No. 728,249. PATENTED MAY 19, 1903.

B. G. LAMME.

PUZZLE.

APPLICATION FILED JUNE 26, 1901.

NO MODEL.

Fig. 1.

19	48	5	58	3	64	21	42
45	18	59	8	61	2	43	24
60	7	46	17	44	23	62	1
6	57	20	47	22	41	4	63
51	16	37	26	35	32	53	10
13	50	27	40	29	34	11	56
28	39	14	49	12	55	30	33
38	25	52	15	54	9	36	31

Fig. 2.

142	1	44	103	46	97	140	7	94	49	92	55
4	143	102	41	100	47	6	137	52	95	54	89
101	42	3	144	5	138	99	48	53	90	51	96
43	104	141	2	139	8	45	98	91	56	93	50
110	33	12	135	14	129	108	39	62	81	60	87
36	111	134	9	132	15	38	105	84	63	86	57
133	10	35	112	37	106	131	16	85	58	83	64
11	136	109	34	107	40	13	130	59	88	61	82
126	17	28	119	30	113	124	23	78	65	76	71
20	127	118	25	116	31	22	121	68	79	70	73
117	26	19	128	21	122	115	32	69	74	67	80
27	120	125	18	123	24	29	114	75	72	77	60

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No. 728,249. Patented May 19, 1903.

UNITED STATES PATENT OFFICE.

BENJAMIN G. LAMME, OF PITTSBURG, PENNSYLVANIA.

PUZZLE.

SPECIFICATION forming part of Letters Patent No. 728,249, dated May 19, 1903.

Application filed June 26, 1901. Serial No. 66,147. (No model.)

To all whom it may concern:

Be it known that I, BENJAMIN G. LAMME, a citizen of the United States, residing at Pittsburg, in the county of Allegheny and State of Pennsylvania, have invented a new and useful Improvement in Games or Puzzles, of which the following is a specification.

My invention relates to games or puzzles; and it has for its object to provide an arithmetical game or puzzle the essential physical elements of which are simple and inexpensive and which are susceptible of manipulation to bring them into a considerable number of different relative arrangements, but being susceptible of one special arrangement which affords a solution of the game or puzzle, and in which certain peculiar and remarkable arithmetical combinations are presented.

In Figure 1 of the accompanying drawings I have illustrated in plan view one embodiment of my invention, and in Fig. 2 a similar view of a modification.

The elements of my invention are blocks which severally have four unlike numbers on at least one face and which may be of any material and any thickness and surface dimensions, the blocks being all of the same form and dimensions, and therefore susceptible of many relative arrangements to form an invariable geometrical figure, but being susceptible of only one arrangement which constitutes a solution of the game or puzzle. In Fig. 1 I have shown sixteen blocks, each of which is divided by two lines perpendicular to each other into four equal squares, the whole number of small squares being therefore sixty-four, each of which is provided with a different number, the numbers being from "1" to "64," inclusive, and none being used more than once. The numbers on each block are such that their sum equals one hundred and thirty, and they are so arranged that there is a difference of one between two of the diagonally-disposed numbers and a difference of three between the other two diagonally-disposed numbers on each block. The entire number of blocks when arranged in the form of a square may be designated as the "primary" square, and this is composed of four secondary squares, each of which contains four blocks. When thus arranged in a complete square, there are eight horizontal and eight vertical lines of eight numbers each and two full diagonals of eight numbers each. The partial diagonals on each side of the main diagonals obviously vary from seven numbers to one, and each two diagonals on opposite sides of the main or full diagonals, which together comprise eight numbers, may be designated as "complementary" diagonals. The problem for solution with this combination of blocks having the face numbers thereon, as above described, is to so arrange the sixteen blocks as to present certain peculiar arithmetical combinations and results as follows: When the blocks are properly arranged, the sum of each four numbers in a horizontal line on any two adjacent blocks is one hundred and thirty, and consequently the sum of the numbers in each horizontal line across the primary square amounts to two hundred and sixty. The sum of the four numbers in each vertical line on any two adjacent blocks is one hundred and thirty and therefore, the sum of the numbers in each vertical line of the primary square is two hundred and sixty. The sum of the four numbers on each block is one hundred and thirty and also the sum of each four numbers constituting a square, whether these numbers be on one, two, or four different blocks, is one hundred and thirty. For example:

$$19+48+45+18=130$$
$$48+\ 5+18+59=130$$
$$45+18+60+\ 7=130$$
$$18+59+\ 7+46=130$$

The sum of the numbers in each of the main diagonals of the primary square is two hundred and sixty and the sum of the numbers in each two complementary diagonals is also two hundred and sixty. Considering now the secondary squares which severally comprise four blocks, we find that the sum of the numbers in each of the two main diagonals is one hundred and thirty and the sum of the four numbers in any two complementary diagonals is one hundred and thirty. These conditions are true with reference to each of the four secondary squares. The sum of the alternate numbers in each full diagonal and in each two complementary diagonals of each secondary square is sixty-five—*i. e.*, one-half

the sum of all the numbers in each full diagonal, each two complementary diagonals, each four numbers constituting a square, each vertical line of four numbers, and each horizontal line of four numbers.

