

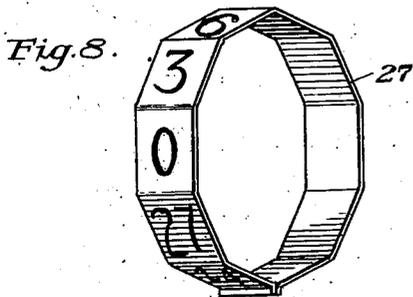
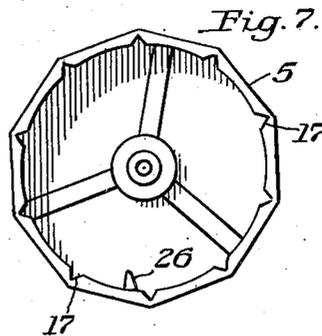
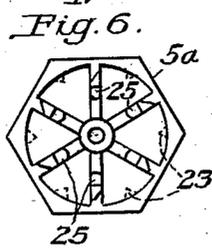
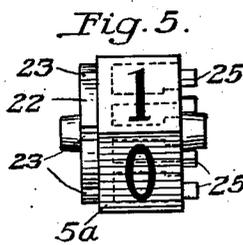
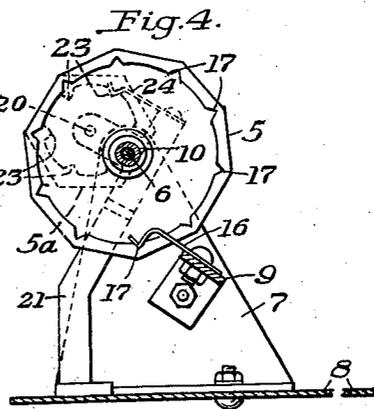
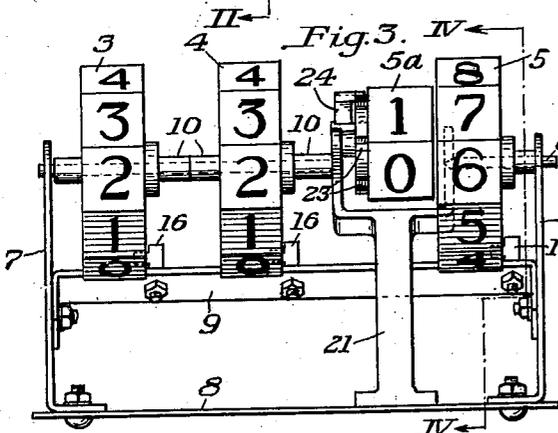
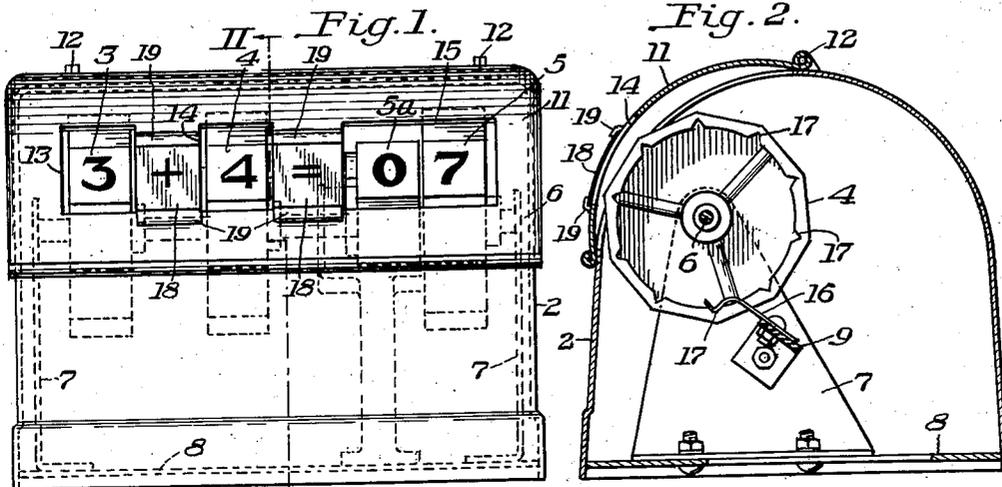
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EDUCATIONAL DEVICE

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UNITED STATES PATENT OFFICE

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EDUCATIONAL DEVICE

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4 Claims. (Cl. 35-77)

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My invention relates to educational devices and toys, and consists in a device which permits a child at play to learn the numerical system and the rudiments of arithmetic.

