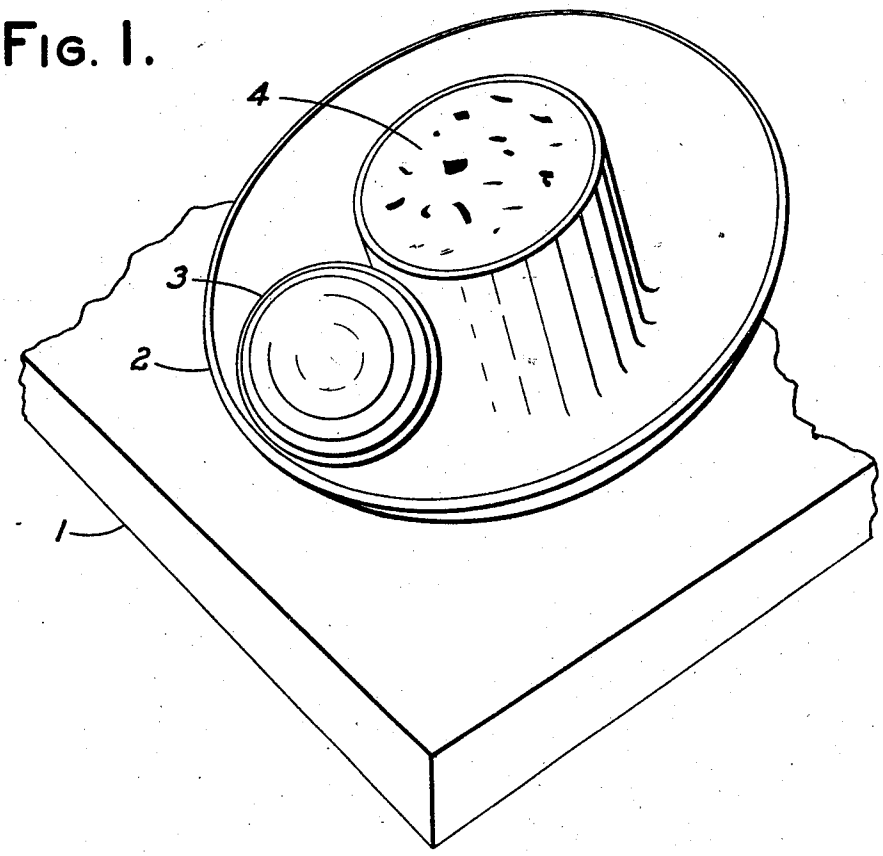
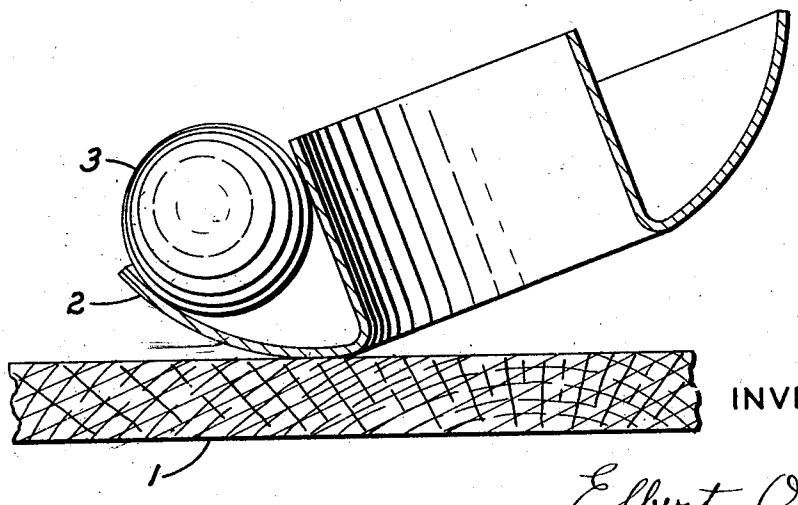


FIG. 2.



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FIG. 3.

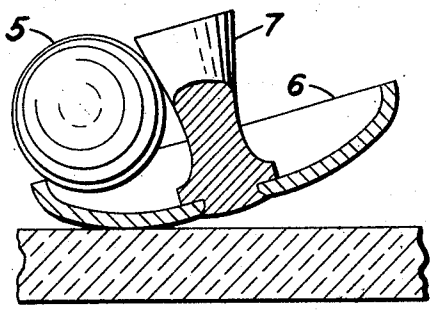


FIG. 4.

