Jan. 8, 1924. 1,479,992

H. J. KINNEY

MATHEMATICAL GAME APPARATUS

Filed April 17, 1922 2 Sheets-Sheet 1

Fig. 1.

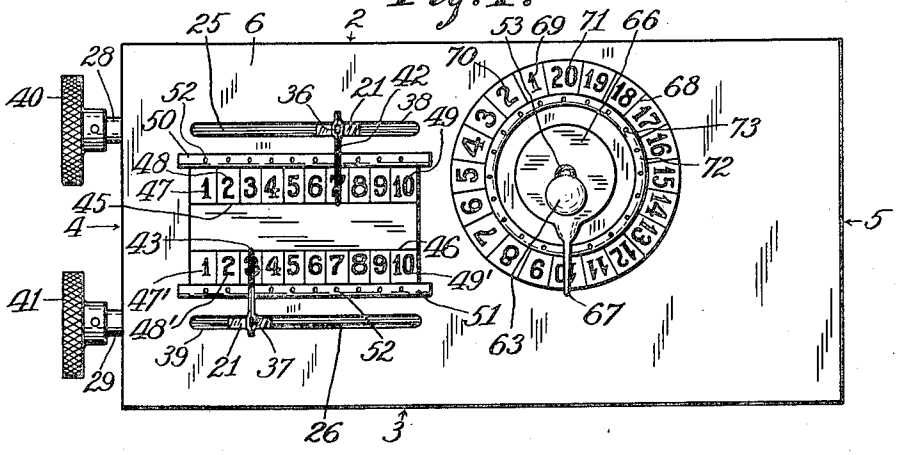


Fig. 2.

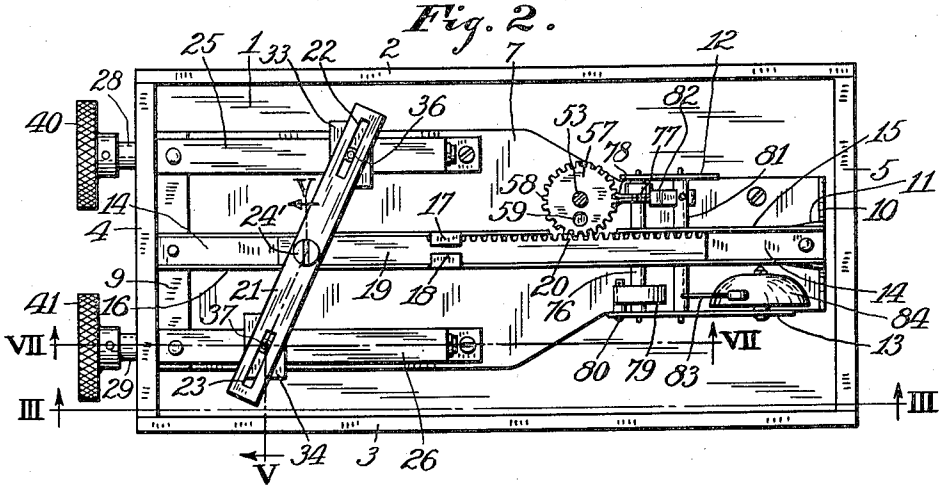
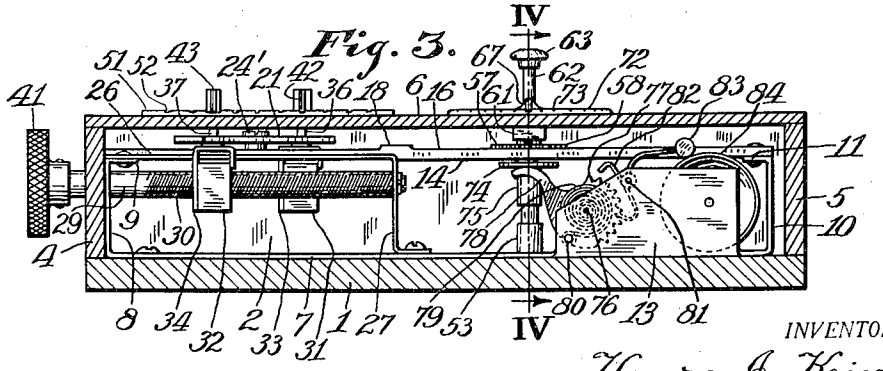


Fig. 3.



