Dec. 17, 1968 J. P. McKEOWN 3,416,801

ROTATING TUBE GAME WITH ROLLING MEMBER

Filed Dec. 21, 1966

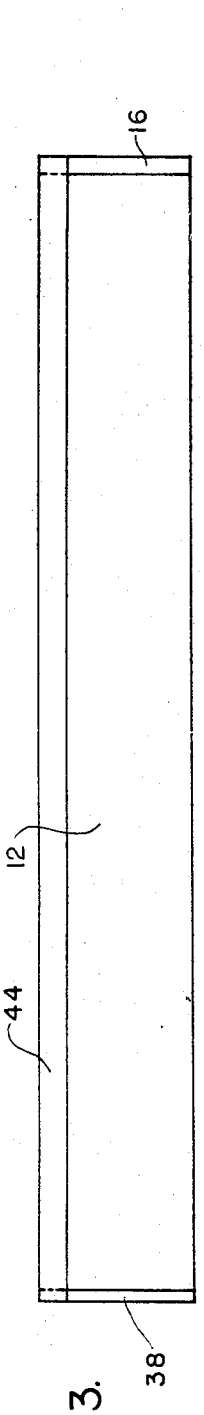


FIG. 3.

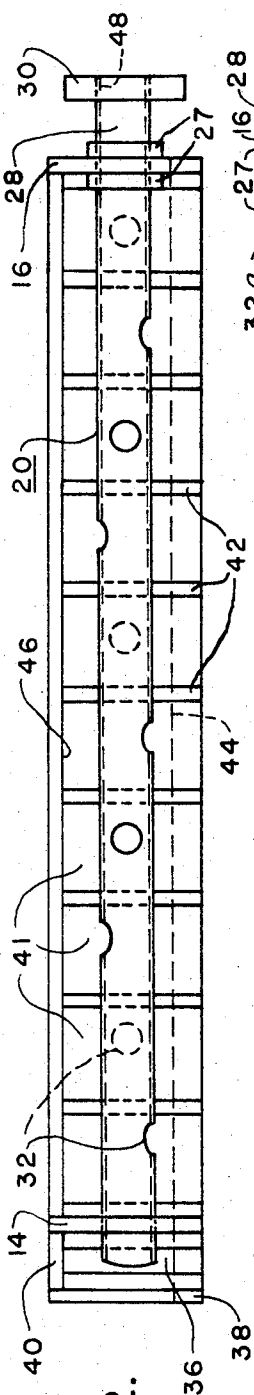


FIG. 2.

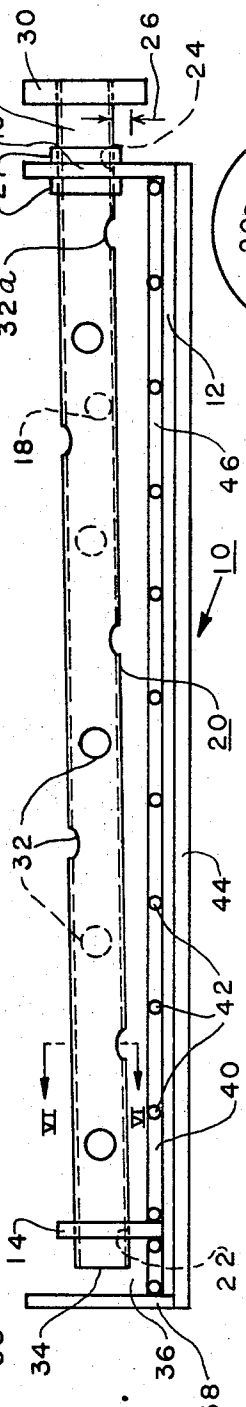


FIG. 1.