The device of the invention is characterized by means for displaying arithmetic symbols in juxtaposition with a system of wheels or disks that carry numerals in sequence on their rims. The wheels are selectively rotatable, to establish in conjunction with said symbols various arithmetical problems and their solutions.

The invention will be understood upon reference to the accompanying drawings, in which:

Figure 1 is a view in front elevation of a device embodying in exemplary way the new and useful improvements of the invention;

Figure 2 is a view of the device in cross section, as seen on the vertical plane of section indicated at II-II in Figure 1;

Figure 3 is a view in front elevation of the mechanism which is arranged within the housing of the device;

Figure 4 is a view of the mechanism, partly in elevation and partly in section, as seen on the broken plane IV-IV of Figure 3;

Figure 5 is a view in side elevation of one of the numerical disks of the mechanism;

Figure 6 is a view in end elevation of said disk;

Figure 7 is a view in side elevation of another of the numerical disks of the mechanism; and

Figure 8 is a view in perspective of a numeral-bearing band that may be removably applied to one of the disks of the device.

Referring to the drawings the toy or device of the invention consists in a housing 2 formed of molded plastic material or sheet metal. Within the housing three disks or wheels 3, 4 and 5 are mounted in axial alignment upon a shaft 6. The shaft is trunnioned at its two ends in brackets 7 which are bolted to, and rise from, a base 8 that forms the floor of the housing. As will appear in greater detail in the ensuing specifications, the third disk (5) of the three is actually formed as a multiple disk, in this case including two disk portions, a disk portion to which the reference character 5 is applied, and a disk portion to which the character 5a is applied.

The brackets 7 are laterally reinforced by a metal cross bar 9, and the disks, freely and individually rotatable in their mounting, are held in spaced relation by means of hub portions or spacer sleeves 10.

The front wall of the housing is in part formed as a cover portion 11 which is hinged at points 12 to the main body of the housing, and this

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cover portion is provided with three open windows 13, 14 and 15, through which window portions of the rims of the three disks 3, 4 and 5 are exposed to view. More minutely considered, the rim of each disk carries printed in sequential order upon it the ten numerical digits—0 to 9, and in this case, the rims of the disks are shaped to provide ten flat facets, one for each digit. Each of the windows formed in the cover portion 11 is of such size as to expose to view one of the numeral-bearing facets of the disk associated therewith.

The disks may be rotated individually by applying rotative stress with the finger or thumb upon the rims of the disks exposed within the windows, and so any desired one of the numerals on the rim of each disk may be brought into position of registry with the corresponding window. Means are provided for yieldingly securing each disk with any selected one of its numeral-bearing facets centered or indexed in the associate window, and such means advantageously comprise detents 16 organized one with each disk. The detents are formed as leaf springs of metal, secured at one end to the cross bar 9, and at opposite end fashioned into a V-shaped catch that yieldingly engages one or another of ten equi-spaced notches 17 sunk in the inner peripheral edge of the flanged rim of the associate disk. The detent of each disk is so positioned that, when it engages one or another of the notches in the disk, one or another of the numeral-bearing facets stands in registry with the window through which the disk is correlated. While the detents yield when rotative stress is applied to the disks, they are nevertheless effective temporarily to secure each disk with the selected numeral presented to view in centered or indexed position in the window associated with the disk, and aligned with certain arithmetic symbols, described below.

Between the first and second disks 3 and 4 means are provided for displaying one of the usual arithmetic symbols “+” or “-” or “×,” while between the second and third disks 4 and 5 (5a) an arithmetic equals sign, “=,” is presented. In the present embodiment of the invention the symbol and equals sign are carried by tabs 18 secured at their upper and lower edges beneath cleats 19 on the face of the cover portion 11 of the housing 2. If desired, the equals sign may be permanently imprinted or embossed upon the cover portion 11, but it is preferable that the arithmetic symbol be carried on a device, such as a tab 18, that allows the tab carrying the “+” symbol to be supplanted by one car-

rying either the "-" or the "x" symbol, as will be understood upon consideration of the following description of the utility of the toy.

In using the device, the child may set up various arithmetic problems and their solutions. Assuming the arithmetic problem to be "3+4," the child sets all disks to read zero, and then turns the first disk to show the numeral 3, and turns the second disk to show the numeral 4, as illustrated in Figure 1. Next, he turns the third disk (5) to show the same numeral as is displayed by the first disk, that is, the numeral "3," and then he turns the third disk four steps in numeral-ascending direction. In such manner the numeral "7"—the answer to the problem—is brought into view.

