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C. E. STUDEN
EXPANDED PLASTIC BOARD HAVING APERTURES
RETAINING PUNCHED PIECES
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3,280,499

FIG. 1

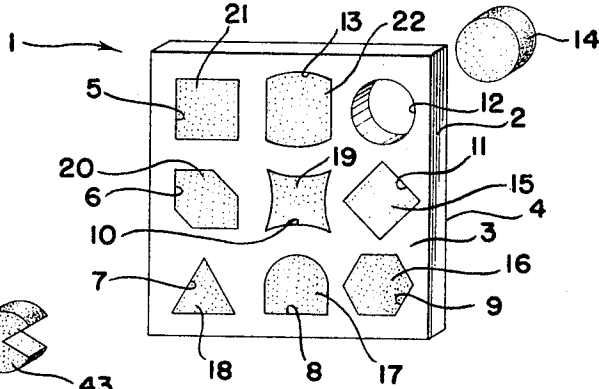


FIG. 2

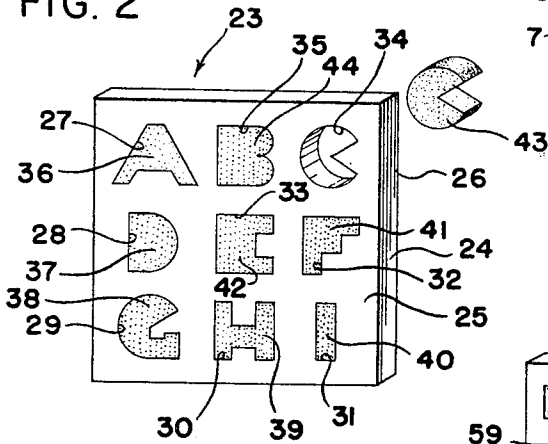
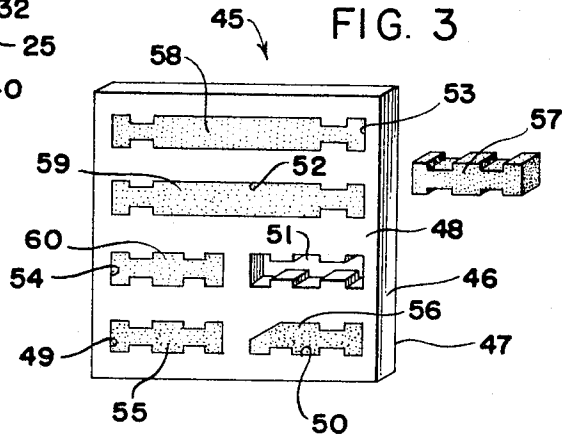


FIG. 3



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EXPANDED PLASTIC BOARD HAVING APERTURES RETAINING PUNCHED PIECES

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2 Claims. (Cl. 46-17)

This invention concerns a game board employing the use of an expanded plastic material for use in an educational and recreational device.

In the past, game boards of various descriptions and compositions have been used in both the recreational and educational fields. For one reason or another, however, these game boards have not proved entirely satisfactory. The primary disadvantage of prior art game boards is their inherently short lives, in that the frictional fit between the inserted portions and apertures quickly become a loose sliding fit due to the properties of the game board material used. Further pronounced disadvantages of game boards constructed in accordance with the prior art lies in the fact that they are dangerous to some involved in their use, difficult to manufacture, and are not durable. To date, the game board industry has been in quest of a material to solve these problems.

The instant invention sets forth a solution to the various problems which have heretofore faced this industry, and generally speaking, includes a game board consisting of a shaped blank which has an exterior of expanded plastic. This shaped blank has at least one aperture therein adapted to frictionally retain at least one portion of material, preferably of a different color than the shaped blank. This portion of material has a geometric configuration that is complementarily shaped at least in part to the geometric configuration of the aperture, and may protrude from the plane of the shaped blank.

In order to manufacture an expanded plastic game board with the most favorable characteristics, the expanded plastic blank is punched with at least one die. After removing the die, the punched blank is positioned over a second blank which has apertures correspondingly shaped to the punched portions of the punched blank to register the punched blank over said apertures and to exchange the punched portions of the first blank into the apertures of the second blank to obtain the finished product.

In one specific embodiment, the game board consists of a shaped expanded polyethylene blank with at least one geometrically shaped aperture therein. This aperture frictionally retains a portion of expanded polyethylene which has a cross-section of substantially complementary geometric configuration to the geometric configuration of the aperture. The portion of expanded polyethylene preferably has a color different than the color of the blank, and does not substantially extend from the boundary planes of the blank.

An important aspect of this invention lies in the advantage of using an expanded plastic for a game board in that it is entirely safe for all to use for a multitude of purposes. Up to this time, game board materials have been composed of a material with little resiliency and resistance to permanent effects of impact, which yield an unsafe and dangerous product to its consumers.