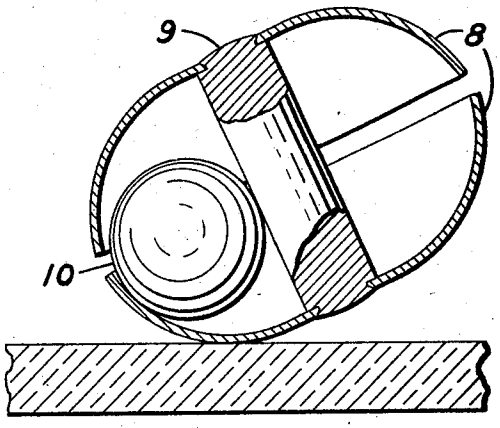


FIG. 5.

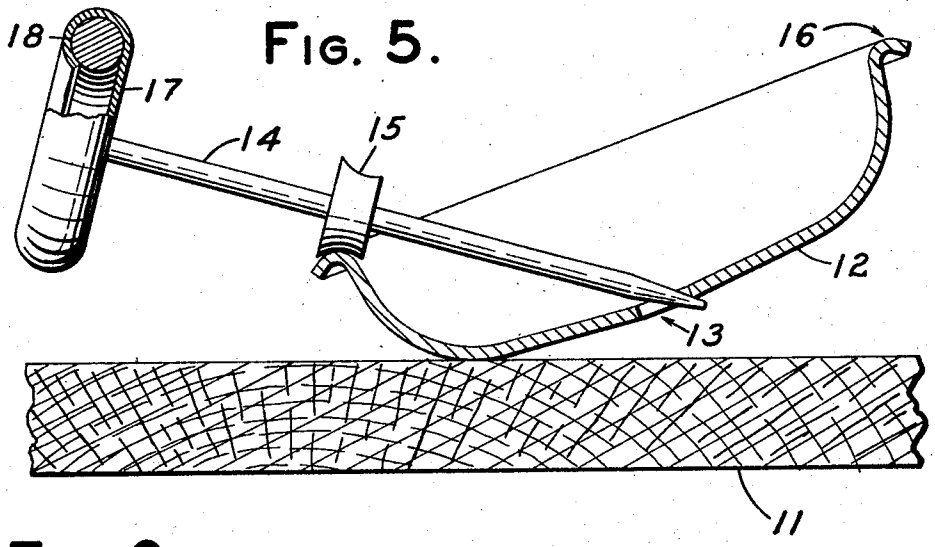
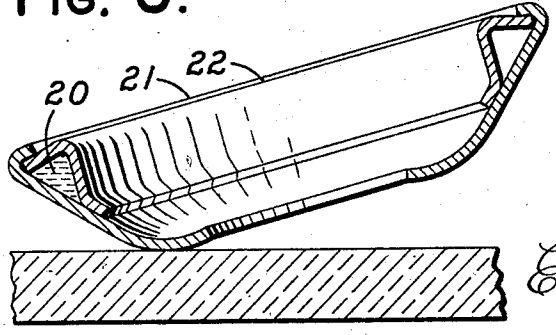


FIG. 6.



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UNITED STATES PATENT OFFICE.

ELBERT O. BROWER, OF HUNTINGTON, NEW YORK.

AMUSEMENT DEVICE.

Application filed December 19, 1927. Serial No. 241,088.

This invention relates to amusement devices, and more particularly to games or puzzles in which one or more players or operators cause one or more traveling elements to move upon a game board or similar element by tilting or otherwise moving the latter.

An object of the invention is to provide a traveling element having novel characteristics of behavior which will be interesting and entertaining.

The invention involves the form of a light shell, and the relative mass of a weight element which is movably assembled with the shell; and in a preferred embodiment of the invention these parts are arranged and proportioned so as to give the weight element a movement of inertia which is greater than the simple inertia of its travel relative to the shell.

In the accompanying drawings, the invention is illustrated in three different forms; Figures 1 to 4, inclusive, showing a preferred form; Fig. 5 showing a form which may be appropriate for devices of relatively large size—if such large sizes may be desired—and Fig. 6 showing an embodiment which may be regarded as much less interesting in its behavior than are the other forms.

