No. 879,145. PATENTED FEB. 18, 1908.

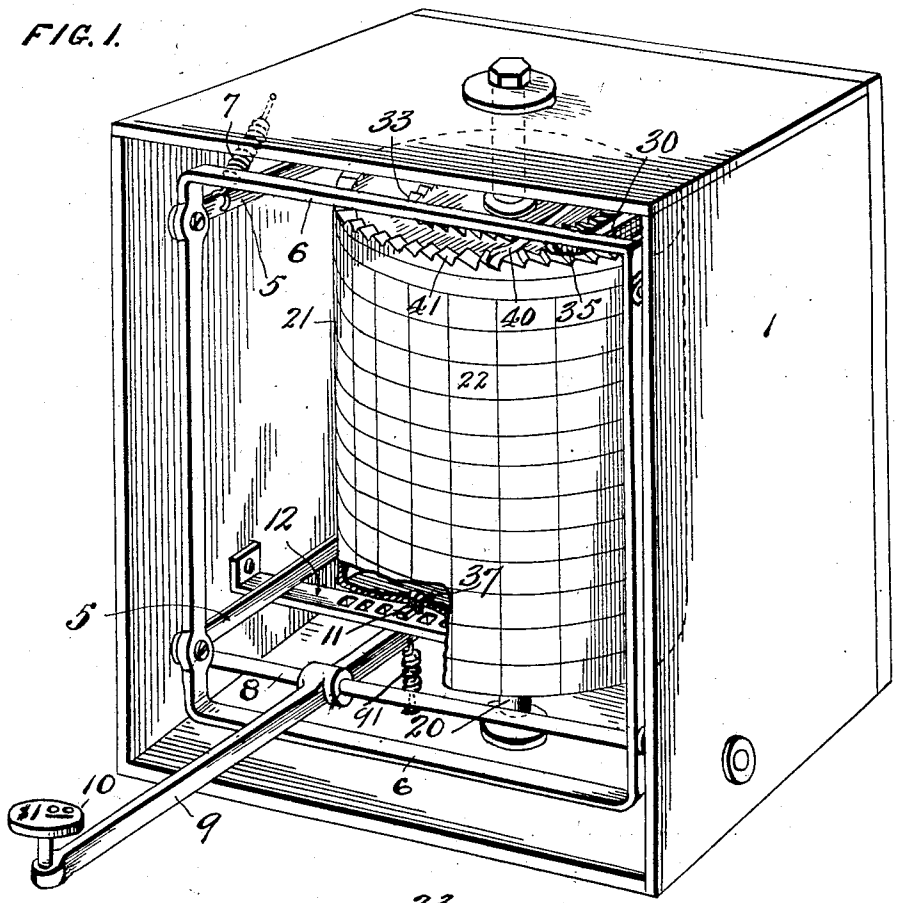
E. E. CLARK.

CALCULATOR.

APPLICATION FILED JULY 13, 1907.

2 SHEETS—SHEET 1.

FIG. 1.



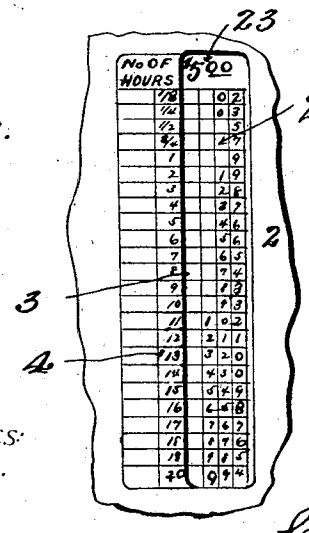


FIG. 2.

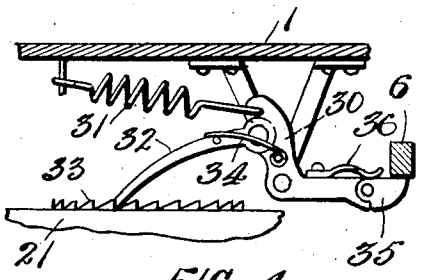


FIG. 4.

WITNESSES:

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2 SHEETS—SHEET 2.