Another important aspect of this invention is the unique frictional properties of open cellular expanded plastic and, more specifically, expanded polyethylene. Due to the open cellular construction of sheared expanded plastic as taught by the immediate invention, a unique frictional fit between the punched portions and the apertures of the formed blank is effected in that the edges of the sheared cells frictionally engage one another. Since the closed cells will deform readily and, more spe-

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cifically, the closed cells adjoining the sheared cells, the apertures will increase in volume (depending on the punched portion's volume) as the punched portion is inserted. After insertion, memory qualities inherent in the closed cells adjoining the sheared cells of the blank and punched portion cause the sheared cells to pop into a holding interlock, decrease the volume of the aperture and thus frictionally retain the punched portion. Furthermore, when the game board is manufactured as set forth in the immediate invention, a frictional fit that does not require an excessive force is obtained and, thus, a child could use the game board with ease. In addition, these favorable frictional properties do not diminish as the game board is used, but rather remain substantially constant.

The proposed game board has the following advantages which the industry has heretofore been searching for. It is substantially impervious to puncture, permanently buoyant, resilient, odorless, non-toxic, shock absorbent, soft to the touch, resistant to mildew or stain, easy to wash, easy to dry, rust proof, acid proof, permanently weather proof, resistant to mars and scratches, and color-fast.

With the problems of the prior art devices in mind, it is a general object of this invention to provide an expanded plastic game board that is safe for all to use for a multitude of purposes.

It is another primary object of this invention to provide a game board with unique frictional characteristics.

It is yet another object of this invention to provide a game board for educational and recreational purposes, which is made of an expanded plastic.

It is still another object of this invention to provide an expanded polyethylene game board which is: substantially puncture proof, unsinkable, resilient, odorless, non-toxic, resistant to permanent impact effects, soft to the touch, resistant to mildew or stain, easy to wash, easy to dry, rust proof, acid proof, permanently weather proof; resistant to mars and scratches, and colorfast.

Other and further objects, features and advantages of the invention will become apparent from the detailed description to follow.

In the drawings:

FIG. 1 is a perspective view showing a plurality of punched portions located in correspondingly shaped apertures of an expanded plastic game board, with one punched portion removed from said board;

FIG. 2 is a view similar to FIG. 1, illustrating an alphabet board with letters of the alphabet as the punched portions;

FIG. 3 is a view similar to FIGS. 1 and 2, illustrating a functional object board with building modules as the punched portions;

In the embodiment illustrated, FIG. 1 shows an object board 1 comprising a formed blank 2 having sides 3 and 4 essentially parallel. The blank 2 has apertures 5 through 13 adapted to frictionally receive and retain substantially complementarily, geometrically shaped punched portions 14 through 22.

FIG. 2 shows an alphabet board 23 comprising a blank 24 with sides 25 and 26 substantially parallel, said blank have apertures 27 through 35 therein adapted to frictionally receive and retain complementarily shaped alphabet letters which are similar to the letters of the alphabet shaped punched portions 36 through 44, said alphabet shaped punched portions frictionally held within said apertures.

FIG. 3 shows an object board 45 consisting of a blank 46 with sides 47 and 48 substantially parallel, said blank 46 having apertures 49 through 54 therein adapted to frictionally receive and retain complementarily shaped

punched portions 55 through 60 in their geometrically corresponding apertures.

Expanded polyethylene is especially adaptable as the expanded plastic used to produce these game boards in that it has substantially all of the favorable characteristics which distinguish this game board over prior art devices. Open cellular expanded polyethylene has the unique frictional properties which lend themselves for use as a game board material. Due to the interlocking of the adjacent open cells of the apertures, and punched portions, a frictional fit is obtained which is not excessively tight and which will not become loose or lose its effect while in use and is substantially constant.

Expanded polyethylene has the low density of approximately 1.8 to 2.2 pounds per cubic foot, which enables the game board manipulator or user to manipulate the board with relative ease and safety. Shipping and handling charges of this product would also be reduced due to this low density characteristic. The water resistant characteristics of expanded polyethylene further lend itself for use as a game board in that it has substantially no capillarity, little water absorption, a high buoyancy factor, and a low water vapor transmission rate.