In the perspective view, Fig. 1, and the sectional view, Fig. 2, 1 represents a board which is to be regarded as having its upper surface level. At rest upon the board 1 is a circular ring 2 which may be formed from aluminum. 3 is a spherical ball, which may be such as commonly are used in ball bearings. A piece of cork 4, indicated in Fig. 1 only, may be inserted in the ring if desired; and into the piece of cork may be struck the quill of a colored feather; or some other distinguishing ornament of effigy may be mounted thus. The form of the shell 2, and the relative proportions of the shell and the ball, may be made substantially as shown in Fig. 2, except for the thickness of the material which forms the shell, which thickness may be determined according to the density of this material and the weight of the ball, so that the assembled parts will come to rest upon a level surface with an inclination approximately as indicated in in Fig. 2.

It will be noted that the ball 3 has no contact with the shell 2 at or near the bottom of the trough or track in which it rolls, but only at the sides of the track, and where these sides make with each other an angle which is relatively acute. Not only is the ball thus limited to a two-point contact with the shell, but also, the angle of the trough is made acute enough so that any pair of contact points (so called) are relatively far from each other, and relatively near to the axis about which the ball must roll, and thus the ball is given a significant moment of inertia about this axis. Such a moment of inertia of the weight element, that is to say, a moment of inertia which is great enough to have significance in the behavior of the shell, is one of the principle features of my invention. It is common in amusement devices to provide a light shell with a weight element having a moment of inertia, but the moment of inertia thus commonly found is materially smaller than that provided in a preferred embodiment of my invention. A shell like that shown in Fig. 2 might be arranged so that the same ball rolled in substantially the same path, but upon a track made of rails located relatively near together; in which case there would still be two-point contact between the ball and the shell, but the moment of inertia of the ball would be very materially less, and the behavior of the shell would become, in my estimation, materially less entertaining.

While it may be novel for me to provide two-point contact between a shell and a ball; mere two-point contact of itself is not the essence of my improvement in their relations, which, rather, consists in separating such contacts sufficiently to provide a desired moment of inertia for the ball; yet there appears to be no definite limit which can be assigned to distinguish exactly between those degrees of contact separation which afford agreeable results, and the lesser degrees of contact separation which must result unsatisfactorily. Being obliged to claim this feature of my invention in terms of structure rather than in terms of inertia, I use the definite expression "fifteen sixteenths of the diameter of the ball" in certain of the appended claims, to designate explicitly a particular degree of separation of the contacts without desiring to imply that this value marks a division between one thing which necessarily is good, and another thing

which necessarily is bad. Furthermore, it should not be inferred that a certain degree of separation of the contacts necessarily affords for the same ball the same moment of inertia when rolling in paths which differ in their diameters or otherwise.

An increase in the distance between the contacts naturally tends to increase the friction of movement of the ball, and it is generally desirable to have no more of such friction than is necessary; so that, for example, a ball of hard steel may afford noticeable better results than a softer ball of brass, when the shell is of relative soft material.

Fig. 3 shows an embodiment which is like that of Fig. 1, but in which the proportions are different, the ball being large in relation to the size of the shell, and the path of the ball being smaller in relation to the diameter of the ball. The device illustrated in Fig. 4 is like the preceding ones, but has a double shell, which prevents the ball from becoming accidentally disassembled, and permits the device to be used either side up.

In the form of embodiment illustrated in Fig. 5, the circular shell 12 has in its center a hole 13 which receives the tapered end of a shaft 14 which has fixed upon it a collar 15 having its periphery grooved to adapt it to roll upon the rim 16 of the shell 12 and to retain the shaft 14 against longitudinal displacement. The other end of the shaft 14 carries a weight which consists of a thin disk 17 having its periphery formed so as partially to enclose the circular ring 18. The radius of gyration of the weight element about its shaft 14, may be made greater than the radius of the collar 15, in order to provide the weight element with a desired moment of inertia. In order to permit the weight element to roll around the shell with a minimum of friction, the ratio between the diameter of the shaft 14 where it normally has contact with the edge of the hole 13, and the diameter of said edge, may be made substantially equal to the ratio between the diameters of the lines of contact between the collar 15 and the rim 16, respectively.