INVENTOR:
Henry J. Kinney
BY
E. T. Silvius,
ATTORNEY.

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Fig. 4.

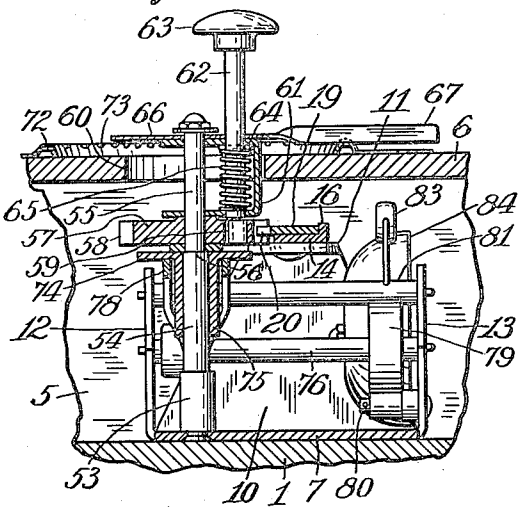


Fig. 5.

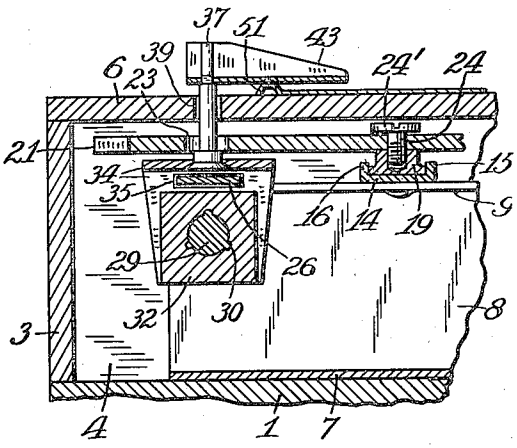


Fig. 6.

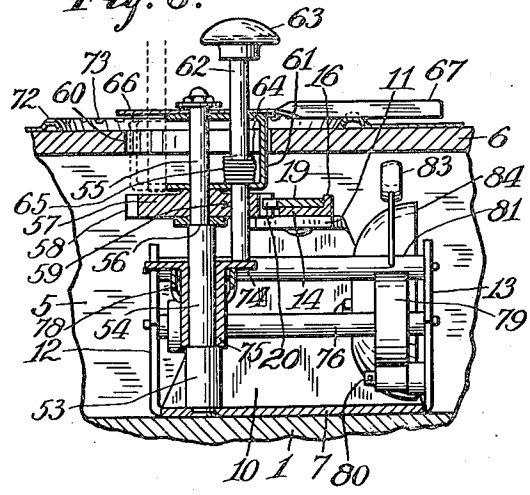


Fig. 7.

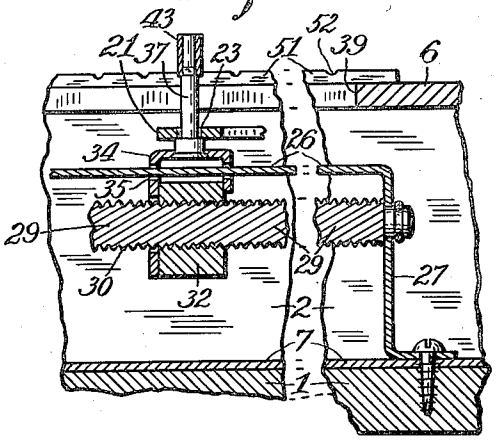
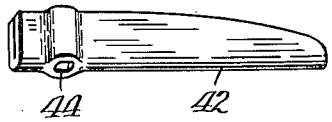


Fig. 8.