Each step in the rotation of a disk is audibly denoted by a clicking sound of the detent 16 as it snaps into a notch 17, as well as visually indicated by the passage of four numbered facets across the area of the window 15; and this is particularly useful in assisting the child to mentally grasp the significance of the manipulation of the third or so-called answer disk 5.

When a study of arithmetic subtraction is to be made the tab bearing the "+" symbol is supplanted by one bearing the "-" symbol. The number from which subtraction is to be made (say 9) is by rotation of the first disk displayed in the window 13; while the number to be subtracted (say 2) is displayed in the window 14. Thereupon, the third disk is rotated to present the numeral 9 which is displayed by the disk at the left of the "minus" symbol, and then the third disk is rotated in numeral-descending direction through the number of steps indicated by the numeral (2, in the given example) that is displayed in the window 14. Hence, the answer "7" is presented in the window 15.

As noted above, the third disk in reality comprises two disk elements 5 and 5a, and it will be understood that in the addition and subtraction examples given the numerals on the disk portion 5 are adequate. Indeed, the numerals on the disk portion 5 are adequate for any problem in subtraction that can be posed by the disks 3 and 4 which bear numerals ranging from 0 to 9. However, in order to permit all examples in addition to be worked the third or answer disk must have, manifestly, an effective range of from 0 to 18, and it is primarily to this end that the third disk is made in a plurality of disk portions.

As here shown, the disk portion 5a is smaller than the main disk portion 5, and it is formed with six facets numbered from 0 to 5. But the facets of the smaller disk portion 5a are equal in size with those of the main disk portion, and the smaller disk portion is so mounted beside the main disk portion that the facets of both disks which are displayed in the window 15 lie in common plane clearly to show one or another of the particular double-digit numerals of which the two disk portions are capable. The smaller disk portion is essentially mounted for rotation on an axis 20 which is eccentric with respect to the axis 6. The axis 20 is trunnioned in the arms of a Y-shaped standard 21, and on the left of the smaller disk portion a cylindrical shoulder 22 is integrally formed, including notches 23, which in structure and function are the counterparts of the notches 17 of the disks already described. A detent 24, similar to the detents 16, is mounted upon the upper end of one of the arms of standard 21, and cooperates with the notches 23.

Means are provided for rotating the disk portion 5a through one step for each full rotation of the disk portion 5. Such means comprise a plurality of lugs 25 on the disk portion 5a that in the assembly protrude laterally into position within the rim of the disk portion 5, and the rim of the latter disk portion carries a lug 26 that in the rotation of the disk portion makes a sweeping contact with one of the lugs 25 on the disk portion 5a; the lug 25 which is thus contacted being the one which (due to the eccentric relation of the two disk portions) is nearest to the rim of the disk portion 5. The sweeping contact of the lug 26 with a lug 25 occurs only once in each complete rotation of the disk portion 5, and the effect of each contact is to advance the disk portion 5a through one step. Accordingly, the effect of rotating the disk 5 through one or more complete rotations is cumulative. An example will make the utility and operation perfectly clear:

Supposing the problem is to add 8 and 9: All disks are set at zero; then the first disk is turned to show the numeral 8 and the second disk the numeral 9; next the disk portion 5 is turned in numeral-ascending direction from its zero setting until the numeral 8 appears; and then the rotation of the disk portion 5 is continued in the same direction through nine steps. As the disk portion 5 passes from the position in which the numeral 9 thereon shows in the window to the position in which 0 shows, the lug 26 on disk portion 5 engages a lug 25 on disk portion 5a and causes the latter disk portion to advance one step, changing the numeral showing in the window from 0 to 1. The rotation of the disk portion 5 is continued through a total of nine steps, and its numeral 7 thereby moved into position in the window. The numerical combination displayed by the two disk portions is 17—the answer to the problem. And so any addition problem involving a total of from 0 to 18 may be worked.

As a matter of fact, it will be noted that the compound disk 5, 5a is capable of displaying any number from 00 to 59, it being understood that two full rotations of the disk portion 5 will advance the complementary disk portion to show the numeral 2; three rotations of disk portion 5 will result in disk portion 5a displaying the numeral 3; and so it is that any number from 00 to 59 may be displayed by the two disk portions. The use of the toy in problems involving totals of more than 18 and up to 59 of course requires numerals on the disks 3 and 4 of higher value than 9. To this end a band, such as the band 27 of Figure 8, provided with any desired sequence of numerals, may be applied to the rim of either or both of the disks 3 and 4. The band 27 comprises a split ring of resilient material, shaped to conform to the surfaces of the disks. In order to apply a band to a disk, the cover 11 is lifted and the band sprung into place on the rim of a disk. Manifestly, by the use of a plurality of interchangeable number bands, the range of the arithmetic problems which may be worked is very wide.

