March 29, 1966 J. H. BEVERETT 3,242,799

MARBLE KALEIDOSCOPIC TOY

Filed July 20, 1964 2 Sheets-Sheet 1

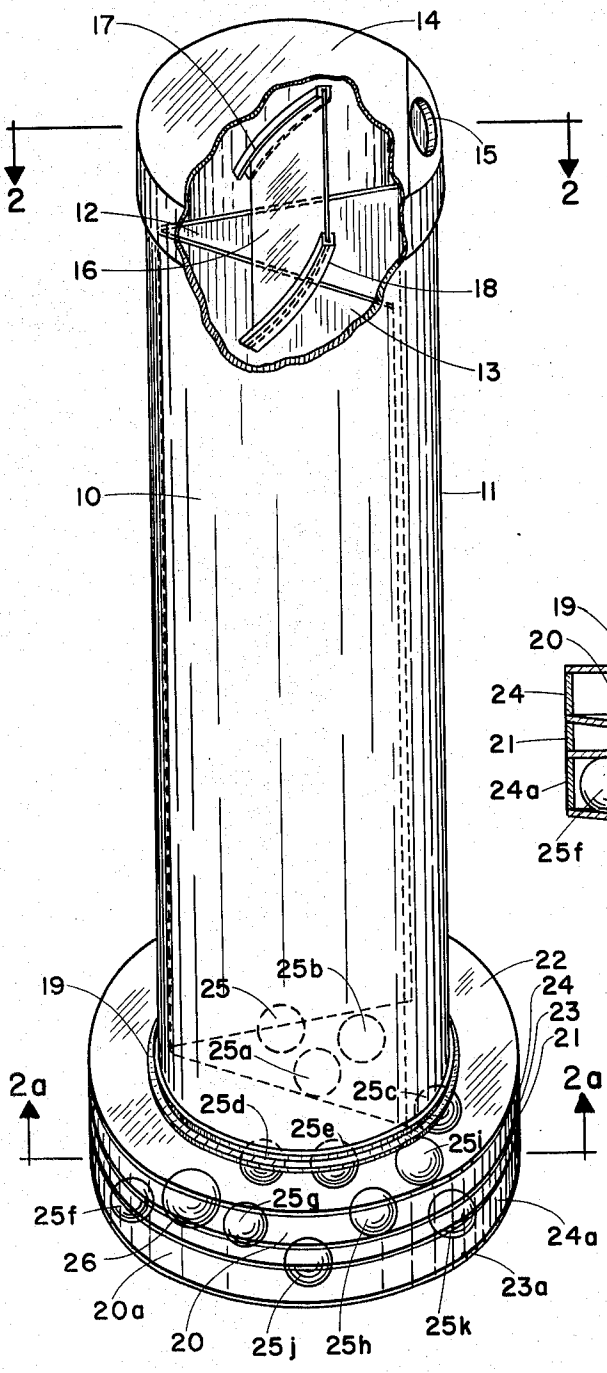


FIG. 1

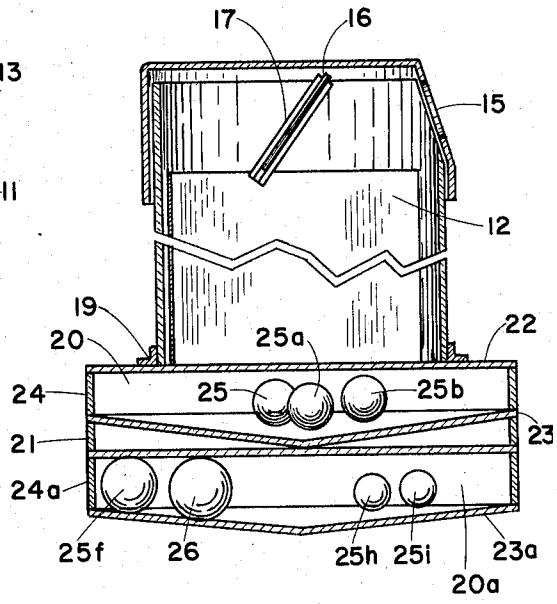


FIG. 2

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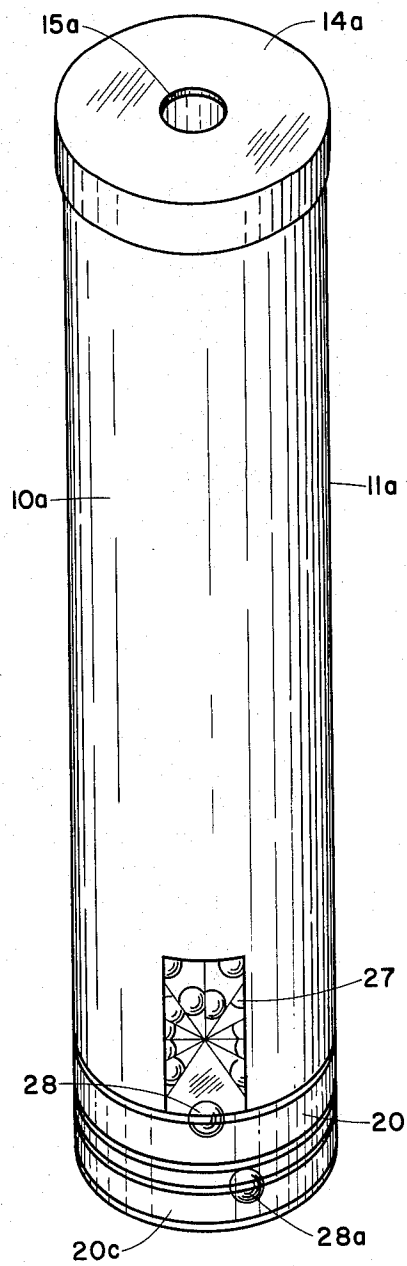