INVENTOR:
Henry J. Kinney,
BY
E. D. Silvius,
ATTORNEY.

Patented Jan. 8, 1924. 1,479,992

UNITED STATES PATENT OFFICE.

HENRY J. KINNEY, OF INDIANAPOLIS, INDIANA.

MATHEMATICAL GAME APPARATUS.

Application filed April 17, 1922. Serial No. 553,630.

To all whom it may concern:

Be it known that I, HENRY J. KINNEY, a citizen of the United States, residing at Indianapolis, in the county of Marion and State of Indiana, have invented a new and useful Mathematical Game Apparatus, of which the following is a specification, reference being had to the accompanying drawings, and to the letters and figures of reference marked thereon.

This invention relates to the type of game apparatus which includes mechanism intended to be designedly operated in the attainment of the results sought, and the invention relates more particularly to a mechanism and indicators whereby simple mathematical problems may be worked out in an amusing and instructive manner.

An object of the invention is to provide a new and useful game apparatus which shall be so constructed and operated as to be amusing to children particularly, and to encourage them to learn simple numbers and to add them together.

Another object is to provide a new game apparatus which shall be entertaining in character and also puzzling so as to excite interest in the new game.

A further object is to provide a new game apparatus which shall be educational, not costly to manufacture, which shall be attractive and easily operated and be durable in use.

With the above mentioned and other objects in view, the invention consists in novel mechanism and indicators whereby mental calculations may be indicated and results announced by a signal, and the invention consists also further in the novel parts, and in the combinations and arrangements of parts, as hereinafter particularly described and further defined in the accompanying claims.

Referring to the drawings,—Figure 1 is a top plan of the new game apparatus; Fig. 2 is a top plan of the internal mechanism of the apparatus, the casing of which is uncovered; Fig. 3 is a sectional elevation approximately on the line III—III in Fig. 2; Fig. 4 is a fragmentary sectional elevation on an enlarged scale approximately on the line IV—IV in Fig. 3; Fig. 5 is a fragmentary section approximately on the line V—V in Fig. 2 on an enlarged scale; Fig. 6 is a fragmentary sectional elevation similar to Fig. 4 but having various elements represented as in different positions to those in the other figure; Fig. 7 is a fragmentary section on an enlarged scale approximately on the line VII—VII in Fig. 2; and, Fig. 8 is a perspective view of one of the pointers comprised in the apparatus.

Similar reference characters in the different figures of the drawings indicate corresponding elements or features of construction herein referred to in detail.

The game apparatus as preferably constructed comprises a casing which incloses parts of the apparatus and has other parts thereof on its top as a game board, the casing comprising a bottom or base 1, side walls 2 and 3, end walls 4 and 5, and a top or cover 6, all suitably connected together. A suitable frame is provided and secured within the casing and it preferably comprises a base plate 7 arranged on the bottom 1 and having an upright end plate 8 provided on its top with a top bar 9, the base plate having an opposite end plate 10 provided on its top with a top plate 11; and the plate 7 has also two upright side frame members 12 and 13 thereon. A guide bar 14 is secured to the top bar 9 and the top plate 11 and it has upwardly extending side guides 15 and 16 to which top guide lips 17 and 18 are connected respectively. A rack bar 19 is slidingly guided upon the guide bar 14 and it has gear teeth 20 on one of its side edges in proximity to one end thereof. The rack bar may be variously operated and controlled, but preferably by dual means such as a crosshead 21 having longitudinal slots 22 and 23 adjacent to its opposite ends respectively, the central portion of the crosshead being connected to the rack bar by means of a suitable pivot 24 having a head 24'. Two parallel guide bars 25 and 26 are horizontally arranged at a suitable distance from opposite sides respectively of the guide bar 14 and are secured at one end to the top bar 9, the opposite end of each guide bar being provided with a leg 27 that is secured to the base plate 7. Two operating shafts 28 and 29 are arranged under the guide bars respectively and extend through the end wall 4 of the casing, being rotatably supported in the end plate 8 and the legs 27, each operating shaft having screw threads 30 thereon. Two nuts 31 and 32 are arranged on the operating shafts respectively in connection with the screw threads thereon and are provided with guide boxes 33 and 34 respectively, the boxes be-