In Fig. 2 I have shown a primary square composed of thirty-six blocks, each of which is divided into four squares, the same as the blocks shown in Fig. 1, the entire set of numbers on the primary square being from one to one hundred and forty-four, inclusive. The combination and arrangement of numbers are the same as in the square shown in Fig. 1 and already described, except that the sum of the numbers on each block is two hundred and ninety and the sum of each four numbers forming a square, whether on the same block, on two blocks, or on four blocks, is two hundred and ninety. Also the sum of each horizontal line of numbers on any two adjacent blocks is two hundred and ninety and the sum of each vertical line of four numbers on any two adjacent blocks is two hundred and ninety. In this form there are nine secondary squares of four blocks each, and the sum of the numbers in each main diagonal, as well as in each two complementary diagonals in each of these secondary squares, is two hundred and ninety. The sum of the numbers in each diagonal of the primary square and in each two complementary diagonals of the primary square is eight hundred and seventy—*i. e.*, three times the corresponding sums on the secondary squares. In this embodiment of my invention the sum of alternate numbers in each full diagonal and in each two complementary diagonals of each secondary square is one hundred and forty-five—*i. e.*, one-half the sum of each combination of numbers above described as pertaining to the secondary squares.

In each embodiment of my invention the difference between two of the diagonally-disposed numbers on each block is equal to the lowest number of the entire set, and the difference between the other two diagonals on each block is equal to three times the lowest number of the entire set.

While I have shown the invention as embodied in one set of sixteen blocks and in one of thirty-six blocks, it will be understood that the invention is susceptible of further variation as regards the number of blocks and also as regards the numerals employed, and it is therefore my intention to cover and include the employment of any number of blocks susceptible of arrangement into squares in the same general manner as that specifically disclosed, it being understood that there will be four numbers on each block, that no number will be used twice, and that a proper arrangement of the blocks will insure such relative location of their numbers as will provide the combinations set forth in the claims.

Instead of employing a set of numbers that are consecutive from the lowest to the highest the several numbers in the set may be the products which result from multiplying consecutive numbers by any constant, in which case the constant obtained by adding together certain horizontal, vertical, and diagonal lines of numbers and certain numbers constituting squares will equal the product secured by multiplying the sums hereinbefore given by the constant used as a multiplier of the consecutive numbers. For example, if the numbers shown in Fig. 1 are all multiplied by five the sum of each line of four numbers on adjacent blocks and of each four numbers forming a square will be six hundred and fifty—*i. e.*, five times one hundred and thirty. In general it will be observed that the constant which is employed as a multiplier of the consecutive numbers appears as a factor in the results secured by combining the products in the manner hereinbefore set forth.

I have illustrated blocks having square faces and have designated certain combinations of individual blocks and certain combinations of the surface numbers as constituting "squares" without any intention of necessarily limiting the shape of either the individual blocks, the primary and secondary combinations of such blocks, or the arrangement of the surface numbers to what would be signified by a strict geometrical use of the term "square." It will be understood that the faces of the blocks may have any one of a large number of different shapes and that the numbers may have quadrangular arrangements on the block-faces which would afford the results hereinbefore set forth, or at least some of them, even though the figures thus outlined by the numbers were neither squares nor rectangles. The terms "vertical" and "horizontal" are also not used in a strict geometrical sense, since an arrangement of the numbers on the faces of the blocks so that they may be arranged in approximately straight lines that intersect each other otherwise than at right angles is within the scope of my invention.

Whatever may be the shape of the individual blocks it is obvious that the numbers may be so disposed thereon that when the blocks are assembled the numbers will form two sets of parallel lins which intersect each other, and the sum of each four numbers in alinement on adjacent blocks in each of such sets is a constant. If the numbers are not uniformly disposed in squares, there will of course be no straight-line diagonals the sum of the numbers of which will have the characteristics hereinbefore set forth.

I claim as my invention—

1. A plurality of blocks each of which has four numbers in its respective corners and all of said blocks being adapted to form a square on which the sum of each four numbers constituting a square is constant.

2. A plurality of blocks which are respectively provided with four numbers in their corners and which collectively have unlike

numbers, said blocks being adapted to form a square on which the sum of each four numbers constituting a square is constant.

3. A plurality of blocks which are respectively provided with four numbers in their corners and which collectively have unlike numbers, said blocks being adapted to form a square on which the sum of each four numbers constituting a square is equal to the sum of each vertical line of four numbers on any two adjacent blocks.