FIG. 3

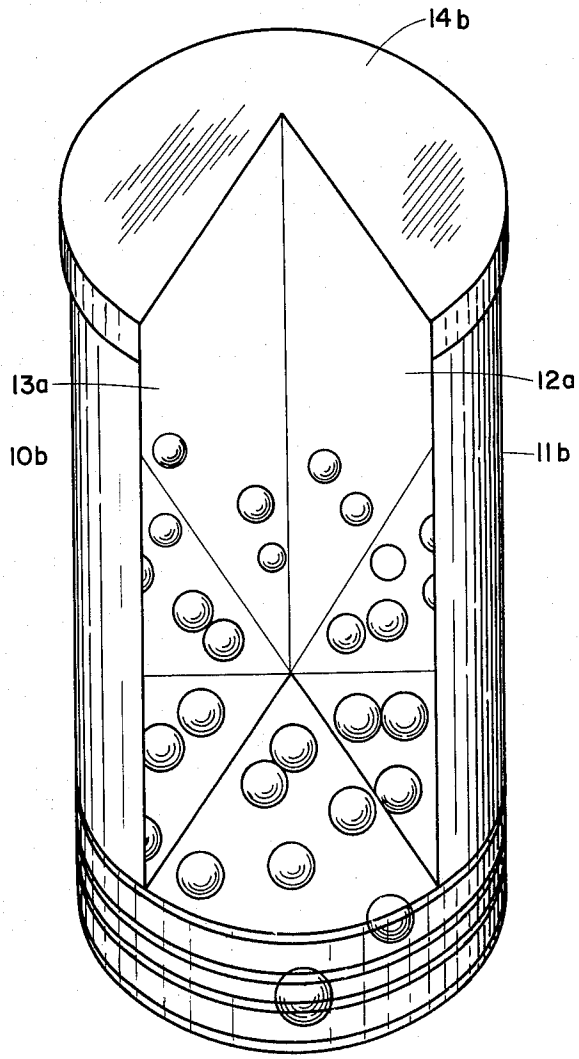


FIG. 4



FIG. 5

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MARBLE KALEIDOSCOPIC TOY

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5 Claims. (Cl. 88—15)

This invention relates to toy kaleidoscopes.