ing slidingly guided on the guide bars 25 and 26 respectively, each box preferably having a guideway 35 therein through which the guide bar extends. The guide boxes have studs 36 and 37 fixed thereon respectively that extend upward through the slots 22 and 23 respectively and also through slots 38 and 39 which are provided in the top 6 of the casing so that one end of the crosshead may be moved by one of the operating shafts and the opposite end of the crosshead may be moved by the remaining one of the operating shafts, the operating shafts being provided respectively with suitable hand wheels 40 and 41. The studs have pointers 42 and 43 secured to the upper portions thereof respectively, each pointer having a squared hole 44 receiving the stud, and they point to a numbered scale or indicator having suitable characters or symbols thereon to which the pointer may be moved. Preferably two similar graduated scales or tables 45 and 46 are provided in any suitable manner upon the top 6 between the slots 38 and 39, one having numerals 47, 48, 49 thereon, the other having similar numerals 47′, 48′, 49′.

The numerals on each scale as illustrated are 1 to 10 inclusive arranged in numerical order along the scale. Preferably the top 6 has two ribs 50 and 51 arranged adjacent to the scales respectively and having each a series of ten notches 52 in the top thereof at the respective numerals in the scale, to securely hold the pointers when set, and to permit accurate positioning of the pointers, also so that the crosshead and the rack bar shall be brought to proper positions necessary in the operation of the apparatus.

At a suitable position in proximity to the side member 12 the base plate 7 has a shaft 53 rigidly supported thereon that extends upward in proximity to one side of the guide bar 14, and it has a relatively small portion 54 from which extends a relatively smaller portion 55 at the lower end of which is a shoulder 56, and a disc 57 is rotatively arranged on the portion 55 and supported upon the shoulder, the disc having gear teeth 58 on its periphery that mesh with the gear teeth 20 on the rack bar, there being a gap in the side guide 15 permitting the meshing of the gear teeth. The disc has a socket or hole 59 therein on one side of the axis of rotation of the disc. The top 6 of the casing has an aperture 60 therein through which the shaft portion 55 extends and in which a portion of a yoke 61 is received that is rotatively arranged on the portion 55 of the shaft above the disc. A push-rod 62 is guided for vertical movement in the yoke 61 so as to be entered in the hole 59 when in register therewith, the yoke and the disc being independently rotatable, and the push-rod has a knob 63 on its top for convenient operation thereof. The yoke has a suitable opening therein and the push-rod 62 has a stop pin 64 inserted therein so as to be within the opening, and a coil spring 65 is arranged in the opening and is under compression between the pin 64 and the bottom of the opening to normally force the push-rod upward. A cover plate 66 is suitably fixed to the top of the yoke to constitute a portion thereof and to cover the aperture 60, and it has a pointer 67 fixed thereto that extends across a dial 68 suitably fixed upon the top 6. The dial comprises a suitable number of numerals 69, 70, 71, arranged in a circle, being numbers 1 to 20 inclusive as preferably designed to constitute a mathematical apparatus, although in some cases other characters or symbols may be substituted for the numerals to afford an interesting puzzle. The top 6 has a circular rib 72 thereon that is concentric to the stationary shaft and it has notches 73 in its top arranged at the numbers or characters to permit the pointer 67 to be accurately positioned at the different numbers or characters.