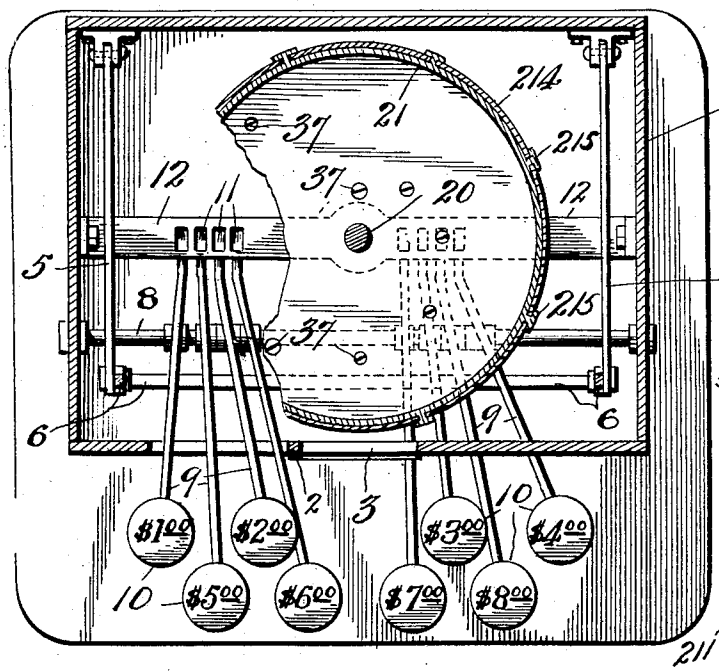

FIG. 3.

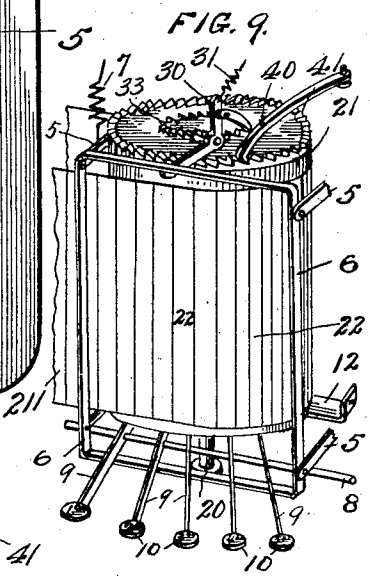

FIG. 9.

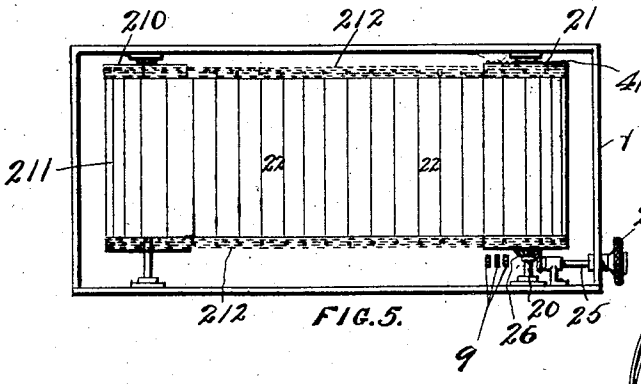

FIG. 5.

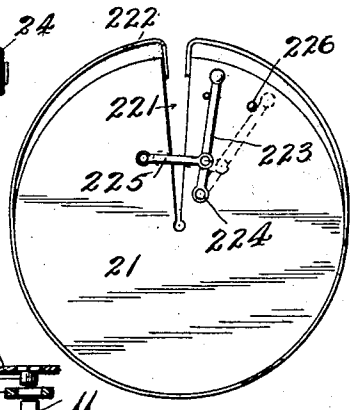

FIG. 7.

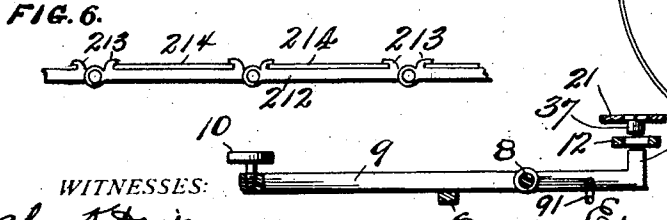

FIG. 6.

FIG. 8.

WITNESSES:

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UNITED STATES PATENT OFFICE.

ERNEST E. CLARK, OF COLORADO SPRINGS, COLORADO.

CALCULATOR.

No. 879,145. Specification of Letters Patent. Patented Feb. 18, 1908.

Application filed July 13, 1907. Serial No. 383,577.

To all whom it may concern:

Be it known that I, ERNEST E. CLARK, a citizen of the United States, and resident of Colorado Springs, El Paso county, State of Colorado, have invented certain new and useful Improvements in Calculators; and my preferred manner of carrying out the invention is set forth in the following full, clear, and exact description, terminating with a claim particularly specifying the novelty.

This invention relates to calculators, more especially of that type in which is employed a key-operated cylinder, although in the simpler forms of my invention the several keys may be dispensed with and a single knob substituted.

The object of the invention is to improve the construction of devices of this character without unnecessary complication of parts or seriously increasing the cost of manufacture.