It is the primary purpose of this invention to create a novel toy kaleidoscope for the amusement of both children and adults wherein the reflected patterns emanate from spinning circumrotating marbles instead of from loose or disc-embedded fragments. The patterns formed are of an entirely different character from the fragment pattern type and further, the patterns constantly and rapidly change, thus producing an action toy of considerable interst.

Another object of the invention is to create an educational toy which illustrates the applications of centrifugal force, kinetic energy and leverage ratios. Another object of the invention is to create an action toy which requires a degree of physical exertion to manipulate, which is beneficial to a child. Still another object of the invention is to develop coordination, a certain degree of which is required to successfully manipulate the toy.

Still additional objects, benefits and advantages will become evident from a study of the following detailed description of preferred embodiments of the invention in conjunction with the accompanying drawing, in which:

FIGURE 1 is a perspective view of one embodiment of the basic invention, having the upper portion of the viewing arrangement cut away for clarity.

FIGURE 2 is a cross-sectional view of FIGURE 1 taken along the lines **2**—**2** and **2***a*—**2***a*.

FIGURE 3 is a perspective view of a simpler embodiment of the invention wherein the marble encasement is of the same approximate diameter as the tubular housing and the eyepiece is of the same design and general construction as the ordinary familiar kaleidoscope.

FIGURE 4 is a perspective view of one embodiment of the invention wherein the reflecting surfaces are open, to permit viewing of the kaleidoscopic patterns by several persons at the same time.

FIGURE 5 is a cross-sectional view of an alternate bottom of the marble encasement, referring back to FIGURE 2.

Novelty of the present invention lies in (1) the employment of spheres preferably vari-colored marbles for forming the kaleidoscopic patterns, (2) the provision for the marbles to circumrotate inside a transparent encasement, (3) the provision for the marbles to rock to and fro inside the marble encasement, (4) the provision for the marbles to spin instead of roll as they circumrotate the marble encasement, (5) the provision for the marbles to spin and bounce against each other, and (6) the provision for the marbles to spin substantially alone after circumrotation action has ceased. Each of these provisions present kaleidoscopic patterns of novel, interesting and amusing character.

The spinning action of the marbles in conjunction with circumrotating action is due to the fact that the marbles bear against both the top and bottom of the encasement slightly to one side of their axes of rotation, creating a considerable leverage revolution ratio when compared with rolling action. It is to be noted that the encasement itself consists of a circular top and a circular bottom having various combinations of plane, conical and concave curvatures which, when a cylindrical spacer of proper thickness is introduced therebetween form a modified V shape runway track enclosure. This arrangement causes the marbles to spin at relatively high revolutions instead of roll when the kaleidoscope is manipulated in a gyratory motion imparting centrifugal force to the marbles. The patterns thus formed by the marbles in action are observed substantially in the usual manner of an ordinary kaleidoscope, except that the device is held vertically instead of horizontally.

