

Oct. 23, 1923.

M. S. CHAMBERS

1,471,943

PUZZLE

Filed Jan. 3, 1923

2 Sheets-Sheet 1

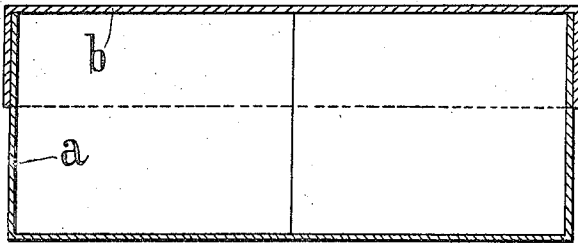


Fig. 1.

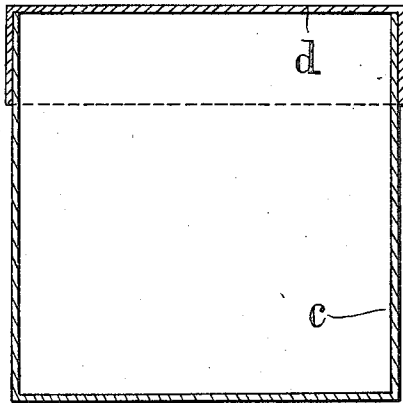


Fig. 3.

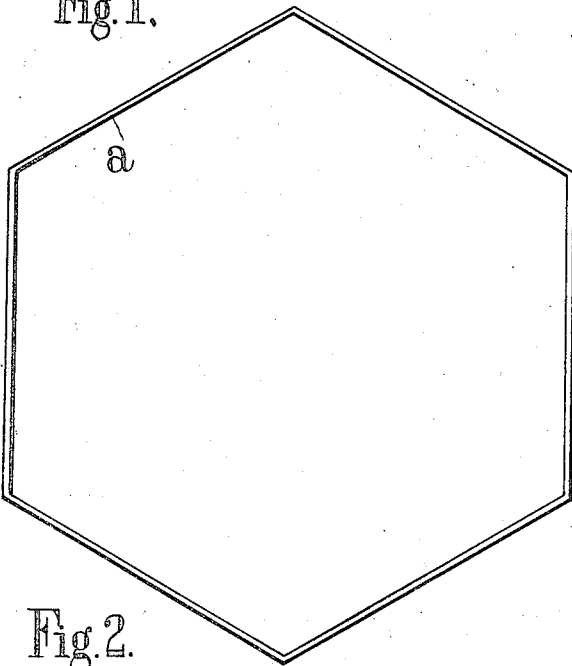


Fig. 2.

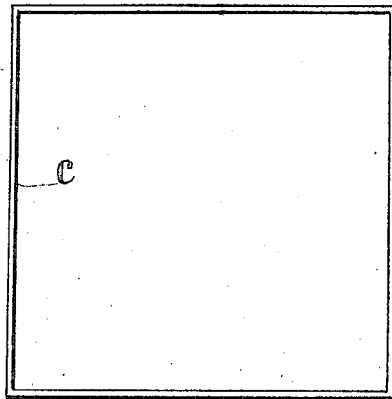


Fig. 4.

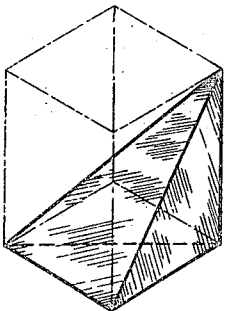


Fig. 5.

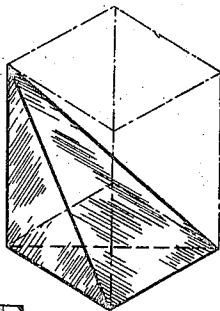


Fig. 6.

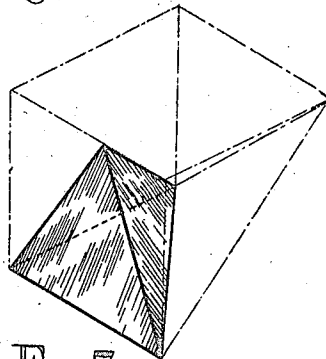


Fig. 7. Inventor:  
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By *Merker Clark*  
Attys.

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2 Sheets-Sheet 2

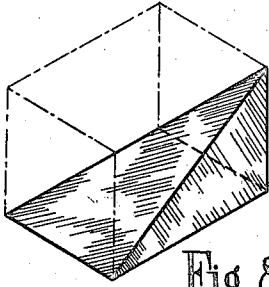


Fig. 8.