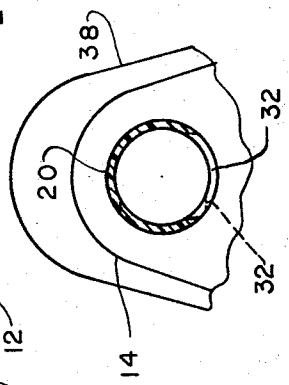


FIG. 6.

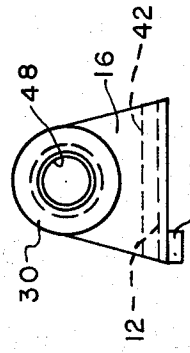


FIG. 5.

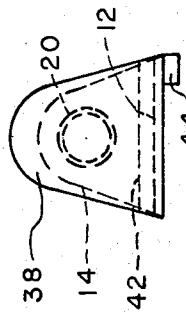


FIG. 4.

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ROTATING TUBE GAME WITH ROLLING MEMBER

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The present invention relates to a game structure and more particularly to a game structure which taxes mind-manual coordination and dexterity of all age groups.

My game structure is an absorbing test of skill and coordination which has been found to interest players of almost any age. It exercises manual dexterity as well as the coordination between the mind and the hand. The game structure is arranged so that the component parts thereof are few in number and are relatively uncomplicated. Moreover, the structure can be manipulated with one hand so that the dexterity of one hand of a player can be tested against that of the other hand. By this same token, a more advanced player can offer a handicap to an inexperienced player by playing left-handed, or otherwise with his less-favored hand.

The game structure of my present invention is arranged with a single, uncomplicated moving part adapted for manipulation by the fingers of one hand and thus affords a chance for the development of finger dexterity, particularly of the rotative variety. Thus, the game not only provides an absorbing play, but, in the case of children or young people in general, accentuates the development of that manual dexterity frequently utilized in later life, for example, in the operation of various types of production machines or power tools.

The game structure of my invention is preferably mounted at a stationary location, and thus it is not necessary or desirable to hold the game structure in both hands during play. Therefore, the playing characteristics of the game structure are reproducible from one player to the next to ensure fairness in the competitive use of the game. Further, the relatively stationary position of the game structure during play substantially limits the testing of the player's skill substantially to the eye-hand or finger coordination, as only these parts of the player's body are exercised during manipulation of the game structure. Therefore, the game structure can be utilized also for testing purposes, as in those cases wherein it is desired to select a limited number of individuals from a group to perform tasks requiring a high degree of manual dexterity, for example, in the operation of certains forms of production machinery.

In manipulating my novel game structure, the object is to propel a ball or marble or the like along a straight, predetermined path in avoidance of movable obstacles placed in the path. These obstacles may be in the form of dropout slots in an inclined and rotatable transparent tube, or a tube provided with other visual access means. The tube must be constantly rotated with the hand and fingers as the ball falls by gravity along the tube to move the obstacles away from the path of the moving ball. This action requires not only excellent hand and finger dexterity, but also a high degree of coordination between the hand and the eye of the player. This follows from the fact that the moving ball, when the game structure

is placed as directed on a level surface, always moves with the same speed of travel and, as the ball moves in a straight line, the maximum travel distance of the ball through the game structure is predetermined in every use of the game structure. Likewise, the distances between the movable obstacles and their paths of possible collision with the moving ball are always the same regardless of the particular player who is manipulating the game structure. Therefore, the direction of movement and the rate of travel of the ball through the game structure cannot be influenced by the player, with the exception that his inability to remove one of the movable obstacles from the path of the ball terminates the movement of the ball through the structure. Manipulation of the game structure depends, then, upon a single variable, i.e., the player's manual dexterity and more particularly the dexterity of one hand only so that movements of other parts of the player's body do not influence the result obtained. This furnishes not only an absorbing and interesting play, but also provides reliable test results of manual and particularly rotative finger dexterity when the game structure is so used.

