

(No Model.)

2 Sheets—Sheet 1.

F. HOWARD.
PUZZLE.

No. 402,017.

Patented Apr. 23, 1889.

Fig. 1.

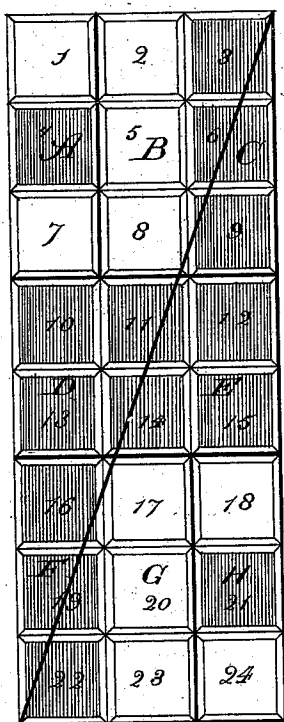


Fig. 2.

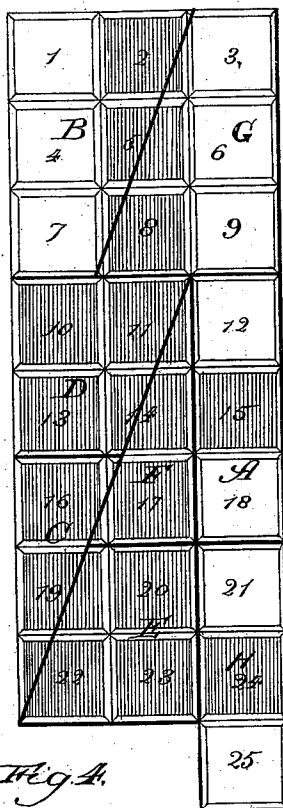


Fig. 3.

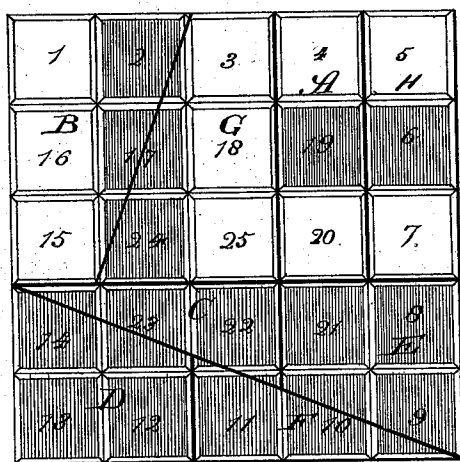
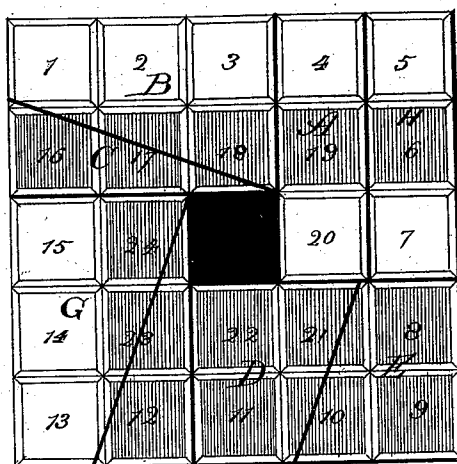


Fig. 4.



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(No Model.)

2 Sheets—Sheet 2.

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Fig. 5.

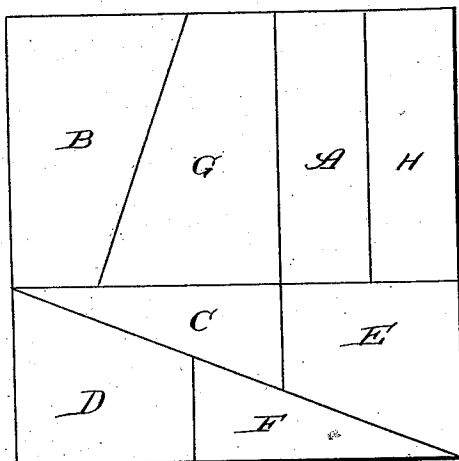
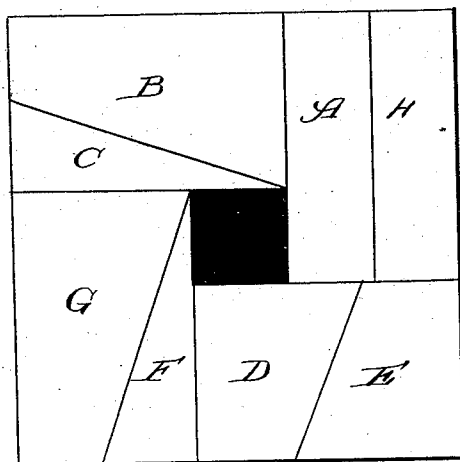


Fig. 6.



