

(No Model.)

S. McCLEARY.

COMBINATION NUMERICAL INSTRUCTION PUZZLE.

No. 284,037

Patented Aug. 28, 1883.

Fig. 1

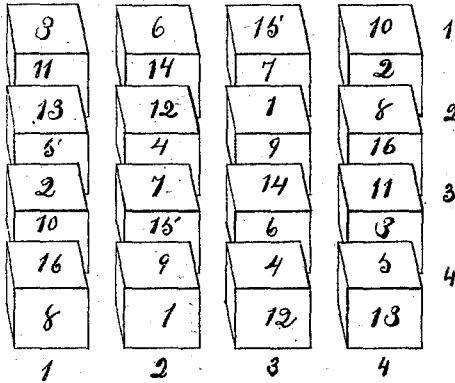


Fig. 2

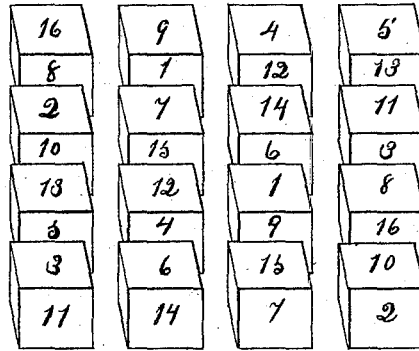


Fig. 3

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

Witnesses:

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UNITED STATES PATENT OFFICE.

SAMUEL McCLEARY, OF WATERVLIET CENTRE, NEW YORK.

COMBINATION NUMERICAL INSTRUCTION PUZZLE.

SPECIFICATION forming part of Letters Patent No. 284,037, dated August 28, 1883.

Application filed April 21, 1883. (No model.)

To all whom it may concern:

Be it known that I, SAMUEL McCLEARY, a citizen of the United States, of Watervliet Centre, in the county of Albany and State of New York, have invented certain new and useful Improvements in Combination Numerical Instruction Puzzles; and I do hereby declare that the following is a full, clear, and exact description of the invention, that will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, and to the letters of reference marked thereon, which form a part of this specification.

Similar letters refer to similar parts in the several figures therein.

My invention relates to combination numerical instruction puzzles; and it consists in marking blocks of wood or other material with different numbers in such a manner that they may be grouped together in squares, and in such a position that the numbers on the horizontal, perpendicular, and two diagonal rows of blocks in a square will, when added together, amount to the same sum, and so that the relative position of the respective blocks may be easily and quickly changed to produce different arrangements, and every possible arrangement of the blocks giving the same numerical results in the same square.

The objects of my invention are, first, to easily and quickly change the relative position of numbered blocks when grouped in the form of a square to show many or all the combinations possible to produce a given numerical result; second, to provide amusement and instruction to the old and young.

Figure 1 represents in perspective sixteen cubical blocks numbered from one to sixteen, inclusive, on four of their six faces. Fig. 2 represents in perspective the same blocks reversed or turned over, so as to show the marked faces not shown in Fig. 1. Fig. 3 is a plan view of sixty-four blocks numbered, as shown, from one to sixty-four, inclusive.

It will be seen from Fig. 1 that the sixteen blocks form a square having four perpendicular, four horizontal, and two diagonal rows of blocks, having four blocks in each row, the horizontal and perpendicular rows being numbered 1 2 3 4. It is plain that the sum of the

numbers on the top faces of the blocks in each of said ten rows is equal to 34. The blocks are separated from each other by a small space in Figs. 1 and 2 to show their shape and the numbers on their front faces; but in use they may be grouped closely together, in which position it is an easy matter to lift with the thumb and finger one whole row at a time and place it in another position. If row No. 1 is thus moved over alongside of No. 4, we shall find the footings of the numbers on said ten rows remain the same as before—viz., 34. We may then move No. 2 over the other rows and place it alongside of No. 1 with the same result as to the footing of the ten rows, and then No. 3 over alongside of No. 2, and the footings will remain the same. The horizontal may be transferred relatively to each other in precisely the same way as the perpendicular rows. It is obvious, therefore, that there are sixteen different arrangements of the blocks, in each of which the footings of the numbers on the upper faces of said ten rows will equal 34. The blocks are also numbered from 1 to 16, inclusive, on three other faces, and in such a manner that the sum of the numbers on the four faces of each block will equal said sum of 34. We will now suppose the blocks in Fig. 1 to be turned over upon their rear faces, so that the front will become the top faces. We shall then have a seventeenth arrangement of the blocks with the same footings as before, and by transposing the horizontal and perpendicular rows, as above described, can secure fifteen more. We will now give the blocks another turn, so that the bottom faces in Fig. 1 will become the top faces. The blocks will then be in the position shown in Fig. 2, in which the ten rows foot up as before, and by transposing the rows, as described, we secure sixteen more arrangements of the blocks with same footings.