Referring now specifically to the drawing, a kaleidoscopic toy **10** constructed in accordance with the present invention is shown to comprise the usual tubular housing **11**, inside of which are longitudinally disposed mirror reflectors **12** and **13** which usually consist of a single piece of bright metal formed in a longitudinal V shape. Inasmuch as it is necessary for the toy to be manipulated and viewed in a vertical position, provision has been made for the viewer to hold his head in substantially a normal position by means of cap **14**, which contains viewing hole **15** angularly disposed to provide a slightly downward viewing positon of the head, and the mirror **16** which is angularly mounted at such a degree as to reflect the pattern images through hole **15** to the eye of the viewer. Slots **17** and **18** are angularly affixed to the inside of tube **11** to provide a fixed mounting for mirror **16**. To the lower end of tubular housing **11** there are affixed by means of plastic or metal ring **19** which is glued or riveted thereto, marble encasements **20** and **20***a*, preferably of transparent material which are joined together by cylindrical spacer **21**, using the plastic weld or gluing process. Encasement **20** is comprised of a transparent circular top **22** which is shown in the drawing to be plane but which may be of convex, concave or a combination of plano-convex curvature if desired, a transparent circular conical shaped bottom **23** and a cylindrical spacer **24**, also preferably transparent. Likewise marble encasement **20***a* is composed of transparent circular plane top **22***a*, transparent circuilar conical bottom **23***a*, and cylindrical spacer **24***a* which is interposed between top **22***a* and bottom **23***a*. Balls or preferably marbles **25**, **25***a*, **25***b*, **25***c*, **25***d* and **25***e* are shown to be disposed inside transparent encasement **20**, and marbles **25***f*, **25***g*, **25***h*, **25***i*, **25***j*, **25***k* and **26** are disposed inside transparent encasement **20***a*. In the cross-sectional view represented by FIGURE 2, only those marbles disposed rearward of lines **2**—**2** and **2***a*—**2***a* are shown.

In operation, the kaleidoscopic toy **10** is grasped vertically in the hand and swung somewhat vigorously in a circular motion, either clockwise or counter-clockwise, which action sets all the marbles in spinning circumrotation. The toy is then held stationary in the hand, still in a vertical position, and the kaleidoscopic patterns are viewed through the hole **15**. As kinetic energy is partially spent, reducing centrifugal force at the same time, the marbles will circumrotate toward the center of encasements **20** and **20***a*, bouncing against each other in the process, and expending their final kinetic energy spinning substantially alone or merely touching each other. All these actions are reflected to the eye of the viewer in ever-changing and interesting kaleidoscopic patterns.

Additional novelty is provided when the kaleidoscopic toy **10** is held between the outstretched palms of both hands (after marbles are placed in circumrotation) and the toy quickly rotated in the direction opposite to that in which the marbles are circumrotating. This action causes the marbles to drop out of circumrotation while still spinning very rapidly. Then an erratic pattern of circumrotation is developed which causes the marbles to constantly hit each other and bounce away, all this action being reflected in kaleidoscopic patterns to the eye of the viewer.

It is to be noted that marble **26** shown in lower encasement **20***a* is of larger diameter than marbles **25** thru **25***k*, which causes it to circumrotate in a smaller diameter path

from the other marbles. Additional marbles the size of marble **26** could be introduced if desired. The advantage of having different sized marbles that circumrote in independent paths according to size, is that more marbles can be circumrotated in this manner, increasing the novelty. Although as many marbles as desired may be introduced into each encasement, there is a practical limit to the number that can be successfully circumrotated, due to the comparatively high leverage ratio imparted to the marbles by the novel V shaped runway track previously described. Therefore, by employing marbles of at least two different sizes following separate circumrotating paths, the number of marbles that may be successfully circumrotated is double.

Aside from observing kaleidoscopic patterns formed by circumrotating and spinning marbles, still additional novelty is provided when the toy **10** is held in the hand or hands in a vertical position, and the lowerportion thereof actuated in a slight to-and-fro movement. The patterns observed by the viewer might best be described as color bursts as the marbles traverse boundaries of the V shaped mirrors **12** and **13**.

FIGURE 3 illustrates a simplified embodiment **10***a* of the invention wherein the transparent encasements **20***b* and **20***c* are shown to have the same approximate diameters as the tubular housing **11***a*, and wherein the cap **14***a* is of the conventional kaleidoscopic type. Such simplified construction permits lower cost of manufacture than the more elaborate toy **10**, the encasement peripheries of which extend well beyond that of the tubular housing **11**. Also FIGURE 3 provides an optional aperture **27**, the purpose of which is to permit more light to enter encasements **20***b* and **20***c*, providing increased illumination of marbles **28** and **28***a*. It is believed that further description of the kaleidoscopic toy **10***a* is not necessary.