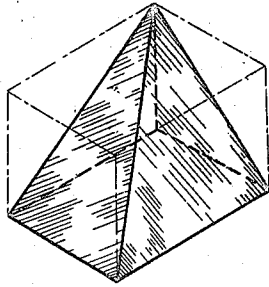


Fig. 9.

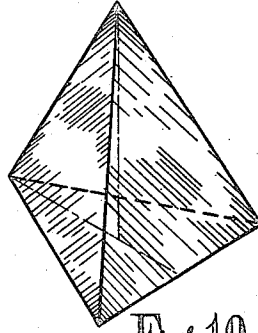


Fig. 10.

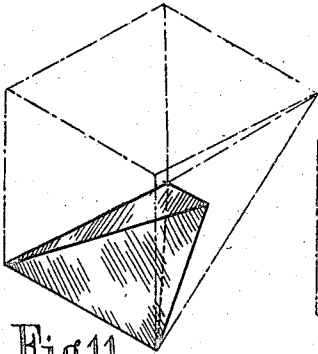


Fig. 11.

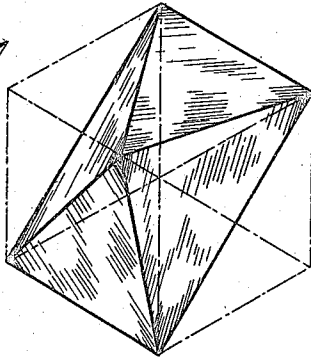


Fig. 12.

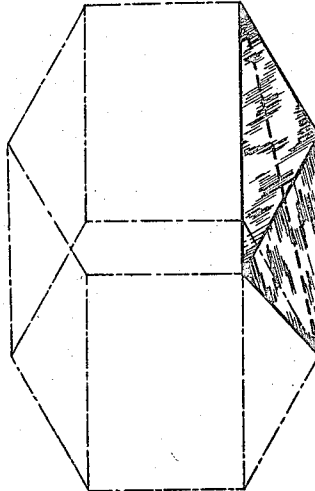


Fig. 13.

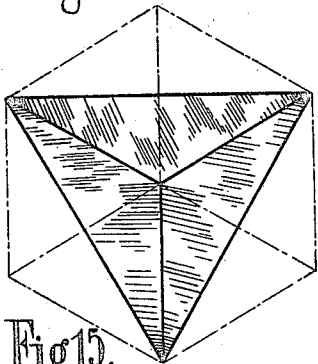


Fig. 15.

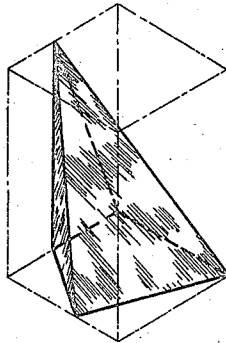


Fig. 16.

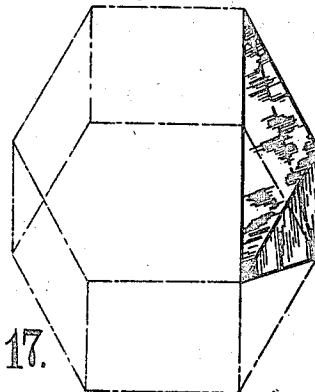


Fig. 17.

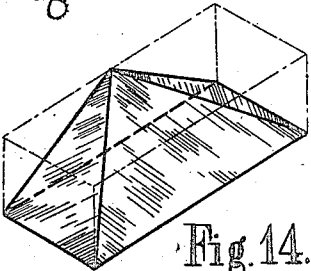


Fig. 14.

Inventor:  
M. S. Chambers  
& Markes Check  
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## UNITED STATES PATENT OFFICE.

MARCUS STANLEY CHAMBERS, OF LONDON, ENGLAND.

## PUZZLE.

Application filed January 3, 1923. Serial No. 610,495.

*To all whom it may concern:*

Be it known that I, MARCUS STANLEY CHAMBERS, a subject of the King of Great Britain and Ireland, and residing at 6 Walton Place, London, S. W. 3, England, have invented a certain new and useful Puzzle, of which the following is a specification.

This invention relates to puzzles involving the building up of a definite form or forms from a number of unitary elements and is based on my discovery that all geometrical forms may be built up from a combination of rectangular based and triangular based units which are the complement of one another and which in the following description I will distinguish from one another by reference respectively to the terms "pyramid" and "tetrahedron" or "pyramidal" and "tetrahedral," it being understood that these terms have their ordinary signification with the exception that the terms "pyramid" and "pyramidal" are limited to a rectangular based figure.