Various forms of game apparatus involving rolling balls or marbles have been disclosed heretofore. For example, the patents to Parker (1,291,105) and to Leonard (747,989), disclose a ball maze arranged on a flat board or the like. In the Parker patent the board is inclined and is rockable by the player about the longitudinal axis of the board. Accordingly, the game structure exercises not rotative finger dexterity, but arm and hand dexterity. Moreover, the course or path and speed of the moving ball is never the same but depends upon the character of movements imparted to the board by a particular player. Therefore, the Parker device in addition introduces too many variables to permit the device to be used for testing purposes. The Leonard apparatus suffers from the same disadvantages of the Parker device and moreover, in the majority of its modifications, the maze type board or plate structure is suspended at its center so that it can be inclined in any direction; as result, the ball can be reversed in its path to introduce still another variable.

In a more recent disclosure Dreyer Patent 3,211,457, a transparent tube is utilized having a series of aligned and apertured partitions therein with the object being to cause balls to drop through the aperture by rotating and shaking the tube. However, the Dreyer apparatus requires the game structure to be held vertically in both hands and thus involves other parts of the player's body rather than the sole exercise of finger dexterity and eye-hand coordination. Moreover, the path of the balls through the game structure is variable since the motion of a given ball can be continued even after it meets an obstacle along its path. Therefore, test or game results are not reproducible and are difficult to measure.

The patent to Young (3,075,770) shows another ball maze including a stacked series of parallel tubes having communicating openings therebetween and other openings which permit the balls to drop out of the tubes. The stacked tubes are tilted back and forth by holding the tubes in both hands of the player in an attempt to cause the ball to pass from the uppermost tube to the lowermost tube through the intermediate tubes and communicating openings therebetween without passing out of the

drop out openings. Here again, the rate of travel of the ball is controlled by the individual player, and the game structure, being held in the hands of the player, can be supported in a variety of positions. Therefore, the Young structure does not exercise finger dexterity and the characteristics of each use of the game structure are not reproducible from one player to another.

The Heinig Patent 966,091 provides game apparatus including an elongated, variably inclined band where the object is to cause a ball to roll along the band without falling off its lateral edges. One end of the band is fixed and the other end of the band is secured to a handle which is grasped by both hands of the player. Accordingly, the player determines the inclination of the band and the rate of travel of the ball. Moreover, the path of the ball is not likely to be straight, and there are no movable obstacles positioned at predetermined distances along the length of the path. Accordingly, the exact manner of using the Heinig game structure likewise is not reproducible from one player to another.

The Becker Patent 1,845,473 discloses a ball maze consisting of an inclined tortuous path structure which is rotated to cause the ball to pass therethrough and to fall vertically through a number of vertically alignable openings, which bridge gaps in the path. The path is largely defined by a number of elongated twisted springs, which permits the progress of the ball to be observed. Although the tortuous path is generally inclined, the rate of travel of the ball through the path is entirely under the control of the individual player rather than completely under the influence of gravity. The tortuous spring structure is wound about a central axle coupled to a wheel intended to be grasped by both hands of the player. Thus, the Becker structure does not exercise finger dexterity of one hand of the player. Although the obstacles in the path of the ball comprising the aforementioned vertical gaps are, to be sure, movable, they cease to become obstacles at a single predetermined rotative position of the tortuous path structure. The time of travel of the ball through the Becker apparatus and also between the individual obstacles thereof is entirely at the control of the player and thus the associated playing time is not self-timed. Therefore, the playing time resulting from use of the Becker apparatus may be uncontrollably long and thus reproducible playing conditions, or testing conditions if the structure is so used, cannot be obtained.

Many similar game structures are known, all of which suffer from the disadvantages pointed out above with reference to this representative sampling of the prior art. Therefore, my game structure, which will presently be described in detail, offers a number of significant improvements in comparison to known game structures. In summary, my game structure exercises a particular type of bodily coordination viz., eye-finger dexterity, permits the testing of one hand against the other, provides enjoyment whether manipulated by a single player or by a number of players competitively, develops rotative finger dexterity in the player, is self-timed in operation so that a given player cannot manipulate the structure in a slow and annoying manner such as in competitive play, and presents a predetermined path and travel time of a ball through the apparatus so that the apparatus can be used reproducibly for testing purposes if desired and so that each player is subjected to identical playing conditions.