FIGURE 4 illustrates an innovation to toys **10** and **10***a* previously described, in that the embodiment **10***b* has an opening formed by the mirrors **12***a* and **13***a*, extending upward through cylindrical housing **11***b* and on through cap **14***b*. This arrangement permits viewing of the kaleidoscopic patterns by several persons at the same time. Transparent encasements **20***d* and **20***e* are of the same construction as previously described encasements **20**, **20***a*, **20***b* and **20***c*. It is thought that the purpose and advantages of kaleidoscopic toy **10***b* will be readily understood without further reference or description.

FIGURE 5 is a cross-section of an alternate suggestion for the curvature formation of encasement bottoms **23** and **23***a* illsutrated in FIGURES 1 and 2, as well as for comparable encasement bottoms illustrated in FIGURES 3 and 4. Here encasement bottom **29** is shown to comprise the combination of both plane and convex curvatures. The convex curvature is formed in the center portion of the bottom and permits either of the kaleidoscopic toys illsutrated to stand erect upon a substantially flat surface, as well as permitting the rotation of the toys, particularly applicable to toy **10***b*, in a direction opposite to that in which the marbles are circumrotating, the purpose and advantages of such action having been previously described.

Having thus described my invention, what I claim as new and desired to be protected by Letters Patent is:

1. A kaleidoscopic toy comprising a tubular housing, at least one encasement affixed to one end of said tubular housing, each encasement consisting of a circular shaped top, and a circular bottom, at least one of which is

curved out of the general plane thereof, the said top and bottom forming a convergent angled runway track between said circular top and bottom; a cylindrical spacer interposed between said circular top and bottom adjacent the boundaries of their peripheries, each encasement being joined to the succeeding encasement by means of a cylindrical spacer interposed between said encasements adjacent the boundaries of their peripheries; at least one ball rotatably disposed in each of said encasements, said balls being of such size as to be constrained by and bear against both the top and bottom of the said respective encasements at points slightly to one side of the axes of rotation of said balls when the toy is swung in a gyratory motion imparting centrifugal force to said balls, causing same to spin at a relatively high rate as they circumrotate within said circular encasements; reflections from said balls being transmitted to the eye of an observer by means of a V-shaped longitudinal mirror disposed within said tubular housing, through an aperture in a circular cap affixed to the upper portion of said tubular housing.

2. A kaleidoscopic toy as set forth in claim **1** wherein the kaleidoscopic reflections from said balls are angularly transmitted to the eye of an observer by means of a mirror angularly mounted above said V-shaped longitudinal mirror, through an aperture in a cap affixed to the upper portion of said tubular housing, said aperture being angularly disposed in relation to said angularly mounted mirror.

3. A kaleidoscopic toy as set forth in claim **1** wherein a longitudinal aperture is provided opposite the apex of the V-shaped longitudinal mirror, said longitudinal aperture commencing at that end of said tubular housing adjacent to said encasements, extending upwardly and terminating intermediate said tubular housing for the purpose of introducing additional illumination upon said balls.

4. A kaleidoscopic toy as set forth in claim **2** wherein a longitudinal aperture is provided opposite the apex of the V-shaped longitudinal mirror, said longitudinal aperture commencing at that end of said tubular housing adjacent to said encasements, extending upwardly and terminating intermediate said tubular housing for the purpose of introducing additional illumination upon said balls.

5. A kaleidoscopic toy comprising a cylindrical housing having reflecting surfaces angularly related and longitudinally disposed within said cylindrical housing, a longitudinal opening the width of and opposite the apex of the reflecting surfaces, said longitudinal opening extending substantially the full length of said cylindrical housing, a circular cap affixed to the upper end of said cylindrical housing, said cap being cut to conform to the opening formed by said reflecting surfaces; and having one or more encasements each containing therein at least one rotatably disposed ball as set forth in claim **1** affixed to the lower end of said cylindrical housing.

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