(No Model.) 2 Sheets—Sheet 1.

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PUZZLE APPARATUS.

No. 547,771. Patented Oct. 15, 1895.

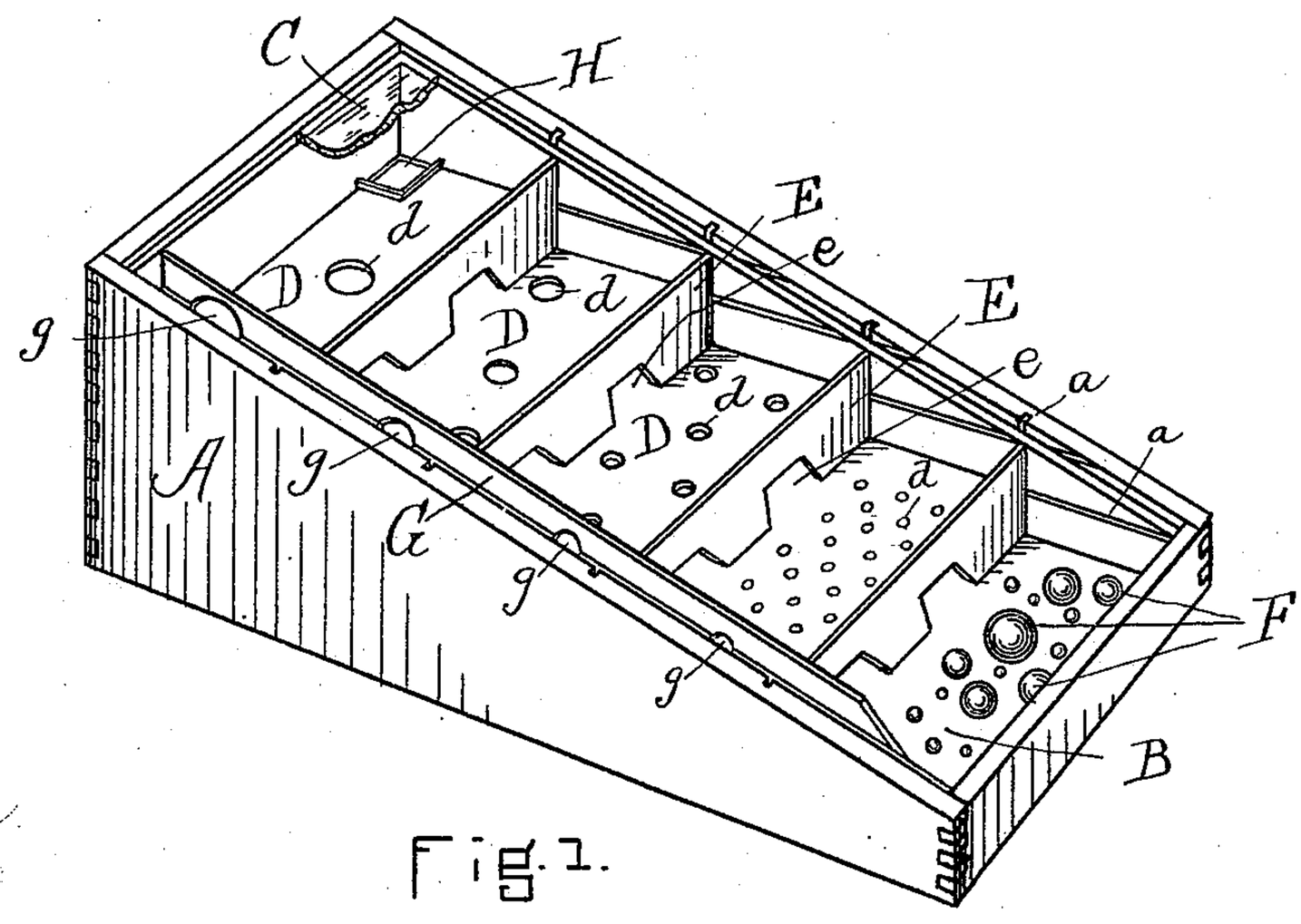

Fig. 1.