Fig. 6 illustrates a form of embodiment which differs from the preceding forms in that the weight element consists of some mercury 20 which is confined in an annular space near the periphery of the ring formed between the members 21 and 22. It is particularly to be noted that in this form of embodiment, the weight element has practically no inertia analogous to that which is due to rotation of a weigh element about an axis of its own as in the embodiments previously considered. This difference in the inertia of the weight element affects the behavior of the weighted shell in a marked degree; and the form shown in Fig. 6 may be regarded as of insignificant interest in comparison with a form such as that shown and described with reference to Fig. 2.

In general, it is desirable to employ a surface which is hard and smooth, for a weighted shell to move upon; and such smoothness may be more imperative in the case of a shell which is very small in size; and may be less imperative if the weight element has a high moment of inertia. For a shell of moderate size, an ordinary board of planed and unvarnished wood, or a floor element of cardboard, may be quite satisfactory, and even preferable to a surface of glass; while in the case of a shell of very small size, as for a device to be carried, floor element and all, in the pocket; a surface of metal, glass or porcelain may be preferable to that of anything less hard and smooth.

While I have indicated approximately in Fig. 2, certain particular forms and proportions, and though I explicitly designate them as characteristic of a preferred embodiment; it will be understood that I do not limit my invention to these particular proportions and forms, nor do I restrict it to any particular sizes or any particular materials. Certain adaptations of the device may be more suitable for the skill or interest of an adult than for a child. Different forms may be preferred according to the character of some game which is to be played therewith, or the use to which it may be put. Thus for example, a single player may hold in his hand a board which has upon it two weighted shells which he endeavors to move from two assigned stations to two other assigned stations, while trying to avoid certain hazards; or a larger floor element may be mounted in some particular manner with its movements under the control of two players who operate individual control elements simultaneously, each player having one weighted shell which is distinguishable from that of his opponent, and the object of each player being to disassemble the weight from the shell of the opponent while preserving his own shell in operative condition.

What I claim is:

1. In an amusement device, a shell made of thin material, and comprising an inner tubular portion and an outer dished portion having its exterior and under side convex, and said portions forming an annular trough adapted to permit a spherical ball to roll therein, and a spherical ball of a size adapted to roll in said trough; the weighted shell being adapted to move without overturning of the shell upon a surface moderately inclined from the horizontal.

2. In an amusement device, a light shell, and a weight element therein, in combination with a floor element for the weighted shell to move upon; the general form of the under

side of the shell being convex in both dimensions, the shell having in its upper side a track element adapted to guide the weight element in a definite path in the shell, the weight element being adapted to move freely upon the track along said path, and the weighted shell being adapted to move without overturning of the shell upon a part of the upper surface of the floor element while the floor element is unsteadily supported with said part of its surface inclined moderately from the horizontal.

3. In an amusement device, a ring made of thin material, and a weight element assembled therewith, in combination with a floor element for the weighted ring to move upon, said ring having the form of a trough adapted to permit the weight element to move in the trough around and around the ring, and the weight element being adapted to move in the trough in said manner.

4. In an amusement device, a ring made of thin material, and having the form of a trough adapted to permit a spherical ball to roll in said trough around and around the ring, and a substantially spherical ball of a size adapted to roll in said trough in said manner; in combination with a floor element for the weighted ring to move upon.

5. In an amusement device, a ring made of thin material, and having the form of a trough adapted to permit a spherical ball to roll in said trough around and around the ring while having two-point contact therewith, and a substantially spherical ball of a size adapted to roll in said trough in said manner; the distance in a straight line, between the two points (so called) of any such pair of contacts being normally greater than fifteen sixteeths of the diameter of said ball, and the weighted ring being adapted to move without overturning of the ring, upon a surface inclined moderately from the horizontal.

6. In an amusement device, a substantially circular ring made of thin material, and having the form of a trough adapted to permit a sperical ball to roll in said trough around and around the ring while having two-point contact therewith, and a substantially spherical ball of a size adapted to roll in said trough in said manner; the distance in a straight line, between the two points (so called) of any such pair of contacts being normally greater than fifteen sixteenths of the diameter of said ball, and the weighted ring being adapted to move without overturning of the ring, upon a surface inclined moderately from the horizontal.

Signed by me this seventeenth day of December, 1927.

ELBERT O. BROWER.