4. A plurality of blocks which are respectively provided with four numbers in their corners and which collectively have unlike numbers, said blocks being adapted to form a square on which the sum of each four numbers constituting a square is equal to the sum of each horizontal line of four numbers on any two adjacent blocks.

5. A plurality of blocks which are respectively provided with four numbers in their corners and which collectively have unlike numbers, said blocks being adapted to form a square on which the sum of each horizontal line of four numbers on any two adjacent blocks is equal to the sum of each vertical line of four numbers on any two adjacent blocks and is also equal to the sum of any four numbers constituting a square, whether on one, two or four blocks.

6. A plurality of blocks which are respectively provided with four numbers in their corners and which collectively have unlike numbers, said blocks being adapted to form a square on which the sum of each full diagonal line of numbers is equal to the sum of each two complementary diagonal lines of numbers.

7. A plurality of blocks which are respectively provided with four numbers in their corners and which collectively have unlike numbers, said blocks being adapted to form a primary square consisting of a plurality of secondary squares the sum of the numbers in each full diagonal line of each of which is equal to the sum of the numbers in each two complementary diagonal lines.

8. A plurality of blocks which are respectively provided with numbers in their corners and which collectively have unlike numbers, said blocks being adapted to form a primary square composed of a plurality of secondary squares upon which the numbers are so arranged that the sum of each full diagonal line of numbers is equal to the sum of each two complementary diagonal lines; to the sum of each horizontal line of four numbers and to the sum of each vertical line of four numbers and to the sum of each four numbers constituting a square on any part of the primary square.

9. A plurality of blocks which are respectively provided with four numbers in their corners and which collectively have unlike numbers, said blocks being adapted to form a primary square comprising a plurality of secondary squares of four blocks each, in which the sum of the alternate numbers in each full diagonal and in each two complementary diagonals is equal to one-half the sum of each horizontal line of four numbers and to one-half the sum of each vertical line of four numbers on each of said secondary squares and to one-half of the sum of any four numbers constituting a square anywhere on the primary square.

10. A plurality of blocks which are respectively provided with four numbers in their corners and which are collectively provided with consecutive numbers, the difference between two of the diagonally-disposed numbers on each block being one and the difference between the other two diagonally-disposed numbers on each block being three.

11. A plurality of blocks which are respectively provided with four numbers in their corners and which are collectively provided with unlike numbers so selected and arranged that the difference between two of the diagonally-disposed numbers on the several blocks is a constant for the entire set and the difference between the other two diagonally-disposed numbers on the several blocks is a different constant for the entire set.

12. A plurality of blocks which are respectively provided with numbers in their corners and which collectively have consecutive numbers, said blocks being adapted to form a square composed of a plurality of secondary squares of four blocks each upon which the numbers are so arranged that a constant quantity results from adding each of the following sets: each full diagonal, each two complementary diagonals, each vertical line, each horizontal line and each four numbers constituting a square.

13. A plurality of blocks which are respectively provided with four numbers in their corners and which are collectively provided with unlike numbers so selected and arranged that the difference between two of the diagonally-disposed numbers on the several blocks is equal to the lowest number of the entire set and the difference between the other two diagonally-disposed numbers on the several blocks is equal to three times the lowest number of the entire set.

14. A set of blocks which are severally provided with four symmetrically-disposed numbers, which collectively have unlike numbers and which are adapted to form a geometrical figure on which the sum of each four numbers forming a quadrangle is constant.

15. A set of blocks which are severally provided with four symmetrically-disposed numbers, which collectively have unlike numbers and which are adapted to form a geometrical figure comprising a plurality of secondary figures of four blocks each, the sum of each four numbers in alinement on each of the secondary figures being constant.

16. A set of blocks which are severally provided with four symmetrically-disposed numbers, which collectively have unlike numbers

and which are adapted to form a geometrical figure on which the sum of each four numbers in alinement, and not diagonal, on adjacent blocks equals the sum of each four numbers constituting a quadrangle.

17. A set of blocks which are severally provided with four symmetrically-disposed numbers, which collectively have unlike numbers and which are adapted to form a geometrical figure comprising a plurality of secondary figures of four blocks each, the sum of each four numbers in alinement on each of the secondary figures being equal to the sum of each four numbers constituting a quadrangle on any part of the primary square.

18. A set of blocks bearing a series of unlike numbers, each of said blocks having four numbers arranged in the form of a square and all the blocks of the set being adapted to form a primary geometrical figure comprising a plurality of secondary figures of four blocks each on which the sum of alternate numbers in each full diagonal and in each two complementary diagonals is equal to one-half the sum of each horizontal and each vertical line of four numbers and also to one-half the sum of four numbers constituting a square anywhere on the primary figure.

In testimony whereof I have hereunto subscribed my name this 25th day of June, 1901.

BENJ. G. LAMME.

Witnesses:

JAMES B. YOUNG,

WESLEY G. CARR.