In order to work multiplication problems, the arithmetic symbol between disks 3 and 4 would by interchanging of tabs 18 be caused to read "x." A band 27 would be provided for each multiplier, and the band for the multiplier to be used would be secured on the rim of the disk portion 5. In Figure 8, the band is shown numbered for the multiplier "3." Thus, when the disk 3 is set to show this multiplier, the disk 4

may be set to indicate any number from 0 to 9, and the disk 5 turned in numeral-ascending direction through the number of steps indicated by the numeral showing on the disk 4. The answer to the multiplication problem posed by the disks 3 and 4 will be presented by disk portion 5. A band 27 may be provided for each multiplier desired, and so the child using the toy may learn elementary multiplication, as well as addition and subtraction.

Within the terms of the appended claims various modifications and reorganizations of the exemplary structure described are held in contemplation.

I claim:

1. In an educational toy having a rotary disk with a laterally extended rim adapted to carry on its face a series of figures, and a detent for releasably securing said disk in any of several positions of rotary adjustment; the invention herein described wherein said detent comprises a leaf spring mounted externally of said disk and having at its distal end a laterally extending finger, the body of said disk including means located radially within the face of said laterally extended rim for cooperation with the finger of said detent.

2. In an educational toy comprising a housing having a window, a disk with a laterally extended rim rotatably mounted in said housing, a series of figures on said rim adapted by rotary adjustment of the disk to be selectively displayed in said window, and a detent for releasably securing said disk in adjusted position; the invention herein described wherein said detent comprises a leaf spring mounted externally of said disk and having at its distal end a laterally extending finger, the body of said disk including means located radially within the face of its laterally extended rim for cooperation with the finger of said detent.

3. In an educational toy comprising a windowed housing having means for displaying in spaced relation an arithmetic symbol and an "equals" sign, three disks rotatably mounted in said housing, with the rim of the first disk presented in a window at the left of said symbol, the rim of the second disk presented in a window between the symbol and the "equals" sign, and the rim of the third disk presented in a window at the right of the "equals" sign, the first and second disks each having a succession of numerals on its rim whereby, by selective disk rotation, numerals may be selectively posed on opposite sides of said symbol to present various arithmetic problems, and the third disk having on its rim a succession of numerals representing the arithmetic answers to said problems and adapted by disk rotation to be selectively registered with said "equals" sign; the invention herein described wherein said third disk comprising a compound disk having two disk portions of unequal diameters arranged side by side with their centers eccentric and their rims positioned substantially flush within the area of said window at the right of the "equals" sign, the two disk portions being severally rotatable to bring into registry with said "equals" sign numerical combinations representing the answers to said problems, a detent for each disk portion comprising a leaf spring mounted externally of said disk and having at its distal end a laterally extending finger, and each disk

portion having means arranged to cooperate severally with said detents, the larger of said disk portions having a laterally extended rim, and said means of the larger disk portion which cooperate with the associated detent comprising a series of notches in the internal face of said extended rim.

4. In an educational toy comprising a windowed housing having means for displaying in spaced relation an arithmetic symbol and an "equals" sign, three disks rotatably mounted in said housing, with the rim of the first disk presented in a window at the left of said symbol, the rim of the second disk presented in a window between the symbol and the "equals" sign, and the rim of the third disk presented in a window at the right of the "equals" sign, the first and second disks each having a succession of numerals on its rim whereby, by selective disk rotation, numerals may be selectively posed on opposite sides of said symbol to present various arithmetic problems, and the third disk having on its rim a succession of numerals representing the arithmetic answers to said problems and adapted by disk rotation to be selectively registered with said "equals" sign; the invention herein described wherein said disks are mounted to be selectively rotated, detent means cooperating with each disk for restraining the disk in selected position of rotation, said detent means comprising a support, leaf springs for said disks severally mounted on said support in spaced-apart relation, a laterally extending finger on each leaf spring, a series of notches on each disk for cooperation with the finger of the associated leaf spring, and each disk having a substantial area of its numeral-bearing rim exposed within the area of the associate window for the fingers of the user to apply rotative stress adequate to overcome the resistance of the detent associated with the disk and effect the turning of the disk from one numeral-displaying position to another.

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