The invention is exemplified in the following specification and illustrated in the drawings forming a part of this specification and wherein—

Figure 1 is a perspective view of the key-operated form of my invention with the front plate of the casing removed and some of the keys omitted; Fig. 2 is an elevation of the front plate; Fig. 3 is a horizontal section through the cylinder and a plan view of the keys, showing part of the cylinder broken away; Fig. 4 is an enlarged detail of the trigger mechanism employed in Fig. 1; Fig. 5 is a modification on a reduced scale; Fig. 6 is an enlarged plan view of links of the chains which are used in Fig. 5; Fig. 7 is an end view of a further modified manner in which the calculator sheet can be clamped upon the cylinder; Fig. 8 is a detail of one key; Fig. 9 shows how the key principle is applied to the calculator of Fig. 5.

In the various drawings the numeral 1 designates the casing whose front plate 2 has an upright slot 3 adjacent which is marked at 4 the number of hours or other multiplier for use as set forth below. Within the casing on links or other supports 5 is pivotally sustained a frame 6 which may be held normally raised by a spring or springs 7. Across the lower portion of the casing extends the fulcrum rod 8 upon which are pivoted a number of key levers 9 whose bodies extend over the lower bar of the frame 6, whose front ends have removable keys 10, and whose rear ends are held down by springs 91 and have upwardly projecting stops 11. These latter pass through and stand in individual holes in a guide strip 12, so that when any key is struck it depresses the frame 6 and elevates its individual stop 11, and when the key is released the springs 7 and the other spring 91 will return the key to its normal position.

Mounted on an upright shaft 20 within the casing is a drum or cylinder 21 whose face carries a series of columns 22, each having figures coming respectively opposite the multipliers as indicated at 4, and these figures in the columns are the products of such multipliers by the multiplicand 23 which heads the column and is therefore the price per hour. However, I do not limit myself to this use of figures as they can be changed according to the work the calculator is intended to perform. It is obvious that whatever column is brought opposite the slot in the casing, the accumulated wages at so much per hour for so many hours will be instantly indicated, and the mechanical part of my invention consists in the means for rotating the cylinder and stopping it where desired.

A very simple idea of carrying out this mechanical feature would be to mount the cylinder on its shaft and rotate it by a knob on the outer end of the shaft, using a suitable brake as set forth below so as to hold any column in registry with the slot. A slight amplification of this idea is shown in Fig. 5, where the knob 24 is on a horizontal shaft 25 which is geared as at 26 to the upright shaft 20. This idea might be used with a single cylinder as is obvious, but I have used this view to show a second cylinder 210 connected with the first cylinder 21 by a web 211 having on its face the columns 22 though in greater number than a single cylinder could carry. This view also shows in dotted lines sprocket chains 212 at top and bottom which might be employed in place of the web to connect the cylinders, and the links of these chains are better shown in Fig. 6. It will be seen that each carries spurs or flanges 213 into and between which should be slipped cards 214 which on their faces contain the printed columns 22—thus rendering it possible to change the columns at will.

In Fig. 7 the cylinder 21 is slitted radially as at 221 and the sheet 222 containing the columns of figures is removably attached to the cylinder by being passed around it as shown and having its ends entered into the

slit after which they are clamped therein by suitable lever mechanism which closes the slit. As here shown, the lever 223 is pivoted at 224 to the end or head of the cylinder on one side of the slit, and a link 225 connects it with the other side of the slit, so that when the lever is drawn to the dotted position and engaged behind a stop 226 the slit is closed and the sheet clamped therein. This is another means for rendering the figures on the cylinder removable so as to vary the capabilities of the calculator.

In the preferred form of my device shown in the first four views, however, the descent of the frame 6 moves an L-shaped trigger 30 as best seen in Fig. 4 and stores energy in a spring 31, and when the frame slips off the tip of the trigger the contraction of the spring restores the trigger to its initial position and pushes on a pawl 32 which engages teeth 33 on the head of the cylinder, the pawl being kept in engagement with the teeth by a spring 34. The tip 35 of the trigger is pivoted as shown, and a spring 36 holds it normally in position as will be understood in triggers of this character. From the bottom of the cylinder depends a series of studs 37 which are arranged one each in a series of concentric circles which lie over the stops 11 of the various keys, and each stud is so located within its circle that when it engages the stop of its key the column of figures corresponding with that key is exposed through the slot. Thus a depression of any key depresses the frame 6 and through the trigger mechanism permits the spring 31 to rotate the cylinder until the proper stud 37 contacts with the raised stop 11 of the key which is depressed, and the operator finds his products exposed.

In Fig. 9 are shown a few keys such as those numbered 10 in Fig. 3. This is done to indicate that the key arrangement of the last mentioned view might be substituted for the knob arrangement 24 of Fig. 5, in which case the cylinder 21 would be rotated or spun by the contraction of the spring 31 as above described, and this cylinder might be connected by a web 211 with another cylinder 210 in a properly elongated casing. Said two drums might also be connected by the sprocket chains shown in Fig. 6; but in the preferred form of my invention, the cylinder itself has spurs or flanges 215 on its exterior, as shown in Fig. 3, and cards 214 are slipped therein to permit ready change of the figures on the sheet, the keys 10 or 100 being then replaced by other keys having corresponding indications. In effect, any form of such spurs are practically the equivalent of the clamping device shown in Fig. 7, as either construction has flanges which embrace both edges of the card or sheet.