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UNITED STATES PATENT OFFICE.

FRED HOWARD, OF HYDE PARK, ILLINOIS.

PUZZLE.

SPECIFICATION forming part of Letters Patent No. 402,017, dated April 23, 1889.

Application filed May 25, 1888. Serial No. 275,675. (No model.)

To all whom it may concern:

Be it known that I, FRED HOWARD, a citizen of the United States, residing at Hyde Park, Illinois, have invented certain new and useful Improvements in Puzzles, of which the following is a specification.

The object of my invention is to construct a puzzle consisting of a number of blocks of certain shapes which arranged in one way will produce a certain number of apparently equal portions or sections, and which arranged in another way will produce a greater number of apparently equal portions or sections of the same apparent shape and size as the less number of sections, and by the different arrangement of the same blocks to produce a solid square and a hollow square of the same apparent external dimensions; and my invention consists in the features and details of construction hereinafter described and claimed.

In the drawings, Figure 1 represents a plan view of eight blocks of certain shapes, of which four are in size and shape the duplicates of the other four; and Figs. 2, 3, 4, 5, and 6 are plan views of the same blocks as shown in Fig. 1, but differently arranged or put together, except that in Figs. 5 and 6 the blocks are represented as plain instead of being marked off into sections, as in the other figures.

In the drawings, the eight blocks are distinguishable from each other by the heavy dark lines and are lettered, respectively, A, B, C, D, E, F, G, and H, while the equal portions or sections are numbered from 1 to 25, inclusive.

In making my improved puzzle, I cut out four blocks of the shape of A, B, C, and D, and then cut out four other blocks, E, F, G, and H, which are apparently duplicates of the ones first cut. These eight blocks may be made of wood, card-board, or other material, and may be painted or colored in whole or in part as fancy or taste may dictate. In the first four figures of the drawings I have represented them as marked off into portions or sections of apparently equal size, and in the last two figures I have shown them as plain. The size of these blocks may also be varied at pleasure, though their relative proportions

should be so maintained as that they will form a square when arranged, for instance, as in Fig. 3 of the drawings. I will now describe one way in which I am able to cut these blocks. I take, for instance, a square, as that shown in Fig. 5 of the drawings. I then cut it on a line parallel with two of its sides at about three-fifths of its length measuring from one side; thus dividing it into two right parallelograms, one containing about three-fifths and the other about two-fifths of its superficial area. I then take the larger portion and cut off from its end two right parallelograms, as A H, each equal in width to about one-fifth of the longer side of such larger portion. This leaves of such larger portion a part apparently square having each of its sides about equal in length to three-fifths of the length of the side of the original square. I then bisect this remaining part on a line beginning at a point about one-third of the length of one of its sides measuring in one direction and running diagonally across and terminating at a point about two-thirds of its length measuring in the same direction, thus dividing this smaller square into two apparently equal trapezoids, represented as B G. Taking now the smaller portion of the original square, I bisect it on a line extending diagonally from one corner to the opposite corner, thus dividing it into two triangles. I then cut each of these triangles on a line parallel to the shorter base, cutting its hypotenuse and longer base at points about two-fifths of their length measuring from their shorter base, thus dividing these triangles into two trapezoids, as D and E, and into two smaller triangles, as C and F. The size of the square which may thus be divided is immaterial so long as it is divided as above described and the proportions named are substantially maintained. By arranging these eight blocks in various ways I am able to secure a number of curious and surprising results, causing an increase or decrease of the number of apparently equal portions or sections into which the whole surface or area of the blocks may be divided.

In the first figure I have shown the blocks arranged with A, B, and C fitted together and side by side and placed at the top; D and E fitted together and with their upper ends

against the lower ends of A, B, and C; and F, G, and H, which are the apparent duplicates of A, B, and C, fitted together and with their upper ends against the lower ends of D and E. This makes a figure with twenty-four apparently equal portions or sections, which I have numbered from 1 to 24 inclusive, arranged in three rows of eight each and with fourteen colored or shaded squares. I then take the same blocks and arrange them as shown in Fig. 2. In this case B and G are fitted together and placed at the top, D, F, and A are fitted together with their upper ends against the lower ends of B and G; but in arranging the blocks D, F, and A the lower left corner is left unfilled. I then take C and fit it into the lower left corner just mentioned, which leaves two-thirds of its length extending. I then place E against the bottom of F and the extended side of C and slip H into place against the bottom of A and the side of E, which, however, leaves one-third of its length extending below the bottom of E. This makes a figure of twenty-five apparently equal portions or sections instead of twenty-four, as produced by the arrangement of the blocks in Fig. 1 and with fifteen colored or shaded sections.