It should be remarked that the different faces of the blocks have interesting and peculiar phases, which stimulate investigation and afford amusement. For example, in Fig. 2 it will be seen that every square of four blocks foot up just 34. By giving the blocks another turn we bring the fourth face of each block on top, exposing the numbers shown on the front faces of the blocks in Fig. 2, and by transposing the rows, as described, secure sixteen

more different arrangements of the blocks with same results as to footings.

I prefer to make the blocks in the form of small cubes, as they may be much more easily manipulated in this form; but they may be of any desired form, shape, or material. It will be readily seen that with sixteen such cubical blocks numbered on four faces of each block, as shown, any person can easily and quickly produce any or all of the sixty-four different combinations or arrangements described after the blocks have been arranged to form any one of the sixty-four combinations, whereas with blocks numbered only on one side or face, as they have been heretofore constructed, it would be possible to obtain only sixteen different combinations without long study and experiment to obtain the other forty-eight combinations. Any number of blocks obtained by multiplying sixteen by four raised to n power may be arranged in the same manner, so that the perpendicular, horizontal, and two diagonal rows of the square will foot up the same sum. For example, if n equal 1, we shall

have $4 \times 16 = 64$ blocks, as shown in Fig. 3. It will be found upon inspection that the numbers on all the horizontal, perpendicular, and diagonal rows containing eight blocks foot up two hundred and sixty, and that the blocks are in the form of a checker-board, which always has sixty-four squares. To further carry out the resemblance the alternating blocks may be of a different color. The white blocks are marked W and the black blocks B.

To assist in arranging the blocks in the form of a checker-board, and so that the eight horizontal, eight perpendicular, and two diagonal rows of blocks will foot up two hundred and sixty, I have placed on one of the perpendicular and on one of the horizontal margins of each block a row of six numbers, by means of which the blocks can be easily and certainly, without the necessity of experiment, placed in the above-described position in sixty-three different ways, and the sixty-fourth will give the same result, except that the blocks will not come in the form of a checker-board as to color of the blocks, the object of this exception being to incite the young to mental exercise in finding out this combination.

The method of arranging the blocks is as follows: Take any one of the blocks for the lower left-hand corner of the large square—for example, block No. 1 in Fig. 3—then fill out the first horizontal row with the blocks whose numbers appear on the horizontal margin of the block selected, (in this case block No. 1,) and in the order therein given. Only six numbers are

given; but the number of the eighth or last block can be found in every instance by subtracting the sum of the numbers on the seven blocks already placed from 260, the total of each row. The perpendicular row is formed in the same manner, using the perpendicular row of numbers on the corner block. Then, to complete the second perpendicular row, find the sum of the numbers on the initial corner block (No. 1) and the adjoining block on each side. Subtract this sum from 130, (one-half of the sum of each full row,) and the remainder is the number of the block required to complete the lower left-hand square of four blocks. It will be seen that the large square is made up of sixteen small squares of four blocks each, and the fourth block of any small square may be found by subtracting the sum of the numbers on three of the blocks from the number 130, by which rule it is easy to fill out the successive rows with the blocks properly arranged. As any block may be placed in the lower left-hand corner, it is evident that we may in this way obtain as many different arrangements as there are blocks—viz., sixty-four.

In addition to the numbers shown, there may be letters or other marks upon any or all of the blocks to call attention to particular features, or further assist in grouping the blocks, as described.

What I claim as new, and desire to secure by Letters Patent, is—

1. Sixteen or more blocks numbered on four sides in numerical order from one upward by marking such a number not greater than the number of blocks on each of the four sides of each block, that the same number shall not appear more than once on each block, and that the sum of the numbers on the four sides of each block shall be the same, substantially as described, and for the purposes set forth.

2. Sixteen or more blocks numbered by marking with figures in numerical order from one upward on one or more block-faces, and having additional figures or symbols on one or more of said blocks to indicate the relative position to be occupied by the blocks in a square in which the numerical value of different rows of blocks shall be the same, substantially as described, and for the purposes set forth.

In testimony whereof I have hereunto set my hand this 5th day of March, 1883.

SAMUEL McCLEARY.

Witnesses:

C. D. KELLUM,
GEO. A. MOSHER.