In any form of my invention, I preferably employ an undulating or ratchet-toothed track 41 on the cylinder, engaged by a brake 40 carried by the casing or other fixed support and having its free end properly shaped to engage said track and hold the columns frictionally opposite the opening in the casing.

What is claimed as new is:

1. In a key-operated calculator, the combination with a casing having an upright slot in its front with figures adjacent, a rotary device mounted therein and carrying columns of figures adapted to be exposed singly through said slot, and a brake for checking its rotation with any column opposite the slot; of a series of key levers each having a key and a stop, a frame mounted on swinging supports within the casing and depressed by the depression of any key, a spring actuated trigger depressed and released by the descent of said frame, a pawl on the trigger, ratchet teeth on said rotary device engaged by the pawl whereby said spring rotates or spins said device when the frame disengages the trigger, and a series of studs depending from said device and standing each in one of a series of concentric circles and so located that when it engages its respective key-stop the proper columns of figures will be exposed.

2. In a key operated calculator, the combination with a casing having an upright slot in its front with figures adjacent, a rotary device mounted therein and carrying columns of figures adapted to be exposed singly through said slot, and a brake for checking its rotation with any column opposite the slot; of a series of key levers each having a key and a stop, a guide strip having holes through which the stops are guided, a frame mounted on swinging supports within the casing and depressed by the depression of any key, a spring actuated trigger depressed and released by the descent of said frame, a pawl on the trigger, ratchet teeth on said rotary device engaged by the pawl whereby said spring rotates or spins said device when the frame disengages the trigger, and a series of studs depending from said device and standing each in one of a series of concentric circles and so located that when it engages its respective key stop the proper column of figures will be exposed.

3. In a key operated calculator, the combination with a casing having an upright slot in its front with figures adjacent, a rotary device mounted therein and carrying columns of figures adapted to be exposed singly through said slot, and a brake for checking its rotation with any column opposite the slot; of a series of key levers each having a key and a stop, a frame mounted on swinging supports within the casing and depressed by the depression of any key, a spring actuated trigger depressed and released by the descent of said frame, a pawl on the trigger, ratchet teeth on said rotary device engaged by the pawl whereby said spring rotates or

spins said device when the frame disengages the trigger, other springs for counterbalancing the weight of the frame, and a series of studs depending from said device and standing each in one of a series of concentric circles and so located that when it engages its respective key stop the proper column of figures will be exposed.

4. In a key operated calculator, the combination with a casing having an upright slot in its front with figures adjacent, a cylinder mounted therein and carrying columns of figures adapted to be exposed singly through said slot, and a brake for checking its rotation with any column opposite the slot; of a series of key levers each having a key and a stop, a guide strip having holes through which the stops are guided, a frame mounted on swinging supports within the casing and depressed by the depression of any key, a spring actuated trigger depressed and released by the descent of said frame, a pawl on the trigger, ratchet teeth on said cylinder engaged by the pawl whereby said spring rotates or spins said cylinder when the frame disengages the trigger, other springs for counterbalancing the weight of the frame, and a series of studs depending from said device and standing each in one of a series of concentric circles and so located that when it engages its respective key-stop the proper column of figures will be exposed.

5. In a key-operated calculator, the combination with a casing having an upright slot in its front with figures adjacent, a cylinder mounted therein and having upright pairs of flanges on its exterior, and cards or sheets removably inserted in said pairs of flanges and having columns of figures registering with those on the casing; of a series of key levers having interchangeable keys at their front ends and stops at their rear ends, studs on the cylinder engaging individual stops when raised and arranged to each respectively expose a certain column of figures through said slot, means for rotating the cylinder in one direction, and mechanism whereby said means is actuated by the depression of any key.

6. In a key operated calculator, the combination with a casing having an upright slot in its front with figures adjacent, a cylinder mounted therein and having upright pairs of flanges on its exterior, and cards or sheets removably inserted in said pairs of flanges and having columns of figures registering with those on the casing; of a series of key levers having interchangeable keys at their front ends and stops at their rear ends, studs on the cylinder engaging individual stops when raised and arranged to each respectively expose a certain column of figures through said slot, means for spinning the dru n in one direction by stored energy, and mechanism for first storing and then releasing said energy during the depression of any key.

In testimony whereof I have hereunto subscribed my signature this the 29th day of June, A. D. 1907.

ERNEST E. CLARK.

Witnesses:

HENRY E. NOLTE,

CLAIRE B. JEFFERS.