In Fig. 3 I begin at the upper left corner and arrange B, G, A, and H so that they fit together. I then place C with its point at the lower left corner of B and fit it against the lower ends of B and G. I then arrange E in place, fitting it against the lower ends of A and H. I then put in F with its point at the lower right corner of E and fit in D to complete the square. This makes a square composed of twenty-five apparently equal portions or sections arranged in five rows of five sections each and with fifteen of the sections colored or shaded.

In Fig. 4 I place B at the upper left corner with its slanting side down and fit C against it with its slanting side up. I then fit A and H against the end of B with their upper ends even with the upper side of B, which causes them to extend one-third their length below the lower side of B and C. I then fit D and E together and arrange them lengthwise at the lower right corner with two of their sections on a line with the outer edge of H and with their upper edges against the lower ends of A and H, which causes them to extend one-third their length beyond the inner side of A. I then fit F and G together and place them in the lower left corner with their inner side and upper end against the inner end and lower side of D and C, respectively. This forms a square of the same apparent external size as that shown in Fig. 3; but it contains only twenty-four equal portions or sections instead of twenty-five, and but fourteen colored or shaded ones. The central or twenty-fifth portion or section has disappeared entirely and taken its number with it.

In Figs. 5 and 6 I have represented the same shaped blocks as plain and undivided

into portions or sections. I arrange them precisely as described in reference to Figs. 3 and 4, and exhibit, respectively, a solid square and a hollow square formed of the same blocks and with the same apparent external measurements. In these cases the puzzle consists in forming a solid square and a hollow square out of the same blocks and without any apparent enlargement or diminution of the outer sides and without increasing or diminishing the amount of material used.

I have described the use of eight blocks, of which four are the apparent duplicates of the other four; but it is obvious that these blocks could be multiplied by further subdivision as long as they formed when put together blocks of the shape I have shown and described. For instance, the block A could be divided into, say, three parts to correspond to the sections marked on it, but when put together they would form a block of the shape of A and perform the same office in the aggregate arrangement of the blocks. I do not, therefore, confine myself to the use of eight blocks, and in increasing or diminishing the number of portions or spaces it is obvious that all those spaces which are uncut or undivided play no part and may be dispensed with. In this way the puzzle does not depend for its success upon the use of twenty-four portions or spaces, but may be exhibited with a much less number. In like manner, by marking a greater number of portions or spaces on the blocks or using a greater number of blocks more than twenty-four and twenty-five spaces may be employed in the exhibition of the puzzle.

In the claims I shall speak of the parts which compose my invention without reference to the various subdivisions into which these various parts may themselves be divided, as above explained. I do this merely as a matter of convenience, and therefore desire it understood that when I speak of a "parallelogram," for instance, in the claims I mean to cover such form, whether made of one integral piece or of several pieces, which, when put together, form a figure of that shape.

I claim—

1. In a game or puzzle, the combination of a number of blocks having the form of parallelograms, trapezoids, and triangles, and substantially of the numbers and proportions described in the specification, whereby, when arranged in one way, they produce a figure of a certain superficial area, and when arranged in another way a figure of an apparently different superficial area, substantially as described.

2. In a game or puzzle, a square divided into parallelograms, trapezoids, and triangles by dividing the whole square into two rectangular portions or parallelograms, one containing about two and the other three fifths of its superficial area, dividing the larger portion of the original square on lines parallel to

its end at about one-fifth and two-fifths of its
length, and dividing the remaining part of
the larger portion diagonally on a line from
a point on one side about one-third to a point
5 on the opposite side about two-thirds of the
length of its side, dividing the smaller portion
of the original square into two triangles, and
dividing these triangles on a line parallel to
their shorter base at a point on their longer
10 base about two-fifths of their length, measur-
ing from the shorter base, whereby the parts

may be rearranged to form a hollow square of
the same apparent dimensions as the original
solid square, a right parallelogram, or a right
parallelogram of the same apparent dimen- 15
sions, with a small square projecting at one
corner, substantially as described.

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