The invention consists in a puzzle comprising in combination a plurality of units of tetrahedral and pyramidal form adapted to be fitted together in order to fill entirely a prescribed geometrical space.

The invention also consists in other details and arrangements hereinafter described or indicated.

In carrying my invention into effect in one of its simple forms I provide a box in the form of a cube and a second box of equal capacity but of hexagonal form in plan and in conjunction with such boxes I provide a plurality of units or elements in the form of pyramids and tetrahedra or sub-multiples or truncated parts of pyramids and tetrahedra and if these are suitably chosen as to size and number it will be found that they are capable of being fitted exactly into the cube or into the hexagonal casing thus creating a transmutation of form.

The accompanying drawings illustrate one form of puzzle constructed in accordance with the invention.

Figure 1 is a sectional elevation of a hexagonal box *a* of a certain capacity.

Figure 2 is a plan with the cover *b* removed while,

Figure 3 and 4 are similar views of a cubic box *c* with lid or cover *d*, it being under-

stood that the capacities of these two boxes are equal.

Figures 5 to 17 inclusive illustrate isometrically units or elements drawn to the same scale as the boxes or casings shown in Figures 1 to 4 and of such units or elements I construct 74 which when properly fitted together may be made to fit exactly either into the hexagonal box *a* or into the cubic box *c*.

Figure 5 illustrates an element of irregular tetrahedral form of which six are provided.

Figure 6 illustrates a further tetrahedral form similar to but oppositely disposed to that shown in Figure 5 of which six are provided.

Figure 7 shows a further tetrahedral element of which four are employed.

Figure 8 shows a form of pyramid of which two are employed.

Figure 9 shows a further form of pyramid of which two are provided.

Figure 10 shows a form of tetrahedron, one of which is employed in my puzzle.

Figure 11 shows a further form of irregular tetrahedron constituting sub-multiples of a square based pyramid, of which eight are required, each of which forms one-eighth of a square based pyramid.

Figure 12 shows a form of rectangular based pyramid of which four are employed.

Figure 13 shows a tetrahedron of which six are required.

Figure 14 shows a semi-rectangular based pyramid of which six are used.

Figure 15 shows a regular tetrahedron of which there are fourteen in the puzzle.

Figure 16 shows a truncated tetrahedron of which three are used, and

Figure 17 shows a unit of tetrahedral form of which twelve are used.

To assist in determining the exact shapes of the individual units composing the puzzle, in Figs. 5 to 9 and 11 to 16, there is indicated in dot and dash lines, the regular geometric figures from which the puzzle units are cut.

There are thus illustrated isometrically a series of units or elements to the same scale as the boxes or casings shown in Figures 1 to 4 and such units or elements are seventy-four in number, the result being that if these seventy-four pieces or units are constructed in the manner shown and described

and to the same relative dimensions as the dimensions of the boxes or casings shown in the drawings such seventy-four elements may be made to fit exactly either into the 5 hexagonal box *a* or into the cube *c*, and it is the object of the puzzle to provide amusement and instruction in the proper working out of the grouping of the units or elements to enable such exact fitting to be accom- 10 plished in each case.

It will be understood, however, that since the invention is based upon the discovery that all known and hitherto unknown or unnamed geometrical forms may be built up 15 from a combination of triangular based members (tetrahedra) and square-based members (pyramids) the invention is capable of very considerable extension and modification without departing from its 20 spirit and scope.

Furthermore, cardboard, metal, or other material may be chosen for the formation of the boxes or containers and also for the construction of either hollow or solid units 25 or elements depending upon the purpose for

which these are to be employed or any practical requirements that may have to be fulfilled.

Having now described my invention, what I claim as new and desire to secure by Let- 30 ters Patent is:—

1. A puzzle comprising in combination a plurality of boxes of different geometrical forms but of the same capacity, and a pre- 35 determined number of units of tetrahedral and pyramidal form capable, when fitted together, of entirely filling any one of said boxes.

2. A puzzle comprising in combination a plurality of boxes of different geometrical 40 forms but of the same capacity, and a predetermined number of tetrahedral and pyramidal units and sub-multiples of certain of said units, the whole of said units being 45 capable of being fitted together in order entirely to fill any one of said boxes.

In testimony whereof I have signed my name to this specification.

MARCUS STANLEY CHAMBERS.