I accomplish the aforementioned desirable features of my invention by providing in a game structure, the combination comprising an elongated tube, means for supporting said tube in an inclined position thereof, said tube being rotatably mounted in said supporting means and having openings adjacent its ends to receive and to discharge a rolling member such as a ball and the like, said tube having a number of obstacles spaced along the length thereof and movable into and out of the path of said rolling member, and means forming at least part of the wall structure of said tube for providing visual access to said rolling member as it moves along the length of said tube. In certain arrangements of my novel game structure said obstacles are openings provided in walls of said tube, said openings being sized to permit said rolling member to drop therethrough when said openings are disposed in the path thereof, said supporting means comprises a pair of spaced upright supports mounted adjacent the ends of an elongated base member and a plurality of scoring compartments are disposed along the length of said base member at positions respectively beneath said obstacle openings.

During the foregoing discussion various objects, features and advantages of the invention have been set forth. These and other objects, features and advantages of the invention, together with structural details thereof will be elaborated upon during the forthcoming description of certain presently preferred embodiments of the invention and certain presently preferred methods of practicing the same.

In the accompanying drawings, I have shown certain presently preferred embodiments of the invention together with certain presently preferred methods of practicing the same wherein:

FIGURE 1 is a side elevational view of one form of game structure in accordance with my invention;

FIGURE 2 is a top plan view of the apparatus as shown in FIGURE 1;

FIGURE 3 is a bottom plan view of the apparatus as shown in FIGURE 1;

FIGURE 4 is a left end elevational view of the apparatus as shown in FIGURE 1;

FIGURE 5 is a right end elevational view of the apparatus as shown in FIGURE 1; and

FIGURE 6 is a partial cross-sectional view of the game structure as shown in FIGURE 1 and taken along reference line VI–VI. thereof.

Referring now more particularly to the drawings, my exemplary game structure **10** shown therein comprises an elongated flat base member **12** having an upright support **14** or **16** adjacent each end thereof respectively. To define a path of travel for a ball or marble **18** through the game structure **12**, an elongated tube **20** is furnished. The tube **20** is supported upon the supports **14** and **16** at a relatively slight inclination with respect to the base **12** by engagement with apertures **22** and **24** formed respectively in the supports **14, 16.** In the example shown, the elevation of the right end of the tube **20** relative to the left end thereof, as viewed in FIGURE 1 of the drawings, is denoted by dimensensional arrows **26.** It will be appreciated, of course, that a greater or lesser elevation can be provided depending upon the rate of travel desired for the ball **18** through the tube **20.** However, for a given game apparatus, as constructed in accordance with my invention, the rate of travel will always be constant when the base **12** of the apparatus **10** is supported upon a level surface.

The tube **20** can be fabricated from any convenient structural material, and in the illustrated embodiment the tube is fabricated from a transparent plastic material such as acrylic plastic. Alternatively, the tube can be fabricated from a relatively rigid opaque material having its surface provided with a number of closely spaced slots or aperatures which are dimensioned to prevent the ball **18** from falling therethrough but which provide a screen effect and resulting visual access to the ball **18.**

The plastic tube **20,** in this example, is provided with a pair of collars **27** secured thereon and disposed adjacent the opposed sides of one of the upright supports **14** or **16,** for example the support **16.** The collars **27** are fixedly secured to the tube **20** as by gluing or welding to prevent withdrawal of the tube **20** from the supports **14** and **16.** The tube **20** otherwise is freely rotatable in the apertures **22, 24** of the supports **14, 16.**

To provide a convenient means for rotating the projecting end portion **28** of the tube **20**, an annual member or wheel **30** is secured to the adjacent end of the tube **20**. The wheel **30** can be fabricated from a suitable material such as plastic or plywood and can be secured to the tube **20** by gluing or welding depending upon the materials involved. It will be understood that the wheel **30** can be dispensed with and the tube **20** can be rotated by grasping the adjacent end portion **28** with the fingers.