Constructed as above described the apparatus may be quietly operated, but in order to render the game a little more interesting an audible signal preferably is provided, and to this end a collar 74 is movably arranged on the shaft portion 54, being provided with a guide sleeve 75, and a rock-shaft 76 is supported by the frame side members 12 and 13 and has a toothed wheel or segment 77 secured thereto that is provided with a forked arm 78 extending under the collar 74 to be operated on the downward movement of the collar. A spring 79 is wound about the rock-shaft 76 and has its inner end connected thereto, the outer end of the spring being connected to a stud 80 secured to the side member 13 whereby to yieldingly force the arm 78 and the collar 74 upward retractively. A tumbling-shaft 81 is mounted in the frame members 12 and 13 and has a suitable escapement lever 82 fixed thereon to be operated by the segment 77. A hammer 83 is fixed on the tumbling-shaft and extends adjacently to a gong or bell 84 that is mounted on the frame member 13, whereby a signal may be given when the push-rod 62 passes through the hole 59 in the disc and pushes the collar 74 downward, indicating that the problem or puzzle has been successfully solved.

In practical use, the hole 59 in the disc 57 being invisible, the object of the player of the game is to bring the push-rod 62 in alignment with the hole and push it into or through the hole, and when the gong is present in the apparatus to further push the push-rod down to the collar 74 and operate the collar and to sound a signal on the gong or bell. The bringing of the push-rod and the hole into alignment is interestingly facilitated by proper setting of the

pointers respectively at the corresponding characters or symbols on the scale and the dial. When the apparatus contains the dual means for operating and controlling the rack-bar 19, and two pointers and scales are provided as illustrated, either one or both of the shafts 28 and 29 may be rotated to move the pointers 42 and 43 or either of them to any of the numbers desired on the scales. For instance, the pointer 42 may be brought to and set at the number 7, the pointer 43 being brought to and set at the number 3, the sum of 7 and 3 added together being 10. Or the sum of 10 may be attained by other numbers such as 6 and 4, 8 and 2, and so forth. Having decided upon the value of the total of two numbers, as 10, the pointer 67 is brought to and set at the number 10 on the dial 68. Then the push-rod 62 may be depressed into the hole 59 in the disc 57 and may be pushed through the hole to operate the collar 74 whereby the sound signal is operated. Conversely, the pointer 67 may be set at any one of the numbers on the dial, after which either one or both of the shafts 28 and 29 may be rotated to bring the pointers 42 and 43 to a number or numbers on the scale that shall total the number indicated on the dial, after which the push-rod may be successfully operated. When either one or both of the shafts 28 and 29 are operated the cross-head 21 moves the rack bar 19 and it causes rotation of the disc 57. The operation of either one of the shafts 28 and 29 is sufficient for any number from 1 to 10 inclusive but when a greater number or total is desired the remaining shaft must be operated, assuming that each pointer has a range of 10 positions and that the dial has 20 indicating marks, as illustrated for example.

Having thus described the invention, what is claimed as new is,—

1. A game apparatus having a movable push-rod provided with an adjustably supported guide yoke and also a register socket for the push-rod provided with an adjustably supported guide, the yoke and the guide being independently movable to aline the push-rod and the register socket, and gearing connected with the guide of the register socket to move the socket to the push-rod.

2. A game apparatus having an indicator scale and a dial having each a series of characters in graduated arrangement, pointers movable to the characters on the scale and the dial respectively, operating means for the pointers respectively, and signaling means controlled by the pointers and operable only when the pointers are set at corresponding characters on the scale and the dial respectively.

3. A game apparatus having a push-rod provided with an adjustably supported guide yoke and also a register socket for the push-rod provided with an adjustably supported guide, the yoke and the guide being independently rotatable to align the push-rod and the socket, mechanical means for accurately adjusting the guide of the socket having an indicator, and means for manually adjusting the guide yoke having an indicator.

4. A game apparatus having a push-rod provided with an adjustably supported guide yoke and also a register socket for the push-rod provided with an adjustably supported guide, the yoke and the guide being independently movable rotatably to align the push-rod and the socket, the guide yoke of the push-rod having a pointer fixed thereon, a graduated indicator dial with which the pointer co-operates, and gearing connected with the guide of the register socket to move the socket to the push-rod.