More specifically, the water absorption or the amount of water absorbed internally when expanded polyethylene is submerged under water is as follows. For one day, less than one percent by volume is absorbed; for forty-eight days, less than four percent by volume is absorbed in the polyethylene. The water adsorption or the amount of water adsorbed in the open surface cells of trim stock (not extruded surface) when expanded polyethylene is submerged under water is less than one-tenth of a pound per square foot of surface area of water adsorbed in two days. Expanded polyethylene has a minimum buoyancy factor of fifty-five pounds per cubic foot, which is the nominal amount of weight which expanded polyethylene will support in fresh water. Thus, with these favorable water resistant characteristics, the game board could be used in the water with no harm done to it. Many games and variations of games could be made up by using this game board in water contests. An example of this would be where a number of the games are disassembled and each part thrown into the water and scrambled. The contestants, when given a signal from the shore, would each race to complete their game board of an assigned color. These water resistant characteristics could also be utilized in the use of a game board as an emergency life saving device for those who are in trouble in the water by simply throwing the game board to the person in trouble. It is easily seen that from the water absorption characteristics, that this material could be dried out in a short period of time, with no detrimental effects to the expanded polyethylene game board.

Expanded polyethylene also has favorable mechanical properties which lend itself for use as a tough, resilient, game board. The tensile strength of polyethylene is approximately 20 to 30 p.s.i. This tensile strength property, when coupled with expanded polyethylene's favorable bend characteristics, produces a game board which is practically impervious to normal and even abnormal usage. Prior art devices have shown game boards which have little or no resiliency. Expanded polyethylene remedies this with a resiliency of thirty to thirty-five percent rebound. This resiliency may be determined by the well known Bashore resiliometer test which compares the first rebound of a falling one and one-quarter ounce weight to its original drop from a height of sixteen inches. Thus, when a game board is thrown at a window, wall, or other vulnerable places, little or no harm will be done due to the resilient and density properties since the expanded polyethylene will simply rebound and carries little momentum due to its aforementioned low density.

Furthermore, prior art devices have not provided a light, stable game board. Expanded polyethylene shows a fair resistance to discoloration in that it begins to yellow

after five hundred hours in the sun. Thus, when a thoughtless child leaves his game board on the lawn, relatively little harm will be done.

Chemically, polyethylene also lends itself for use as a game board in that it is exceptionally resistant to most solvents and chemicals at room temperature. An example of the game board utilizing the chemical resistance of expanded polyethylene would be when used in a pool. The chlorinated water of the pool would indeed not substantially harm such an expanded polyethylene game board.

Due to polyethylene's "cell memory," the game board would substantially return to its original shape after being bent and deformed, because the close cellular structure of polyethylene remembers its cellular positions. It is further realized that the game board need not be completely of expanded polyethylene, but may have a relatively hard core, such as wood, to which at least one layer of expanded polyethylene is laminated to the plywood core by a cement.

Expanded polyethylene also has favorable frictional properties since the friction fit between the punched particles and apertures remains substantially the same throughout much wear. Prior art devices have shown the use of game board materials, such as wood, without these properties, which have created some difficulties in the game board art. This problem has shown up in critical tolerances, due to frictional fit requirements, of prior art game boards which utilize materials such as wood and thus to higher production costs.

It is to be understood that this specification is not limited to the use of expanded polyethylene, and other expanded plastics, such as expanded polyurethane and expanded polystyrene, may be used as full equivalents.

As an educational device, the alphabet board could be used by children who are learning the alphabet through manipulation of the geometric configurations of the letters of the alphabet. Since children are more ready to play a game than to sit down and study, this would provide an added incentive for them to learn the alphabet while still playing a game.

The building module board would be used by those of a slightly higher age as building blocks where the punched particles are building blocks to construct various buildings and structures such as a log cabin. It is easily seen that when made on a scale of reasonable magnitude, the building module board would become a fine storage mechanism for log cabin blocks which have heretofore been made from wood or similar hard and dangerous materials. The co-ordinator board of FIG. 1 could be used by those in the higher age brackets to display and test their intelligence by taking a test which is composed of replacing a scrambled group of the punched portions and placing them in their respective particles by hand in a previously determined time limit. Other embodiments could be an animal board, a learn-your-numbers board, puzzle board, or any co-ordinator board.

It may be easily noted that these boards provide an educational device which combines education with pleasure and thus is very profitable to one's education, but yet does not tend to make children weary of education.

For ease of the description, the principles of the invention have been set forth in connection with but a few illustrated embodiments, as shown in FIGS. 1, 2 and 3.

It is not my intention that the illustrated embodiments nor the terminology employed in describing them be limiting inasmuch as variations in these may be made without departing from the spirit of the invention. Rather, I desire to be restricted only by the scope of the appended claims.

I claim:

1. An expanded polyethylene game board consisting of an expanded polyethylene blank with at least one geometrically shaped aperture having sheared cell walls therein, said aperture frictionally retaining a correspond-

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ingly shaped sheared cell punched portion of expanded polyethylene of a color different than the color of said blank, said portion having been originally punched from a different aperture than the one in which it is retained.

2. An expanded polyethylene game board as in claim 1 with said aperture frictionally retaining said punched portions by means of interlocking sheared cells.

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