Along the length of the tube **20** are disposed a number of apertures **32** in the sides, top and bottom of the tube **20**, as viewed in FIGURE 1 of the drawings. These apertures **32** desirably are arranged in an equally spaced alternating or spiral array along the length of the tube **20**. Each aperture **32** is larger than the ball **18** so as to provide dropout obstacles therefor. Therefore, in order to permit the ball **18** to roll by gravity along the full length of the tube **20**, it is necessary to rotate the tube **20** for the purpose of successively removing the dropout apertures **32** from the path of the ball **18** as the latter approaches each opening **32**. The lower end **34** of the tube **20** is left open so that the ball, if it succeeds in traversing the entire length of the tube **20**, can drop out of the lower end **34** into a final scoring compartment **36** defined by end wall member **38**, the adjacent upright support **14** and a bead or rod section **40** secured adjacent the rear edge of the base **12**.

The surface of the base member **12** is desirably divided into a number of intermediate scoring portions **41**, each associated with one of the dropout openings **32**, by a number of transversely extending rods or beads **42**. In this arrangement of the invention, the base member **12** is sloped toward the rear, as viewed in FIGURE 1 of the drawings, by an elevator strip **44** secured to the underside of the base member **12** and extending along the front edge thereof, as better shown in FIGURE 3 of the drawings. To retain the ball **18** within a given one of the scoring positions or compartments **41** into which it may fall, a longitudinal rod member or bead **46** is secured along the rear lateral edge of the base member **12**, as better shown in FIGURE 2 of the drawings. Thus, as shown in FIGURE 1, each of the scoring portions **41** is disposed directly beneath an associated one of the dropout openings **32**. Suitable scores can be allotted to the inter mediate scoring positions **41** and to the final scoring position **36** consonant with the increasing difficulty of obtaining these positions as the ball progresses along the length of the tube **20**.

When playing the game, the ball **18** is placed in the upper open end **48** of the tube **20** whereupon it commences to roll by gravity toward the lower open end **34** thereof. To prevent the ball **18** from falling through the first opening **32***a*, the tube **20** is rotatively displaced in either the clockwise and counterclockwise direction by grasping and turning the wheel **30** with the fingers. This action removes the obstacle in the form of opening **32***a* from the path of the ball **18**, but at the same time places one of the succeeding openings **32** into the path of the ball. Therefore, the tube **20** must be continually adjusted by turning the wheel **30** as the ball passes along the length thereof to successively remove the openings **32** from its path of travel.

If the player successfully causes the ball **18** to elude each of the openings **13** by proper manipulation of the wheel **30**, the ball **18** drops out of the lower open end **34** of the tube **20** into the final or highest scoring compart ment **36**. The openings **32** are, of course, larger in diameter than that of the ball **18** so that the ball readily drops therethrough. If desired, the openings **32** are of such size so as to provide axial overlappage, as better shown in FIGURE 6, with the result that there is no rotative position of the tube **20** whereat an essentially unobstructed path through the tube is provided.

The game structure can be rendered easier or more difficult to manipulate by decreasing or increasing the slope or inclination of the tube **20** or by decreasing or increasing the number of dropout openings **32** or both. Alternatively, the openings **32** can be irregularly spaced along the length of the tube **20** and/or certain of the openings **32** can be made larger than others, although all of the openings **32** are sized to permit the ball **18** to drop therethrough.