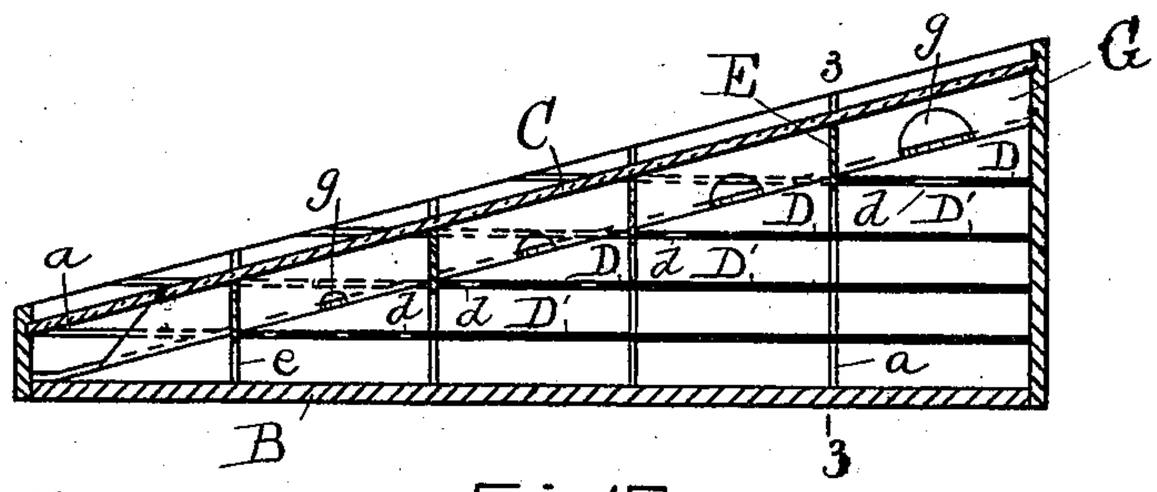

Fig. 2.

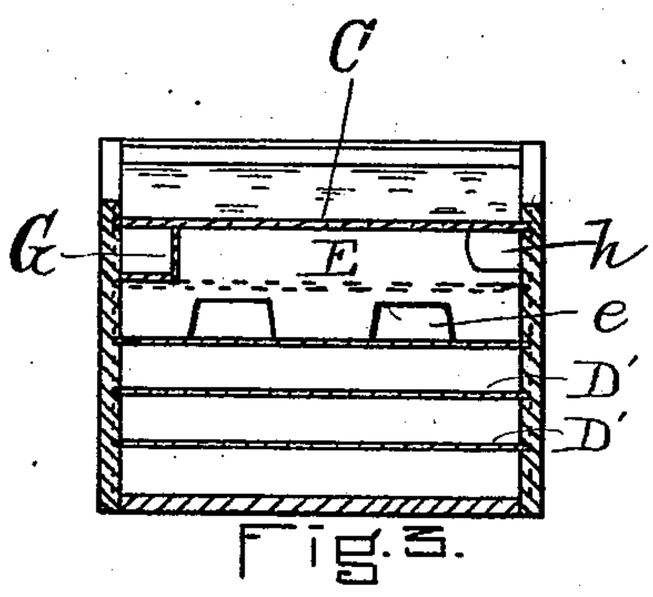

Fig. 3.

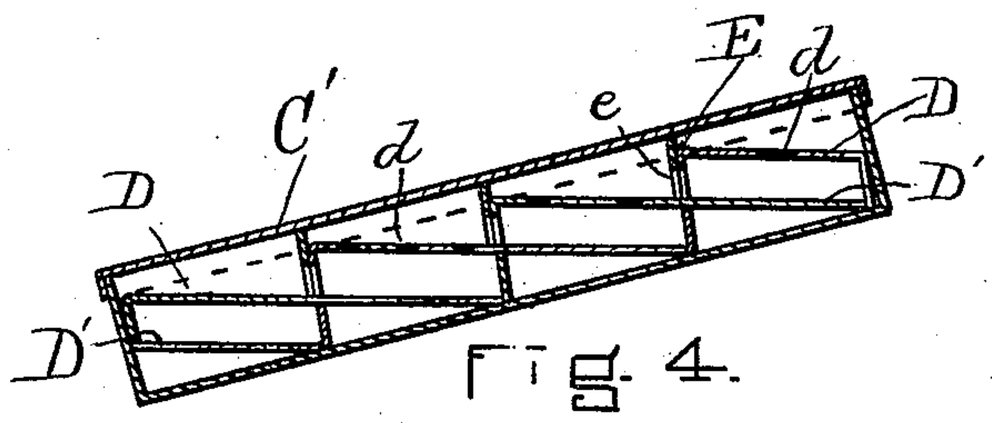

Fig. 4.