5. A game apparatus having a push-rod provided with an adjustably supported guide yoke and also a register socket for the push-rod provided with an adjustably supported guide, the yoke and the guide being rotatable independently of the other to align the push-rod and the socket, gearing connected with the guide of the register socket to move the socket to the push-rod, a stationary gong, and a hammer to strike the gong having operating means to be operated by the push-rod when moved through the register socket.

6. A game apparatus having a supported vertical shaft, a disk and a yoke independently rotatable on the shaft, the disk having a hole therein and also peripheral gear teeth, the yoke having a pointer fixed thereto, an indicator dial extending about the shaft and stationarily supported to which the pointer may be set, a push-rod movably guided in the yoke to be moved into the hole in the disk when the push-rod and the hole are brought into alinement one with another, and gearing having connection with the peripheral gear teeth to rotate the disk.

7. A game apparatus having a supported vertical shaft, a disk and a yoke independently rotatable on the shaft, the disk having a hole on one side of its axis of rotation and having also peripheral gear teeth, the yoke having a pointer fixed thereto, an indicator dial extending about the shaft and stationarily supported on a plane below the pointer, a rack bar horizontally arranged and movably guided and having gear teeth in mesh with the gear teeth on the disk, means for moving the rack bar, and a push-rod movably guided in the yoke on one side of its axis of rotation to be moved into the hole in the disk when the push-rod or the hole are brought into alinement one with another.

8. A mathematical game apparatus in-

cluding a vertically supported shaft, a toothed disk wheel and a yoke independently rotatable on the shaft, the wheel having a hole therein, a dial extending about the shaft and stationarily supported, the dial having indicator numbers thereon numerically arranged in a circle, a pointer fixed to the yoke and extending above the dial, a push-rod vertically guided in the yoke to be depressed to the disk wheel and provided with a retracting spring, the push-rod being movable into the hole in the wheel when aligning therewith, a rack bar horizontally guided in connection with the disk wheel, a graduated scale arranged horizontally and having numerically arranged numbers thereon, a device connected to the rack bar to directly operate the bar and provided with a guided guide box having a stud thereon arranged in proximity to the scale, a pointer secured to the stud and extending above the scale, a nut arranged in the guide box, and an operating shaft rotatably supported and connected with the nut.

9. A mathematical game apparatus comprising a casing having a bottom and side and end walls and also a top, said top having two slots and an aperture therein, a frame secured upon said bottom and having side members and also two end members, a main guide bar supported on the end members of said frame, a rack bar movably arranged on the guide bar and having gear teeth on one edge thereof, two parallel guides secured to said frame and extending below said slots, two guide boxes slidingly arranged on the parallel guides respectively and provided each with a stud extending upward through the adjacent slot in said top, a crosshead centrally pivoted to the rack bar and having slots receiving said studs respectively, two operating shafts rotatably mounted under said parallel guides respectively and having screw threads thereon, the operating shafts extending through one of said end walls and having hand-wheels on the outer ends thereof respectively, two nuts on the screw threads of the operating shafts respectively and connected to the guide boxes respectively, two graduated scales arranged upon said top between said slots, each scale having numbers thereon, two pointers connected to said studs and extending over said scales respectively, a vertical shaft fixed upon said frame and extending through said aperture, a toothed disk wheel and a yoke independently rotatable on said vertical shaft, the wheel being in mesh with the teeth of said rack bar and having a hole on one side of the axis of rotation of the wheel, a push-rod vertically guided in the yoke and spring-pressed towards said wheel, a dial arranged upon said top and extending about the vertical shaft, the dial having indicating numbers thereon arranged in a circle, a cover plate fixed on said yoke and covering said aperture and having a pointer fixed thereon extending over said dial, a gong supported on said frame, a hammer to strike the gong and provided with operating means including a pivotally supported arm, and a collar movable on said vertical shaft to be operated by the push-rod and operating said arm.

In testimony whereof, I affix my signature in presence of two witnesses.

HENRY J. KINNEY.

Witnesses:
E. T. SILVIUS,
ROBERT LIEBRICH,