With my game structure, it will be seen that the path of the ball **18** follows an essentially straight line through the structure, that its maximum length of travel is constant, that the time of passage of the ball through the tube **20** is constant for a given elongation **26** thereof (provided the base member **12** is placed on a level surface), and that the time of passage between adjacent dropout openings **32** is constant. Therefore, the playing conditions associated with use of the game structure **10** are reproducible, which heightens the interest in the game and the sense of competition when there are more than one player. In addition, this reproducibility of playing conditions makes the game structure applicable to testing or development of manual and particularly finger dexterity and attendant eye-hand coordination.

From the foregoing, it will be apparent that novel and efficient forms of game structures have been disclosed herein. While I have shown and described certain presently preferred embodiments of the invention and have illustrated presently preferred methods of practicing the same, it is to be distinctly understood that the invention is not limited thereto but may be otherwise variously embodied and practiced within the scope of the following claims.

I claim:

1. In a game structure, the combination comprising at least one rolling member, an elongated tube, means for supporting said tube in an inclined position thereof, said tube being rotatably mounted in said supporting means and having openings adjacent its ends to receive and to discharge said rolling member, such as a ball and said tube having a number of obstacles spaced along the length thereof and movable into and out of the path of said rolling member, and means forming at least part of the tubular wall structure of said tube for providing visual access to said rolling member as it moves along the length of said tube.

2. The combination according to claim **1** wherein said obstacles are openings provided in walls of said tube, said openings being sized to permit said rolling member to drop therethrough when said openings are disposed in the path thereof.

3. The combination according to claim **2** wherein said tube is open at both ends and said obstacle openings are disposed in a spiral array.

4. The combination according to claim **2** wherein said obstacle openings are equally spaced along the length of said tube.

5. The combination according to claim **1** wherein said visual access means comprises a tube fabricated from a transparent material.

6. The combination according to claim **1** wherein said supporting means comprises a pair of spaced upright supports mounted adjacent the ends of an elongated base member.

7. The combination according to claim **6** wherein a plurality of scoring compartments are disposed along the length of said base member at positions respectively beneath said obstacle openings.

8. The combination according to claim **1** wherein said tube is open at both ends, and an annular knob is mounted on said tube adjacent one end thereof to facilitate rotation of said tube.

9. The combination according to claim **1** wherein said tube is open at both ends, and compartment means are positioned adjacent the lower end of said tube for receiving said rolling member when it exits from said open lower end.

10. The combination according to claim **7** wherein said

scoring compartments are delineated by a longitudinal rod and a plurality of spaced transversely extending rods secured to the upper surface of said base member, and a longitudinally extending elevator strip is secured to the under surface of said base member and laterally displaced relative to said longitudinal rod to laterally incline said base member so said rolling member rolls by gravity against said longitudinal rod.

11. The combination according to claim **2** wherein said openings are sized so as to afford axial overlappage with others of said openings so that no rotative position of said tube affords a straight line path therealong for said rolling member in avoidance of said apertures.

References Cited

UNITED STATES PATENTS

242,187	5/1881	Bryan	273—110
993,456	5/1911	Naylor	273—115
2,515,346	7/1950	Jackson	273—113
2,747,297	5/1956	Zalkind	46—1 X

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U.S. Cl. X.R.

273—113; 46—43

UNITED STATES PATENT OFFICE

CERTIFICATE OF CORRECTION

Patent No. 3,416,801 December 17, 196

John P. McKeown

It is certified that error appears in the above identified patent and that said Letters Patent are hereby corrected as shown below:

Column 4, line 51, "dimensensional" should read -- dimensional --; line 65, "aperatures" should read -- apertures --. Column 5, line 2, "annual" should read -- annular --; line 44, "inter mediate" should read -- intermediate --. Column 6, line 37, cancel "such as a ball and".

Signed and sealed this 17th day of March 1970.

(SEAL)
Attest:

Edward M. Fletcher, Jr.
Attesting Officer

WILLIAM E. SCHUYLER, JR.
Commissioner of Patents