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PUZZLE APPARATUS.

No. 547,771. Patented Oct. 15, 1895.

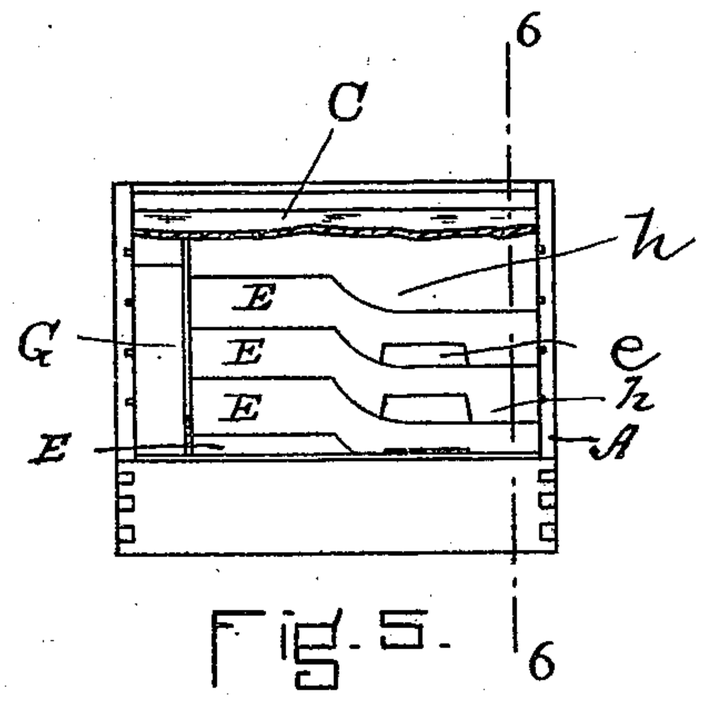

Fig. 5.

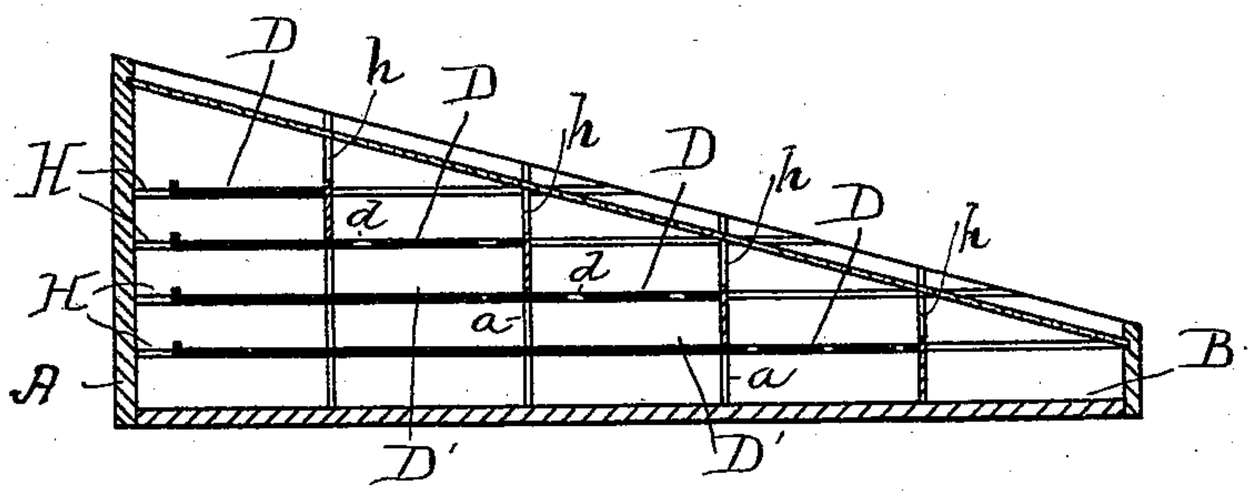

Fig. 6.

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UNITED STATES PATENT OFFICE.

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PUZZLE APPARATUS.

SPECIFICATION forming part of Letters Patent No. 547,771, dated October 15, 1895.

Application filed April 23, 1895. Serial No. 546,847. (No model.)

To all whom it may concern:

Be it known that I, HENRY C. CROSS, of Somerville, in the county of Middlesex and State of Massachusetts, have invented certain new and useful Improvements in Puzzle Apparatus, of which the following, taken in connection with the accompanying drawings, is a specification.

The essential peculiarities of my puzzle are embodied in a box or inclosure subdivided by transverse vertical partitions and by horizontal perforated shelves or steps so as to form a series of compartments each successively lower than the preceding one, like the steps of a stairway, said partitions, however, extending above and below each perforated step to form the front of one compartment and the back of the next lower one. Each perforated step has immediately beneath it an unperforated shelf integral with the next lower step. An inclined glass top or other transparent cover closes the several compartments. The perforations are successively of less diameter and preferably more in number from the upper step downwardly, and a series of shot or like spheres of correspondingly different sizes are introduced into the higher compartment, whence they descend gradually through the perforations until only one size remains in each—viz., the size which is just too large to pass through the hole, but remains seated in it. Openings are formed through the lower portion of the vertical partitions for the free passage forward of the spheres which have dropped through the perforations and upon the unperforated rear portion of the next lower shelf or step. A chute or inclined way is provided, serving as a passage for all the balls together from the floor or lowest level to the highest chamber, and lateral openings from this passage may admit them to the other chambers, if desired. These openings and passage may serve also as outlets for the return of all the balls to the lower level when the game is done; but I prefer to form a special channel for this purpose, either vertically in one corner of the upper compartment and down through all the shelves or by cutting away the upper corner of each partition next to the glass, so that when the device is partly inverted all the balls may have a free passage either way along the corner of the box where the glass meets the side wall.

My game-box will preferably be made of thin wood or heavy strawboard with its vertical walls grooved internally to receive the bottom, the horizontal cardboard shelves or steps and vertical partitions, and the glass top. The walls may be dovetailed at corners for strength and economy, and as the shell is preferably about wedge-shaped, a box of double height may be made up rectangularly and then divided obliquely by a saw-cut into two tapering boxes ready for the shelves, partitions, and glass. This method of manufacture forms part of my invention. These tapering boxes not only economize material in construction and space and weight in storage and transportation, but the light is admitted as freely to the lower compartments as to the upper one. Furthermore, by bringing the oblique faces together in shipment, the glass fronts are protected against breakage even in the mails. The horizontal shelves may extend rearwardly from each perforated step to the end wall of the box, or only so far as beneath the perforated part of the next higher step, where an upright transverse barrier is erected.

The game is simple, but by no means easy to accomplish without practice. There are as many balls inclosed as there are perforations in the several steps, and the object is, after getting all the balls into the highest compartment, to so manipulate the box as to seat all the balls in their proper perforation. To do this requires that the smaller ones drop through the holes before the larger ones become seated, and in unseating one which had become located prematurely others would also be displaced. Thus considerable dexterity is required, because while the operator is "coaxing" some of the balls into place others will escape from him and drop through the outlet-passage, whence they have to be patiently worked upwardly again. As a modification I may make the unperforated shelves, the perforated steps, and the upright connecting-walls of the compartments of continuous strips of cardboard or the like, folded at right angles and laterally slitted half-way across on lines intermediate between such

folds, so as to interlock and form a succession of chambers meeting each other cornerwise, with independent transverse partitions rising at the front of each step. These cardboard parts may be placed in a shallow rectangular box, all standing obliquely therein, the lower corners of the chambers resting on the bottom of the box and the cover touching the upper edge of each partition. Even these partitions may be omitted and a transparent cover caused to rest on the outer corners of the successive steps. These modified forms of my game-box would, in use, be held obliquely, so as to bring the shelves and steps into horizontal position.

In the drawings, Figure 1 is a perspective view of my game apparatus; Fig. 2, a longitudinal central section, and Fig. 3 a transverse section, on line 3 3 of Fig. 2. Fig. 4 is a modification, seen in longitudinal section. Fig. 5 is an end view of my apparatus, showing the several partitions cut away at the upper corner to form a passage for the balls. Fig. 6 is a vertical section on line 6 6 of Fig. 5.

Referring first to the embodiment of my invention shown in Figs. 1, 2, and 3, A represents the wedge-shaped box, having a flat bottom B, vertical sides and ends, and an inclined glass top C. The inner faces of the side walls have horizontal parallel grooves to receive a series of shelves D′ and steps D, which increase in length from the highest to the lowest one, so that they project one beyond another like a pair of stairs. Transverse vertical partitions E are erected, extending above and below each step at its front edge to subdivide the box into compartments; and an aperture *e* is formed through each partition at its lower edge, where it meets the shelf or step next below it. The several steps D have perforations *d*, increasing in number and decreasing in diameter from the top downwardly, and a series of shot or like spherical balls F, corresponding thereto in size and number, being placed in the uppermost compartment may drop through the perforations onto the unperforated shelf D′ below. One size only will remain in each compartment, being slightly larger than the perforations in the step D, and becoming seated therein. Those which drop through roll forward on shelf D′ through the apertures *e* in the partitions and descend through the perforations of the next step or lodge therein. If the larger ones become seated, filling all the holes, before the smaller ones have escaped they must be dislodged to release the others. A quantity of small shot is used, which will go through all the perforations to the floor and lowest compartment, which is the common rendezvous of all before the game begins.

I provide a chute or inclined way G to conveniently convey all the balls to the highest level in beginning the play. This way is shown running along one side of the box and having a lateral opening *g* into each compartment. The uppermost opening is large, to quickly admit all the balls, but the others are preferably small enough to exclude the balls belonging in a higher compartment. These openings may serve also to discharge the balls into the inclined way and thence to the lowest level when the game is ended. Two other outlets are, however, shown, one being a hole H in the corner of the upper step and through each of the shelves beneath it, with a slightly-raised flange, if desired, to guard it, (see Fig. 1,) and the other, (shown in Fig, 3,) which I deem preferable, is an aperture *h* in the upper corner of each partition, next to the glass top C. By tipping the box suitably the balls will readily run, by these outlets, to the bottom B. Where one form of outlet is provided, the other will not be required. Each shelf D′ is integral with the step D, which is on the same level with it; but the shelves need not be extended rearwardly beyond the step next higher if a raised flange or partition is erected at that point. The grooves shown in Figs. 2 and 3 are not essential, as the parts may be otherwise held in place.

The simplest form of my device is shown in Fig. 4, where a rectangular paper box with removable cover incloses the shelves, steps, and connecting parts, formed of bent strips interlocked and placed in the box, ledges being raised on or partitions attached to the front of each step. The cover C′ would be removed in playing the game and used to transfer the shot from the lowest to the highest compartment. It is obvious that the inclined way G may be employed in this form also, if desired, in which case the cover may be permanent. The box may be of wood and grooved obliquely to receive the shelves and steps.

I claim as my invention—

1. In a game apparatus, an inclosing box adapted to contain balls of different sizes, in combination with a succession of perforated steps and of unperforated shelves beneath such steps, each in a lower plane than the preceding one, and a series of upright partitions in front of said steps with an aperture through each at its lower edge, substantially as and for the purpose set forth.

2. In a game apparatus, an inclosing box provided with a transparent cover, and internally subdivided into compartments forming a descending series, the bottoms of such compartments having perforations successively increasing in number and decreasing in size from the top downwardly, and an assortment of balls similarly varying in number and size inclosed in said box, substantially as set forth.

3. In a game apparatus, an inclosing box provided with a transparent cover, a series of horizontal, unperforated shelves and perforated steps integral with said shelves, arranged in a descending order, and a series of vertical partitions in front of and extending above and below said steps, with an aperture

through each partition as described, in combination with an inclined way leading from the lowest level to the highest step, and with an assortment of balls adapted to traverse said way and to descend through or become seated in the perforations of the steps, substantially as set forth.

4. In a game apparatus, a tapering box internally grooved, a series of plain horizontal shelves, dissimilarly perforated steps, and apertured vertical partitions, supported by said grooves, and an inclined glass top, in combination with a series of balls varying in size as stated, an inclined way up which said balls may pass together from the lowest part of the box to the highest step, and with an outlet from each step to such lowest part, substantially as and for the purpose set forth.

In testimony whereof I have signed my name to this specification, in the presence of two subscribing witnesses, on this 8th day of April, A. D. 1895.

HENRY C. CROSS.

Witnesses:
HENRY W. FOLSOM,
A. H. SPENCER.